

Excellence in Research & Innovation

COOPERATION OPPORTUNITIES BETWEEN EUROPE AND SINGAPORE



“ Singaporean institutions have already many collaborations with European research institutes and universities however, there are still opportunities for Singapore to foster closer collaborations on a European level like the participation in the EC Framework Programme. Last year, we observed a first example in this direction, when Singapore signed an agreement with the European Molecular Biology Organization (EMBO) in order to foster exchange and collaboration in the Molecular Life Sciences between Europe and Singapore. Hopefully, this will only be a first example, since the benefit will be clearly for both sides. Such mutual benefits already exist in trade and industry cooperations, with the European Union being the biggest investor in Singapore and with many EU companies present in the country.”

Prof. Bertil Andersson

President, Nanyang Technological University

“ Biomedical Imaging Laboratory, A*STAR collaborates with European hospitals and universities, and thousands of copies of our products are distributed globally in medical markets by European companies. Several clinical and research institutions in Germany, Switzerland (ETH), France, Poland, UK, and Greece use our brain atlases. We have joint projects on stroke with hospitals in Italy, France and Poland. Poland is a particularly active collaborator. Thanks to a bilateral agreement between A*STAR and the Polish Ministry of Science and Higher Education, we received a joint grant with the Medical University of Poznan (the leading medical university in Poland) to work on stroke, which resulted in technology breakthroughs, patents and papers. These activities illustrate a great potential of collaboration between EU and Singapore.”

*Prof. Wieslaw L. Nowinski, PhD, DSc; Principal Scientist and Director of Biomedical Imaging Laboratory, A*STAR*

“ Research in Singapore has considerably developed over the last decade. It is often supported by strong technology and reaches excellence in several areas. To be sustainable, its substantial funding must be maintained beyond the initial period of investment. High level Singaporean scientists have to be trained in larger numbers. In Europe and France, the scientific tradition is old, diverse and profound. There appears to be many complementarities. European researchers are usually very well trained. Scientific and technological gaps may be bridged by further collaborations in the interest of all.”

Prof. Philippe Kourilsky, Chairman of Singapore Immunology network, member of the Academy of Sciences and professor at the College de France

“ International collaboration is important to deliver world class science and helps encourage innovation to benefit everyone. Scientific partnerships between Singapore and Europe are already helping the fight against cancer and infectious diseases, and should ultimately save thousands of lives each year.”

*Prof. Sir David Lane, Chief Scientist, A*STAR*

“ The Singapore-ETH Centre and its Future Cities Laboratory have not landed like an UFO in Singapore, but were developed in close collaboration with a variety of partners including the National Research Foundation, academic institutions, agencies and industry. The Swiss Embassy and swissnex Singapore supported the interaction with the institutional stakeholders and helped us make initial contacts and connections.”

Prof. Gerard Schmitt, Director of the Singapore ETH Centre for Global Environmental Sustainability



Marc Ungeheuer, Ambassador and Head of Delegation of the European Union to Singapore

Foreword

Research and innovation help improve our society, improve our economy and improve the lives of people everywhere. In this booklet, the European Union and a number of European countries present their strengths in research and innovation, and give examples of fascinating success stories taking place in Europe and of joint initiatives between Europe and Singapore.

At a time where Singapore is pushing hard to improve its research and innovation performance, the European Union and European countries offer huge opportunities of fruitful cooperation. For instance, the European Union is investing this year alone over 12 billion Singapore dollars in research in a highly competitive and result-oriented way, and we are likely to further increase our ambition with the next research and innovation programme, Horizon 2020 that will start in 2014. In addition to the EU level, 21 out of the 27 Member States of the European Union increased their public spend on R&D in the recent years.

The European Union and Singapore are currently negotiating a free-trade agreement and a partnership and cooperation agreement, thus giving a new dimension to their relations. I strongly believe that the time is right to step-up our research and innovation cooperation on issues that can bring the greatest mutual benefit in terms of industrial competitiveness and breakthrough on key technologies with the potential to generate new markets.

ASEAN and the EU have just launched the ASEAN-EU Year of Science, Technology and Innovation 2012, with the objective to promote and extend cooperation between the two regions at all levels: policy makers, universities, research organisations, and industry. Since 2008, the European Union and ASEAN have engaged in a bi-regional Science and Technology dialogue that has help set joint priorities and improve ASEAN participation in the EU research programme. We will use 2012 to further improve our links with ASEAN countries, and I believe that much more can be done, in particular with Singapore.

I hope you will enjoy reading this booklet and will make intensive use of the web links and contacts it provides.

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Cooperation opportunities with Europe for Singaporean researchers – a short guide

European funding for research and innovation excellence

The EU 7th Framework Programme

The 7th Framework Programme (FP7) is the EU's main instrument for funding research in Europe and the largest of its kind in the world. FP7 is a highly competitive scheme, designed to respond to Europe's employment needs, competitiveness and quality of life. It runs from 2007 to 2013 and has a total budget of over €50 billion, with about €7 billion in 2012.

The broad objectives of FP7 have been grouped into four categories: Cooperation, Ideas, People and Capacities. For each type of objective, there is a specific programme corresponding to the main areas of EU research policy. All specific programmes work together to promote and encourage the creation of European scientific excellence. Some of the prioritised research areas of FP7 are: Health, Biotechnology, Information & Communication Technologies, Nanotechnologies, Energy, Transport and Environment, including Climate change.

For more information on FP7: http://cordis.europa.eu/home_en.html

FP7 welcomes international collaboration between researchers around the world. Virtually all

calls for proposals are open to Singaporean participants. Although participating organisations from industrialised countries are not normally eligible for funding by FP7, scientists from all leading countries see their participation in the EU programmes as an unique opportunity to work with the best researchers in Europe and worldwide.

To search for FP7 calls and to participate: <http://ec.europa.eu/research/participants/portal/page/home>

Of special interest to researchers at any level of their career are the various **Marie Skłodowska-Curie fellowships** for researchers moving both from and to Europe, as well as the **European Research Council (ERC)** grants, which have enabled many researchers across the world to enhance their careers in Europe. For instance, the Marie Skłodowska-Curie International Incoming Fellowships scheme provides funding to top-class foreign researchers to work on research projects in Europe for duration of 12 to 24 months, while the Marie Skłodowska-Curie Career Integration Grants allow experienced researchers from any country in the world, with at least 4 years' full-time research experience or a doctoral degree, to come and work in Europe for 2 to 4 years.

For more information on Marie Skłodowska-Curie schemes: <http://ec.europa.eu/research/mariecurieactions/>

Schemes managed by the ERC include the Starting Independent Researcher Grants that support up-and-coming research leaders of any nationality who are about to establish or consolidate a research team and to start conducting independent research in Europe in the fields of life sciences, physical sciences & engineering, and social sciences and humanities with up to €2 million per grant, while the advanced investigators grants provide up to €3.5 million to researchers who have already established themselves as independent research leaders and have a recent research track-record and profile which identifies them as leaders in their respective field of research.

For more information on the ERC grants, which are open to top researchers of any nationality or age who wish to carry out their frontier research in Europe: <http://erc.europa.eu/>

The Erasmus Mundus Programme

Erasmus Mundus – Masters' & Doctoral Scholarships



This scheme supports high-quality joint masters and doctoral programmes offered by a consortium of European, and possibly third countries' higher education institutions, scholarships / fellowships for third countries' and European students / doctoral candidates to follow Erasmus Mundus joint masters' courses and doctoral programmes, and short-term scholarships for third countries' and European academics to carry out research or teaching assignments as part of joint masters programmes. Duration: 3 months to 3 years.

Erasmus Mundus - Cooperation Partnerships

This scheme supports the establishment of partnerships between European institutions and institutions in other countries, with the objective of developing mobility schemes.

For more information on Erasmus Mundus: http://eacea.ec.europa.eu/erasmus_mundus

EURAXESS Links Singapore - helps researchers on the move
EURAXESS Links Singapore network was launched in November 2010 and currently has about 870 members from Europe and

Singapore. The purpose of the network is to assist individual researchers on the move by informing on research developments and news, as well as career and funding possibilities in Europe and Singapore. The community is also open to companies, organisations and policymakers with a general interest in research and innovation. The network will soon expand to also cover other countries in the dynamic Southeast Asia region.

The monthly newsletter and the web site, including a members-only area, are EURAXESS Links Singapore's main channels of outreach. The electronic newsletter provides research and innovation news, event information, as well as funding, collaboration and career opportunities. For more information visit the EURAXESS Links Singapore web site: http://ec.europa.eu/euraxess/links/singapore/index_en.htm

The EURAXESS Links community is open to all researchers, in all industries and of all nationalities. The initiative is funded by the European Commission and membership is free of charge. To become a member please register here: http://europa.eu/sinapse/directaccess/euraxess_singapore/join

Outside of Europe, five EURAXESS Links networks currently exist, namely in the US, Japan, China, Singapore and India. Soon new international networks will be launched.

EURAXESS also has a career database - **EURAXESS Jobs** - advertising thousands of Europe-based fellowships and jobs vacancies in research and innovation. For more information: <http://ec.europa.eu/euraxess/index.cfm/jobs/index>

EURAXESS Services is a network of more than 200 centres situated in 38 European countries. If you are a researcher planning to relocate to Europe, EURAXESS Services can assist you and your family in every step of your move. This free personalised service is here to make your life easier. For more information: <http://ec.europa.eu/euraxess/index.cfm/services/index>

Horizon 2020

Horizon 2020 is the financial instrument replacing FP7 from 2014. It will run until 2020 with a proposed €80 billion budget.

For more information on Horizon 2020: http://ec.europa.eu/research/horizon2020/index_en.cfm

Belgium

a key player in biotechnology in Europe



Belgium accounts for a remarkably high proportion of Europe's turnover in biotechnology. It represents 16% of the European biopharmaceutical industry, making our country a key player at world level.



The Biotechnological sector in Belgium

Belgium is one of the most open economies in the world, and this is true for the biotechnology sector too. Although the country represents only 3% of the economy of the EU27, it accounted for 17% of EU exports of biopharmaceuticals in 2008.

In addition, Belgium accounts for a remarkably high proportion of Europe's turnover in biotechnology. It represents 16% of the European biopharmaceutical industry, making our country a key player at world level.

Belgian biotechnology provides direct employment to more than 30,000 people in Belgium, mainly in the health sector (80%). These workers are particularly well qualified, and training in science and technology in Belgium is among the best in Europe, both at secondary level and in universities. Belgian workers are among the most productive in Europe.

Belgian workers are among the top 5 most productive in the world according to recent OECD statistics and the International Labour Organisation. But it is especially in the biotechnology sector that the country stands out:

- In Belgium the number of drugs in development per million inhabitants is the highest in the world, ahead of the United Kingdom or the United States.
- The regions of Flemish Brabant and Walloon Brabant have respectively 61% and 58% of scientists in their economically active, placing them in the top 10 European regions in this regard.
- The number of active researchers in the pharmaceutical industry in Belgium is growing rapidly. Between 2002 and 2007, it rose from 3,591 FTEs to 4,838, an increase of 35%.
- Belgium consistently outperforms the OECD average, in terms of researchers per thousand employees, the number of science and engineering graduates as a percentage of degrees awarded, the proportion of employment in science and technology in total employment, or scientific articles published per million population (OECD, 2010).

R&D in the biotech sector

Spending on research and development is high in relation to the country's size, as confirmed by the latest OECD figures:

- Fifth-highest level in the OECD of public funding (direct and indirect) and tax incentives for R&D in the business sector in 2008.
- Fourth country in the world in terms of biotechnology R&D per firm.
- Third country in Europe in terms of biotechnology R&D per capita in the business sector.
- Second highest proportion of biotechnology R&D in total national R&D in the world.
- World number one for R&D intensity (R&D / production) in the pharmaceutical industry (EFPIA, 2008).

A leading country for research

The network of academic institutions and research centers in Belgium is not only dense, but features some internationally renowned institutions.

Four Belgian universities were recently included among the 100 best European research institutions. Two of them, the Université Catholique de Louvain (UCL) and the Katholiek Universiteit Leuven (KUL), were even included among the 20 top-performing universities in Europe. Our small country boasts three of Europe's top 25 universities for life sciences (Academic Ranking of World Universities 2010).

Whether in medicine, biotechnology or engineering, Belgian universities are among the best.

One look at the budget allocated to these universities and research centers points to a clear conclusion: in Belgium, researchers perform better than elsewhere, and with fewer resources. How can these outstanding results be explained?

- **A high concentration of quality universities and incubators:** the 14 Belgian campuses (5 in Flanders, 5 in Wallonia and 4 in Brussels) are geographically close and organised into effective networks. There are also 22 research centers and a multitude of incubators, all easily accessible.
- **An effective clustering policy, promoting exchanges between universities and businesses:** the clusters of Ghent, Leuven, Liège, Charleroi, Brussels, Namur and Gembloux help universities exchange knowledge and interact with companies.
- **Science and mathematics teaching of international quality:** more than 50,000 students are enrolled in biosciences and in pharmacy schools in Belgium. In addition to meeting high academic standards, they enjoy a solid basic education, as evidenced by the above-OECD average Belgian results as measured in PISA.
- **Effective inter-university structures:** VIB and Welbio are the two most important academic biotechnology networks in

Belgium, and their international reputation is well established.

- **The support of federal and regional authorities:** support for academic research can be relied on in each Belgian region. Politicians and the Belgian population are fully aware of the importance of biotechnology in the economic fabric of Belgium.

VIB and Welbio

Belgian universities are federated within institutions that bring together virtually all stakeholders in the sector.

The two most important are VIB and Welbio.

Combining four of the country's five Dutch-speaking universities and numerous incubators, **VIB** is the main contact point for research in Flanders. Nearly 1,170 researchers of more than 50 nationalities share the objective of achieving exceptional research results and bringing their products to market. VIB receives nearly €75 million. <http://www.vib.be>

Welbio is a new initiative that demonstrates the dynamism and the networking strengths of Belgian universities. Combining the three Walloon academies, the agency's mission is to support the biotechnology sector in Wallonia by training scientists and by speeding effective launch of discoveries.

€15 million was released to launch the initiative, and the first call for proposals was a great success. <http://www.welbio.org>

Denmark



Danish Cleantech – wind and water

Denmark has gained a unique position within the field of cleantech. A range of foreign companies have established their research and development activities in the country or have used research competences from Danish companies. Denmark has an excellent research and development environment with great relations between the public and private sector.



Within the Danish cleantech sector there are a few large companies with a strong presence in the global market. There is also a fairly large number of small and medium sized companies with world-class technology and sound export potential. Denmark's export of technology related to energy and environment compose 18 percent of the country's total export, and it is the fastest growing export sector. With the planned movement towards a fossil-independent society as proposed in the government's "Energy-strategy 2050" is leading to, it is expected that Danish companies will gain even better competitive positions the future. Thus cooperation with Danish cleantech companies can open up for new possibilities for Singaporean researchers and developers.



Both wind and water are important areas within the field of Danish cleantech. Using various technologies in relation to this can reduce the CO₂-emission greatly and contribute to a sustainable environment. Denmark is a flat and windy country, and at the same time surrounded by water. The Danes have traditionally harness these forces of nature to their advantage, e.g. in the use of wind mills.

Wind is by far the most common sustainable energy source in the

country, with more than 19 percent of its energy coming from wind.

Furthermore methods using various water technologies in the cleantech area are of great importance, and a range of experts in this field can also be found in Denmark.

Some Danish cleantech companies are already present in Singapore, and briefs on the expertise of three of these companies are provided below:

Aquaporin

Aquaporin is a Danish cleantech company based in Copenhagen Denmark with a subsidiary company Aquaporin Asia based in Singapore. Aquaporin is dedicated to revolutionizing water purification and desalination of seawater through the use of industrial biomimetic science and technology. The main goal of Aquaporin is to develop the Aquaporin "Inside" technology which is capable of separating and purifying water from all other compounds. Commercial success will be reached through development and proof of the technological concept, development of a prototype and further development thereof into a final membrane technology with sales and out licensing expected in 2013.

Our core expertise is centered on harnessing biological water transport processes by using Nature's own

water transporting proteins - the aquaporins. We incorporate and stabilize aquaporin proteins into synthetic membranes utilizing the high selectivity and water transport capability of these proteins in forward osmosis (FO) and reverse osmosis (RO) based water treatment.

In the development and testing of our water purification technology we have an established collaboration with the Singapore Membrane Technology Center at Nanyang Technological University (NTU), the School of Biological Sciences (SBS) at NTU, and DHI Singapore, a consulting and research company in water, environment and health. The collaboration project *'Aquaporin Based Biomimetic Membranes for Water Reuse and Desalination'* is funded by the Environment and Water Industry (EWI) Development Council in Singapore, and we are actively seeking to establish further collaborative projects in Singapore and beyond.

DHI Water & Environment

DHI is an independent, international research and consulting organization with 29 operating offices worldwide and the Asia Pacific regional headquarter based in Singapore. Our objectives are to advance technological development and competence within the fields of water, environment and health. As a not-for-profit organization, DHI invests 25% of its human resources in research and development often carried out in close collaboration with our many university partners. It is our particular strength to bridge between science and practice improving management and operations of water in all areas of water. In Singapore, DHI operates a Research Centre together with NEWRI from NTU, funded by

the Environment and Water Industry Development Council in Singapore (EWI), set-up to strengthen the water industry through collaborative research projects.

In DHI our innovations are the basis for a wide range of consulting services and leading edge technologies, software tools, chemical / biological laboratories and physical model test facilities as well as field surveys and monitoring programmes. Our activities cover e.g. Urban water, storm water, water resources, flooding, dams and reservoirs, coastal and marine waters.

As an example, DHI developed a wide range of services for the Offshore Renewable Energy market. We integrate state of the art numerical models with in-situ and remote sensors, thorough experience and advanced statistical methods. This provides central understanding for environmental impact assessments, of man-made constructions on the surroundings.

The provision of high quality and reliable metocean data is fundamental for successful, safe and energy - as well as cost - efficient construction, operations and management at sea. DHI Singapore together with MPA Venture Pte Ltd (MPAV) operates Info@SEA - a dissemination portal for metocean information services. Info@SEA provides tailor-made forecasts for all relevant metocean parameters on a local, regional and global scale.

Vestas Singapore

Vestas opened its Vestas Singapore office to consolidate its operations in the strategic market under one roof in the second quarter of 2011. As a centre of excellence and one of

Vestas largest R&D facilities, Vestas Singapore will play a central role in powering the company's strong business growth in Asia, and around the world.

Vestas Singapore houses over 200 staff members, including 120 engineers, currently employed by Vestas various business units in Singapore. With its regional headquarters for Sales and Operations, R&D, Group IT and Spare Parts and Repair in one location, Vestas will be able to better serve its customers through seamless end-to-end service delivery and customer-centric innovation to best meet their needs. The Singapore office will also enable Vestas to accelerate its capabilities in harnessing wind power and advancing the growth of the sector - contributing to the global vision of achieving energy sustainability and security. Vestas Singapore is located at the new Mapletree Business City, a move that is aligned with Vestas' global policy of promoting energy efficiency, green buildings and infrastructure, and sustainable development.

Since establishing its Asia Pacific headquarters in Singapore in 2006, Vestas has significantly expanded its regional presence. Buoyed by the keen interest and demand in Asia for wind power technology, Vestas installed over 1,000MW in markets such as Taiwan, India, Philippines, South Korea, Australia and New Zealand in 2010 - bringing its total base to 4,700MW installed across the region as of June 2011. Vestas will ride on this momentum to tap the business opportunities for wind development in emerging markets in Southeast Asia, in particular Thailand, the Philippines and Vietnam.

For more information please contact:

Address: Embassy of Denmark, 101, Thomson Road, #13-01/02 United Square, Singapore 307591

Website: <http://www.ambssingapore.um.dk> **Telephone:** +65 63555010 **Fax:** +65 62533764

France



Singapore and France for excellence in research, technology and innovation

France and Singapore, two knowledge-based economies, aim at boosting research, innovation and entrepreneurship. Both countries have developed bilateral fruitful partnerships and continue to strengthen their ties through the development of new joint laboratories and high level cooperation.



Prof. Claude Cohen-Tannoudji (1997 Nobel Prize in Physics) introducing his scientific interests and educational background to students from the prestigious Raffles Institution in July 2010



French company ArianeSpace owes 60% of the global market for launching satellites into geostationary orbit with around 267 launches

R&D Key facts and figures

France devoted more than €42.7 billion representing 2.2% of its GDP to Research and Development in 2009. Private companies fund 55% of the R&D budget and run 63% of the R&D activities. There are more than 230,000 full-time scientists, 25 national public research institutions, e.g. CNRS and the more specialised ones: INRIA, CEA, INSERM, CNES...

Worldwide, France is ranked

- 6th in the number of scientific publications and researchers,
- 4th in R&D investment,
- 4th in the number of Nobel Laureates (57) in all fields. Prof Jules Hoffmann was awarded the 2011 Prize for Medicine.
- 2nd worldwide for the Fields Medals with 11 laureates.

To boost France's research, innovation and competitiveness, the "Grand Emprunt" or Big Loan was introduced in 2010 to inject €11 billion and €8 billion into higher education and research respectively. This is in addition to the annual budget for research and education.

Innovation & industries of interest to Singapore

France's leading industrial sectors are aerospace, automobiles and land transport, electronics and info-communication technology,

chemicals and pharmaceuticals. France's expertise in these sectors is well represented through cutting-edge companies based in Singapore such as Veolia, Gemalto, Bouygues, Alstom, Essilor, Thales, ST Microelectronics or Sanofi.

Franco-Singaporean scientific collaborations

Funding

- **ANR - A*STAR Program**
Since 2010, the Agence Nationale de la Recherche (France) and the Agency for Science, Technology and Research, A*STAR (Singapore) have been funding joint research projects between French and Singaporean laboratories.
- **Merlion Program, annual call for joint projects**
Inaugurated in 2006, the Merlion Program is co-financed by the French Ministry of Foreign and European Affairs, the French Ministry of Higher Education and Research and the respective Singaporean partner: the National University of Singapore, Nanyang Technological University, Singapore Management University, A*STAR, Temasek Life Sciences Laboratory and the Singapore Eye Research Institute.



The Airbus A380 is a double-deck, wide-body, four-engine jet airliner, the largest air carrier (up to 853 passengers) manufactured by the European corporation Airbus, a subsidiary of EADS

Joint laboratories

- **Sondra, a Franco-Singaporean laboratory in Defense Technology based in France**
<http://www.supelec.fr/sondra/>

SONDRA was created in 2004, involving Supelec (The French "Grande école" forerunner in the information, energy and systems sciences), Singapore's DSTA, France's Aerospace Lab (ONERA) and NUS. They join forces to carry out non-classified research in Signal processing and Electromagnetism for defense radar applications.

- **IPAL, the first French-Singaporean joint laboratory for Image & Pervasive Access**
<http://ipal.i2r.a-star.edu.sg/>

In 2006, IPAL (Image & Pervasive Access Lab) became the first CNRS UMI (CNRS International Mixed research Unit) in Singapore. The UMI agreement was signed between CNRS, I²R - A*STAR, NUS and the University Joseph Fourier. Since February 2011, two new partners

have joined IPAL: the renowned University Pierre and Marie Curie and the Institut Telecom.

Capitalising the IPAL experience on natural and medical image / information access, IPAL focuses its research around two main axes: Medical Image Understanding and Pervasive Access and Wellbeing Management.

- **The first International Associated Laboratory (LIA) on infectious diseases**

In May 2009, a LIA called "Laboratory of Immunology against Malaria" was set up to advance in the fight against the disease. The partnership was consolidated between SigN at A*STAR, and a joint research unit from INSERM (Health and Medical Research National Institute) and the University Pierre and Marie Curie (UPMC, Paris 6 University).

The research focuses on the identification and validation of immune protection against malaria.

- **CINTRA for Nanophotonics through public-private joint Lab**
<http://cintra.ntu.edu.sg/Pages/default.aspx>

In 2009, the CNRS, Singapore's NTU and Thales Group established a joint international research unit called CINTRA (CNRS International-NTU-Thales Research Alliance). These three highly inter-connected partners focus their research on nanocomponents and new circuit architectures. This is done

to meet future requirements in the field of communications, computing and sensors (electronics, biological and medical applications, etc).

- **CAFS on mechanobiology**
In 2011, a joint laboratory titled Cell Adhesion France-Singapore (LIA CAFS) was created to facilitate bilateral collaborations in mechanobiology, optics, modeling, surface chemistry and micro / nano fabrication. Partners of this laboratory are the Mechanobiology Institute located at NUS, National Centre for Scientific Research (CNRS), ParisTech Industrial Physics and Chemistry Higher Educational Institution (ESPCI), Paris Diderot University and Bordeaux 2 Segalen University.
- **FSQL on quantum technologies**
The France-Singapore Quantum Physics and Information Laboratory (LIA FSQL) was inaugurated in 2011 and will enhance collaboration between the Centre for Quantum Technologies and research centres affiliated with CNRS. The other French partners involved are Nice Sophia Antipolis University, Pierre and Marie Curie University, École Normale Supérieure, Paris-Sud University, Institut d'Optique Graduate School and Paris Diderot University.

Embassy of France - <http://science.ambafrance-sg.org/sciencetech-platform/>

Merlion Program - <http://science.ambafrance-sg.org/sciencetech-platform/merlion/>

National Agency for Research (ANR) - <http://www.agence-nationale-recherche.fr/en/project-based-funding-to-advance-french-research/>

National Centre for Scientific Research (CNRS) - <http://www.cnrs.fr/index.php>

CEA - http://www.cea.fr/english_portal

Ministère de l'Enseignement supérieur et de la Recherche - <http://www.enseignementsup-recherche.gouv.fr/>

Germany



Germany and Singapore – Excellence in Research and Development

Like in Singapore, research and development (R&D) are the cornerstones of the future of the German economy. Generous public funding programs contribute to the excellent conditions allowing universities, research institutions and companies from all over the world to cooperate with their German partners and carry out their R&D in Germany.

Research in Germany



Land of Ideas

The public and private sectors have made a significant commitment to spend around three percent of national GDP per year on R&D activity (today 2.8% of GDP). This amounts to approximately €70 billion R&D spending annually.

Research in Germany - Land of Ideas

A strong research community is characterised by its global competitiveness and international attractiveness. In the age of globalization, research and education would be unthinkable without international cooperation. Hence, networking in these areas with partners worldwide is of utmost importance to Germany as a key business location. On behalf of the Federal Ministry of Education and Research, its International Bureau supports German universities, research institutions and companies in the development of international contacts and networks.

It is also the first contact point for Singaporean based researchers, universities, institutions and companies to establish links with the German research landscape.

High Tech Strategie

The High-Tech Strategy, which was launched in August 2006, was the first national concept to rally the key stakeholders involved in innovation around a common idea. In 2010

Germany decided to continue along this successful path. The new High-Tech Strategy 2020 ensures the continuity of the overall approach and, at the same time, sets new priorities.

The aim of the High-Tech Strategy (HTS) is to create lead markets, intensify cooperation between science and industry, and continue to improve the general conditions for innovation.

Germany pursues the goal of becoming the leading provider of science- and technology-based solutions in the areas of climate / energy, health / nutrition, mobility, security, and communication. The HTS focuses on these areas partnering in international cooperations.

Singapore's strategic R&D areas such as biomedical sciences, environmental and water technologies for clean water and energy as well as interactive and digital media cover the same fields as Germany's HTS.

Top Level University Research

Germany's R&D landscape is characterised by a close cooperation between science and economy. It is based on the dense and decentralised network of more than 400 universities and technical colleges.

The private industry uses these valuable opportunities for cooperation and the access channels to fundamental and applied research at the universities. The findings of the work performed there are effectively used for industrial implementation. Scientists can easily be integrated into the corporate teams of developers and researchers. In addition, laboratory equipment is increasingly made available by the institutes.

Renowned Research Institutes

In a worldwide comparison, Germany holds a unique position thanks to research communities outside the universities.

The application-oriented research communities, Fraunhofer-Gesellschaft and Leibniz-Gemeinschaft, provide mainly small and medium-sized companies with access to top research. Fraunhofer-Gesellschaft invests € 1.6 billion of research money in its more than 80 facilities and over 17,000 employees. A major part of the funds is generated by contractual research in collaboration with the industry. Leibniz-Gemeinschaft's network comprises 83 institutes and almost 14,000 employees.

And the most renowned institutes for fundamental research in the world are located in Germany as well. Max-Planck-Gesellschaft and

Helmholtz-Gemeinschaft enable companies to outsource costly fundamental research, thus reducing the risk associated with the development of new products and decreasing R&D expenditure.

German-Singaporean Mobility Programme

The Federal Ministry for Education and Research is planning with Singaporean partners to create and to strengthen existing scientific cooperation between Germany and Singapore. The programme from 2012 onwards will promote the further development of existing cooperation and support individual scientists and institutions in identifying new research partners and initiating new projects as well as support activities which serve as a preparation for a comprehensive application for German and Singaporean national funding programmes or the funding programmes of the European Union (EU).

Existing German-Singaporean cooperations

Apart from over 50 German universities collaborating with universities, polytechnics and institutions in Singapore, some cooperations have gone a step further, to name but a few:

The newly established Fraunhofer IDM Centre @ NTU is a project

centre for Interactive Digital Media (IDM) operated jointly by Nanyang Technological University (NTU) and the Fraunhofer-Gesellschaft. Facilitated by the multi-agency Interactive Digital Media R&D Programme Office at Media Development Authority (MDA) and funded by the National Research Foundation, the centre fosters international research activities through its network of partner universities.

Technical University Munich (TUM) has established itself in Singapore since 2002. 2010 TUM joined the NRF funded CREATE programme with a comprehensive CREATE project electro mobility - E-mobility for tropical megacities. In the joint centre with NTU 40 faculty staff and over 80 PhD students are working on sustainable solutions for urban mobility in the future.

National University of Singapore and the Federal State Baden-Württemberg are jointly organising since 2007 *Joint Scientific Conferences In Life Sciences*. With its fourth edition recently held in November 2011 at the University of Freiburg. Again a fine example for a steady and sustainable cooperation in a research area in which both Singapore and Germany have defined their priorities.

Ireland



Singapore and Ireland – Innovation Islands

Ireland is famous for its literary giants but it has also produced many world renowned scientists and engineers. Their contributions have laid the foundations for modern chemistry, nuclear energy, computer graphics and even Internet search engines.



Applied Optics Group



Immunology Group, Trinity College Dublin

Today, thanks to strategic investment, Irish science is still shaping our view of the world – continuing a tradition that stretches back thousands of years to the construction of the oldest astronomically orientated structure in the world, the 5,000 year old passage tomb at Newgrange. The construction of this UNESCO World Heritage Site is an early example of Irish interest in connecting with the world around us.

The Irish Government believes that biotechnology, information and communications technology and sustainable and energy-efficient technology represent the engines of future growth in the global economy. €8.2 billion in Government spending is committed to research in these areas and R&D is a central tenet of the Government's framework for sustainable economic recovery. An agency, Science Foundation Ireland (SFI), has been established to administer this funding and facilitate the increasing connections between academic research and industry.

Today, over 82,761 people are employed in companies linked with SFI researchers. Moreover, they generate in excess of €73 billion in exports. A total of 4,978 peer reviewed publications were published in 2010 by SFI-funded researchers and SFI Researchers are collaborating with companies in

29 countries. There are 1,700 active international academic collaborations and SFI research partners are based in 58 countries around the globe, including Singapore.

Examples of Current Irish & Singaporean Cooperation in Research & Development:

- Regenerative Medicine Institute (REMEDI)**
 Based in the National University of Ireland, Galway campus, the vision underlying the creation of the Regenerative Medicine Institute (REMEDI) is the establishment of a world-class research institute as a significant contributor to the way in which medicine in the future will be conceptualised, developed, and delivered. Regenerative medicine, by unlocking the secrets of how the body repairs and regenerates itself at the cellular level, will replace the current paradigm of conventional medical practice. This work will lead to innovative therapeutic strategies applied to a variety of human diseases using minimally invasive approaches. This institute is operated in partnership with the Singapore Stem Cell Consortium and industry partners including Medtronic, Creganna / Tactyx, Proxy Biomedical, Ziel Biopharma, EnBio, Ovagen, Smith and Nephew and ProCure Laboratories.

- **Network of Excellence for Functional Biomaterials (NFB)**

NFB has established strong links with the Tissue Modulation Laboratory (TML), National University of Singapore, headed by Prof Michael Raghunath. NFB and TML are developing means to match the in vitro microenvironment of cultured cells to the native tissue microenvironment from which the cells were derived from. This approach will enable us overcome current bottlenecks in ex vivo tissue cell culture and facilitate wide acceptance and clinical translation of cell-based therapies. To-date, NFB and TML are collaborating in three projects. More projects are also under development.

- **Professor Alan Colman, Executive Director of the A*STAR Stem Cell Programme in Singapore**

Professor Colman was funded by the National University of Ireland, Galway to enable induced pluripotent stem cells (iPS) technology to be established in Galway. This included the training of personnel at his lab in Singapore and the identification of a suitable candidate for the position of Chair in Stem Cell Biology at Galway. The appointment to this position of Dr Sanbing Shen will now accelerate the development of the IPS programme.

Science Foundation Ireland Current Programmes

As part of its international strategy, SFI has identified Singapore as one of the countries which will be given priority to competitive applications under three current SFI funding calls. These are:

E.T.S. Walton Visitor Awards Programme

The E.T.S. Walton Visitor Awards programme (named after the County Waterford-born recipient of the 1951 Nobel Prize in Physics) enables international academic and industrial researchers to visit and collaborate with Irish research groups. The programme involves bringing high-calibre international individuals to Ireland to work with researchers in Ireland to carry out research for a fixed period of time. E.T.S. Walton Visitor Awards are offered on a worldwide competitive basis. Prominent international researchers from academia and industry may be nominated by a public research body in the Republic of Ireland. Applications may be submitted for research stays of between three and twelve continuous months.

SFI Short Term Travel Fellowship Supplement

The Short Term Travel Fellowship (STTF) is designed to enable Irish-based researchers to collaborate on research projects in academic and industrial laboratories outside the Republic of Ireland for

a period of 1 month minimum to a maximum of 6 calendar months. STTF 2011 is available to SFI award holders and team members working in currently active SFI awards. Applications are also accepted from team members and lead-PIs from non-SFI awards subject to certain conditions.

SFI Incoming Short Term Travel Fellowship

SFI are now pleased to announce the launch of the "Incoming - STTF" programme. The Incoming-STTF programme will enable currently active SFI funded researchers to apply for a travel fund to host a team member from an international academic or industrial laboratory for a period of up to 6 months in Ireland. The programme will facilitate collaborations with world-class centres of research excellence and raise international awareness and recognition of Irish science and high-quality research.

Dublin - City of Science 2012

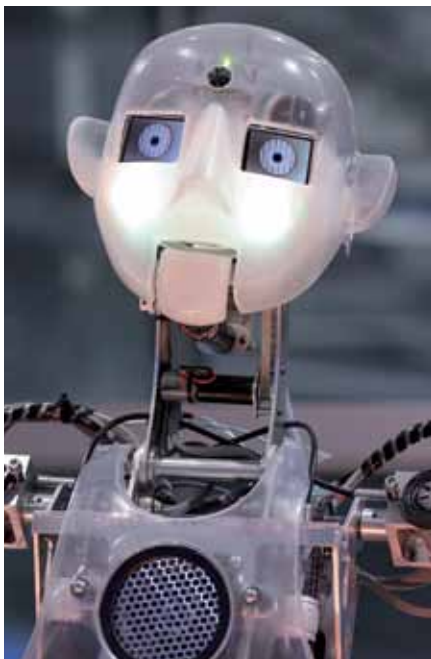
In 2012, Dublin will be the European City of Science and will host the Euroscience Open Forum from 12 to 16 July 2012. The five-day ESPF event showcases science and looks to share it with the widest possible audience. It is hoped that 8,000 Irish and international delegates will take part and engage with 50,000 local participants in the outreach activities.

Poland

Large market of opportunities in Research & Development



The potential of the Polish research and development (R&D) sector is substantial, mainly due to highly-developed specialist personnel. It is expected that in several years there will be an increased interest in opening R&D centres, similar to the ones which happened in the BPO sector. BPO centres are currently generating over 40,000 jobs, and there are over 300 of them.



Warsaw, Copernicus Science Centre,
Photo: Mariusz Cieszewski / www.fotcom.biz



Warsaw, Copernicus Science Centre,
Photo: Mariusz Cieszewski / www.fotcom.biz

Copernicus Science Centre is a science museum in Warsaw. It contains over 450 interactive exhibits that enable visitors to single-handedly carry out experiments and discover the laws of science for themselves. It is one of the most advanced institutions of its type in Europe.

It is hard not to mention the necessity for commercialising research results and the cooperation of the entire sector with entrepreneurs. The largest companies in the world have already started opening R&D centres in Poland, benefitting from the first mover advantage, taking advantage of the availability of the best personnel and cooperating with existing R&D units.

Excellent Human Resources

The capabilities of the Polish market are proven by the potential of its human resources - the current number of students is 1.9 million people (on 458 higher education institutes), over 420 thousand graduates a year, and already 120 thousand people working in the R&D sector. This potential is confirmed by the successes achieved by Polish students in such competitions as The Imagine Cup, Code Jam and the Central European Programming Contest. 717 enterprises and innovation centres have been identified in Poland, many of them related to training and consulting.

Active Private Sector

According to the latest data from the Central Statistical Office, there were 1,157 entities conducting research and development activity in Poland, of which 697 were enterprises. Research and Development activity

is becoming increasingly financed by the private sector. Interest among global actors is also growing. The following companies have already invested in centres in Poland: Google, Siemens, Motorola, Delphi Automotive, Nokia-Siemens, 3M, Intel, Motorola, Samsung, IBM, Oracle, Maersk, Philips, Accenture, HP, VolvoAVIO Group, Aircrat Engines Aerospace and many others. The research activity conducted by international concerns proves the growing attractiveness of Poland. Still, these are figures definitely below its abilities. It is related to the ease of finding the appropriate number of well-educated research staff. Companies are most willing to open research centres operating in the fields of IT, telecommunications and electronics. There are huge development opportunities in the areas of medicine and biotechnology. Due to historical industry trends and the developed scientific facilities, the most attractive sectors for R&D work in Poland are aviation, automotive, electronics, telecommunications, IT, biotechnology, biochemistry, medical and pharmaceutical engineering, construction, robotics and nanotechnology.

Where to start

In the last few years, there has been a boom in science and technology parks, in which a growing number of innovative companies are

being established. The parks are a convenient place for cooperation with universities. Polish and foreign companies are more and more willing to use this opportunity. In years to come the rapid development of the research and development sector is likely to occur, in particular in the electronic and information industry.

The National Science Centre (NCN) is a government executive agency set up to fund basic research and supervised by The Minister of Science and Higher Education. One priority of the Centre is to support and develop the scientific careers of doctoral as well as pre-doctoral researchers. The Centre has devoted at least 20% of its budget towards funding research from this group of scientists.

The National Centre for Research and Development (NCBiR) main task is to manage and implement strategic scientific research and development programmes, that translate directly into innovation development. The tasks of NCBiR include support for commercialisation and other forms of transferring the scientific research results to the economy, ensuring solid conditions for scientists development, particularly the participation of young scientists in research programmes and implementation of international scientists mobility programmes. The Centre is financed from the state budget and the European Union funds.

Why choose Poland as the place for investment in the R&D sector?

If you are looking for the right place to base your research projects, Poland is definitely a right choice. Its advantages make it a perfect partner for Singapore based institutions and researchers. Polish Science and Technology sector is distinguished by:

- Stable economic growth and security of research;
- High potential for employment - a large number of students on various majors;
- Competitive advantage in skills versus remuneration;
- A large number of existing R&D units;
- Science and technology parks facilitating the establishment and conducting of business and research activities;
- A large number of opportunities for obtaining technological support from various sources for investments in fixed assets, and training;
- Research centres not only in the largest cities, but also in smaller towns;
- Low barriers to entry, high support from local authorities;
- Scientific successes of scientists and students;
- A large internal market and opportunities to cooperate with local companies and universities;
- Examples of R&D centres of companies such as ABB, Google, Microsoft, Unilever;
- A comprehensive range of active recreation and relaxation after hard work.

Poland and Singapore - great prospect ahead

In 2011 Poland's Ministry of Science and Higher Education (MSHE) and Singapore's Agency for Science, Technology and Research (A*STAR) signed a 2nd Memorandum of Understanding on Science and Technological Cooperation. New agreement lets both sides further their research and technological development objectives and continue current cooperation. The parties intend to carry out collaboration through exchange of scientific and technical information as well as collaborative research projects chosen within joint grant calls for proposals. Upon the agreement last Polish-Singaporean call for proposals' area is linked to disruptive technologies and security in cyberspace. In 2006 eight (8) projects have been awarded in Materials, Chemicals and Intelligent Systems and in 2007 ten (10) projects have been awarded in Information Technologies and Energy.

There are also agreements between Singapore's National University of Singapore (NUS), Singapore Management University (SMU) and Polish universities: Warsaw University of Technology, Warsaw School of Economics, Cracow University of Technology, AGH University of Science and Technology, Jagiellonian University in Cracow, Kozminski University.

Sweden



Inventing tomorrow's world!

Sweden has been one of the countries investing the largest percentage of its Gross Domestic Product (GDP) in Research and Development (R&D) over the last decade. On average Swedish R&D expenditure totals about 3.6% of GDP, keeping Sweden topped ranked among the OECD countries.



Alfred Nobel

Photo: Ola Ericson/imagebank.sweden.se

The Nobel Prize

The Nobel Prizes were a bequest from the Swedish scientist, inventor, entrepreneur and pacifist Alfred Nobel, to honour those who "have conferred the greatest benefit on mankind". The prizes have been awarded every year since 1901 for achievements in physics, chemistry, physiology or medicine, literature and peace. In 1968, the Bank of Sweden instituted the Prize in Economic Sciences in Memory of Alfred Nobel. More information about the Nobel Prize, www.nobelprize.org.

Some famous Swedish innovators

- Sven Wingqvist invented the multi-row self aligning radial ball bearing in 1907. The same year SKF (Svenska Kullagerfabriken) was established.
- Nils Bohlin invented the three-point seat belt which was introduced by Volvo in 1959. His invention paved way for Autoliv, leading developer, manufacturer and supplier of automotive safety systems.
- Niklas Zennström is a Swedish entrepreneur, co-founder of Skype.

Many of the world's important inventions originate in Sweden, and the rapid pace of innovation shows no sign of slowing down. The Swedish government continue to invest more than ever in research and bright ideas.

Sweden's science infrastructure is world-class. High investment in higher education and basic research has propelled Sweden to a prime position among European economies in terms of university enrolment, workforce skills and R&D. Synergies generated by the close connection between Swedish universities, research institutes and the private sector further leverage the R&D output. R&D conducted by multinationals in Sweden exceeds the volume of publicly financed R&D three-fold.

Sweden has an impressive track record as a leading supplier of innovative solutions and products in a wide range of industry sectors on a global scale. The pacemaker, the safety match, the adjustable wrench, the zipper and the Tetra Pak carton are just some examples of Swedish inventions, being products of a long history of scientific research and development.



Uppsala Berzelii Center

Photo: Melker Dahlstrand/imagebank.sweden.se

Biotechnology

Sweden has a strong standing in biotechnology research, and pharmaceuticals are one of the country's main exports. Swedish medical innovations include the asthma medicines Bricanyl and Pulmicort; the growth hormone Genotropin; and the stomach ulcer drug Losec. Research is not confined to giants such as AstraZeneca and Pharmacia / Pfizer, many smaller biotechnology companies conduct internationally renowned research. Rapidly growing markets include medical devices such as, orthopaedic implants, dialysis equipment, heart-lung machines and ECG equipment.

Other prioritised research areas in Sweden are natural sciences and technology, environment and climate.



Ball-bearing

Photo: Sofia Sabel/imagebank.sweden.se



Academically, Sweden is known for its innovative approach, attracting many international students

Photo: Ulf Lundin/imagebank.sweden.se

Sweden - an innovative country

Sweden is the 2nd most innovative country in the world, according to the Global Innovation Index 2011 published by Insead in Paris.

Sweden - a hive of creativity

Sweden was ranked in top out of 82 countries on their creativity, in the Global Creativity Index 2010 by Martin Prosperity Institute. The Global Creativity Index is based on three human factors: How technologically savvy are they? How capable is their workforce? How open are they to new ideas?

Singapore - Sweden Research Cooperation

To further promote exchanges in the fields of education, research and innovation between Singapore and Sweden, a Memorandum of Understanding (MOU) was signed on 18 October 2010.

The MOU builds upon existing education and research links between the two countries. The National University of Singapore (NUS), Nanyang Technological University (NTU) and Singapore Management University (SMU) have signed MOUs, academic and research collaboration agreements and student exchange agreements with more than a dozen Swedish institutions. Swedish Universities have collaborated with NUS and NTU to launch several joint degree programmes. Both NUS and NTU currently offer joint PhD degrees with Karolinska Institutet (KI). Bilateral student exchanges are extensive and some 300 Singaporeans go to study in Sweden every year.

Research linkages between Singapore and Sweden are strong. For example, a consortium consisting of KI, NUS and A*STAR's Genome Institute of Singapore is working on a Breast Cancer Research Programme. A*STAR also has graduate training tie-ups with Swedish institutes.

A network of distinguished Swedish researchers are conducting research in various universities in Singapore. The Swedish Professor Bertil Andersson has the honour of being the President of NTU. The President of KI, Professor Harriet Wallberg-Henriksson, sits on the Singapore Biomedical Science Executive Committee's International Advisory Council.

As science and innovation plays a key role in tackling challenges that face us on a global and national level, it is a high priority for Sweden to engage with other governments to further research in prioritised areas.

Sweden.se - The official gateway to Sweden - www.sweden.se/eng/

Nationwide Swedish research website - www.forskning.se

The Swedish Research Council - www.vr.se

The Swedish Foundation for Strategic Research - www.stratresearch.se/en/

The Swedish Agency for Economic and Regional Growth - www.growthanalysis.se/en/

Official website of the Nobel Foundation - www.nobelprize.org/

The Swedish Space Corporation - www.ssc.se

Euraxess - Researchers in Motion - www.euraxess.se/

Embassy of Sweden, Singapore - www.swedenabroad.com/singapore

Switzerland

A global top player in Research and Development



Switzerland is facing the same constraints as Singapore in terms of natural resources. Therefore Research and Development are key drivers of the presently most competitive economy worldwide (WEF, 2011).



The Swiss Pavillon at the Singapore International Water Week (SIWW) 2011

If we compare Switzerland's **Scientific Publication index**, i.e. the number of scientific papers published in proportion of the country's total population, Switzerland is ahead of all other countries. The same holds true in terms of the number of patents filed.

The **Swiss National Science Foundation** is the most important instrument of the Confederation for the promotion of research and the development of a new generation of scientists. Scientific research at Swiss tertiary education institutions and independent research institutes are supported by the Foundation.

The **CTI** is the Swiss Confederation's innovation promotion agency. For more than 60 years it has supported the transfer of knowledge and technology between businesses and universities. The CTI promotes the development and application of new technologies; its tools can also be used by small and medium-sized enterprises.

"Science, technology and innovation are the real driving forces behind our modern economies. Open economies depend to a large extent on the translation of scientific discoveries into viable commercial propositions. This is what ultimately determines the pace of economic and societal change. And that in turn is what creates wealth. Switzerland is all the more dependent of this kind of virtuous circle since it has no natural resources."

- Pascal Couchepin, former Federal Councilor for Economic Affairs

Switzerland offers a very dynamic, conducive as well as **competitive education and research landscape**, as testified by 27 Nobel Prize winners from 1901 to 2002. The first Swiss University was founded in 1460 in Basel and today the country offers outstanding higher education in two Swiss Federal Institutes of Technology (ETH Zurich and EPFL), ten cantonal Universities and eight Universities of Applied Sciences. The ETH Zurich ranks on the 15th position worldwide (Times Higher Education World University Ranking 2011).

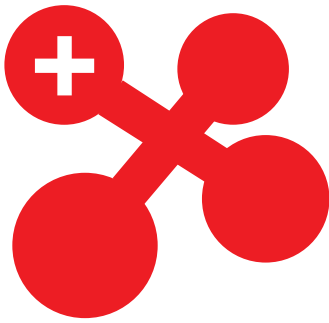
Additional Swiss Federal Institutes are famous around the world for their excellence. As an example, the Paul Scherer Institute (PSI) is a multi-disciplinary research centre for natural sciences and technology, active in solid state physics, material sciences, elementary particle physics, life sciences, nuclear and non-nuclear energy research as well as energy-related ecology.

Competitive public funding is ensured by two main research funding agencies in Switzerland: the **"Swiss National Science Foundation" (SNSF)** and the **"Commission for Technology and Innovation" (CTI)**.

Indeed, research activities conducted in Switzerland play a major part in the most relevant **international research programs**, including the European Research Framework Programmes. Today, the Swiss competences and skills in education, science and technology are recognised internationally.

Switzerland ranks among the **top investors in R&D**, with the private sector ensuring two thirds of the 3% of GDP invested. In the current challenging environment, the Research and Development budgets may be under pressure and adaptability as well as productivity needs to be increased. This is achieved through strong collaborative international networks which foster unique innovations.

The **Innovation Union Scoreboard (IUS) 2010** from the EU Commission Enterprise and Industry ranks Switzerland as the overall innovation leader. This is reflected by patent revenues and patent applications in societal challenges, as well as other indicators including public-private scientific co-publications and number of PhD graduates per capita.



The Planet Solar boat: an international adventure conveying the message of Green Technology, the Swiss way (in Singapore in September 2011)



The Eccerobot, a soft robotics approach to understand human intelligence from the Artificial Intelligence Laboratory of the University of Zurich (in Singapore in April 2011)

In Singapore, academic connections between Switzerland, Singapore and the region are nurtured since 2004 by **swissnex Singapore**, a platform of the Embassy of Switzerland focusing on science, education, art and innovation. The swissnex network comprises platforms in Boston, San Francisco, Shanghai and Bangalore.

Switzerland offers a Highly Competitive Economy

Ranking no 1 on the World Economic Forum (WEF) - Global Competitiveness Report (2011-2012).

Excellent Conditions for Innovation

Switzerland is no 1 on the INSEAD / WIPO Global Innovation Index Report 2011 with Singapore ranking no 3, thanks to its outstanding scientific reputation, dynamic high-tech sector, first-rate Universities and strong protection of intellectual property.

Outstanding performance and well-trained, reliable employees, as well as the concentration of **high-quality niche products and services** are at the heart of the Swiss economy. The key areas for Swiss exports are high-technology driven and include pharmaceuticals, biotechnology, micro and nanotechnology, environmental technologies, as well as finance, design, luxury and hospitality.

In Singapore, Swiss academic presence is growing strong with the **Singapore ETH Center (SEC) for Global Environmental Sustainability and its Future Cities Laboratory**, joining other prestigious institutions including among others the MIT (Massachusetts Institute of Technology), Technische Universität München and Technion (Israel Institute of Technology), hosted by the Singapore National Research Foundation at CREATE (Campus for Research Excellence And Technological Enterprise).

The first International SEC Conference was held in September 2011 at the Nanyang Technological University. This was a great platform for leaders of the SEC research modules and their PhD students to exchange with local and international partners the latest achievements of the Future Cities Laboratory.

The **Canton of Vaud** has mandated a representative based at swissnex Singapore to foster academic collaborations between its institutions of higher learning and the Singapore counterparts in niche domains such as Music, Health Care, Public Administration and Teacher's Education.

The **University of St. Gallen**, ranked first worldwide by the Financial Times for its Master in Management Program, is also well represented in Singapore and is presently strengthening its activities in the City State with the official opening of the St. Gallen Institute of Management in Asia. The Institute will play the role of a hub welcoming alumni, researchers, and undergraduate, PhD, as well as executive students.

Want to find out more?

State Secretariat for Education and Research (SER) - <http://www.sbf.admin.ch/>

swissnex Singapore - <http://www.swissnexsingapore.org>

Future Cities Laboratory - <http://www.futurecities.ethz.ch>

The Netherlands



Singapore and The Netherlands: knowledge-based economies

There is one key driver behind both Singapore's and the Netherlands' positions as global hubs & mainports – their shared status as knowledge-based economies. To maintain and expand these roles, it is logical that both countries exchange expertise.



Singapore-Delft Water Alliance

Singapore-Delft Water Alliance (SDWA) is a Research Centre of Excellence for Water Knowledge involving PUB, National University of Singapore, Dutch Deltares and Delft University. SDWA research agenda adopts systemic approach to the water problem and addresses entire hydrological cycle in an interconnected fashion. Part of the SDWA, the Aquatic Science Centre (ASC) is one of its kind in Singapore as it advocates an open research facility concept. It has several unique features including rain water collection and in-house waste water treatment capabilities.



E-vehicles

In 2009 the Dutch government initiated the 'Formule E-Team', a governmental taskforce with the task to stimulate the introduction of electric mobility at a larger scale and reduce the barriers for implementation. The objective for 2025 is for 1 out of every 10 cars on the Dutch roads to be an electric vehicle. Besides that, the Netherlands aims to be the European main port and international test-bed for electric vehicles.

Four priority sectors

Identifying clear priorities is crucial to the continued growth and progress of knowledge-based economies. The Dutch government has recently defined ten top sectors, and a fund of €500 millions will be allocated to encourage R&D and innovation, more in particular for SME's.

Four of the top sectors have also been chosen as focus areas by the Singapore government. Each sector - **Water, Energy, Creative Industry and Life Sciences & Health** – was carefully selected to reflect a long-term perspective. All four correspond to emerging social trends, as well as to the quest for improved quality of life and sustainability.

Water

With about half of its surface area less than one meter above sea level, and much of it actually below sea level, the Netherlands has historically been associated with water management. The nation has an extensive range of dykes and dunes that protects the low-lying areas from flooding.

The high population density (493 persons/m²) together with an economy largely related to transport, navigation and ports, results in pressure on space and environment

that has to be managed carefully. This is managed through the design of sustainable engineering and 'smart' infrastructure for complex settings.

Water engineering is one of the most prominent sectors in the Dutch economy. The overall theme for the Netherlands' approach to the cooperation between Singapore and the Netherlands in the water sector is "cities, environment & climate change".

Did you know.....?

- Dutch water expertise was used in the engineering of the Marina Barrage.

Energy

The Netherlands has a strong standing in the areas of renewable energy and energy efficiency and a leading position in wind energy at sea, biomass processing and greenhouse farming.

The Netherlands has embraced a courageous vision: by 2050, the country will have a sustainable, reliable and affordable energy system in which CO₂ emissions have been halved and 40 percent of electricity is derived from sustainable sources. The remaining 60 percent of electricity will come from gas, nuclear fuel and modern coal-powered plants using Carbon Capture and Storage (CCS) technology.



Serious gaming

The Dutch gaming industry is one of the fastest growing and most highly acclaimed in the world. The Netherlands also has one of the most active online gaming markets in Europe. Of the top 10 game publishers, nine have direct presence in the Netherlands. In 2011 Dutch based Ranj Serious Games and Singapore based NBDA Asia signed a Memorandum of Understanding (MoU). The final objective is to establish a Singapore based Serious Games unit for the production, marketing and sales of "educational games with a purpose". Both parties are now co-developing "Heartware", a serious game for training retail assistants to engage better with their customers.



Cardiovascular research collaboration

For more than five years there has been an international collaboration led by NTU and the Interuniversity Cardiology Institute of the Netherlands (ICIN). Recently, their team of scientists has discovered more than 10 types of unique proteins which are commonly present in the blood of a person who recently suffered a stroke or heart attack. The breakthrough is a result of clinical samples and data of NUH. The team will now expand their research to study the existence of these proteins, also known as bio-markers, in Singapore's multi-racial population.

Innovation and public-private partnerships are key to the Dutch approach: the government, private sector, and academia co-operate on topics such as green materials, built environment, sustainable mobility, chain efficiency, sustainable electricity, new gas, and greenhouses as a source of energy.

Did you know.....?

- Dutch Philips is world industry leader in LED lighting and responsible for the illumination of the Singapore Flyer with a state-of-the-art LED lighting system.

Creative Industry

The Dutch creative industry is currently gaining considerable international acclaim and has particularly strong profiles in interior design, interactive digital media, (serious) gaming, fashion, and architecture.

The strengths of Dutch design: pragmatic, open-minded, conceptual, out-of-the-box, and adhering to the principle 'less is more'. Dutch creative thinking demonstrates that creativity can make businesses more innovative, attractive, competitive and prosperous.

Dutch design is currently riding a wave of success, as is Dutch architecture, with iconic architect Rem Koolhaas at the helm. Dutch TV production companies develop and sell formats and programs such as 'Big Brother' and 'The Voice' around the world. The same strong international reputation is enjoyed by Dutch game developers.

Did you know.....?

- Dutch architect Ben van Berkel is responsible for the design of the new Singapore University of Technology and Design (SUTD).

Life Sciences & Health

Biomedical science is of the utmost importance for the research agendas of the Netherlands and Singapore. Both countries are being confronted with a fast ageing population. These changes influence the demand for care. Furthermore the Netherlands and Singapore have a multi-racial population.

Under the umbrella of the Life Sciences and Health innovation program the R&D in the Netherlands focuses on the key areas drug development, molecular diagnostics and imaging, and biomaterials and regenerative medicine. Driven by industry, and empowered by the Ministry of Economic Affairs, the innovation program aims to double the industry's turnover, as well as the number of R&D oriented companies and products.

Did you know.....?

- The Dutch Life Sciences and Health innovation program injected €1 billion into more than 100 separate projects over the period of 2008 to 2012.

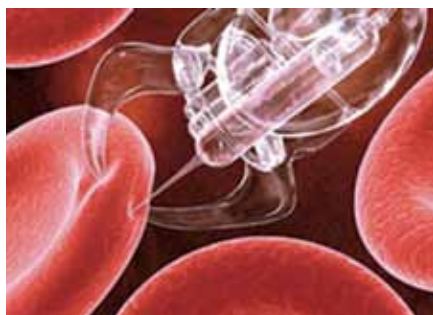
Netherlands Office for Science & Technology in Singapore

The Netherlands Office of Science and Technology in Singapore provides support to the government, knowledge institutions and business world in the quest for technical-scientific information and endeavours to establish international contacts, exchange information and present initiatives for collaboration. It also promotes Dutch Science and Technology in Singapore, presents opportunities for Science and Technology collaboration between Singapore and the Netherlands and facilitates matchmaking.

United Kingdom



The UK punches above its weight in many areas of science. With 2% of the world's population, we produce 9% of the world's scientific papers, and have a citation share of 12% - second only to the US. We attract a higher share of research and development than any other member of the G8.



Among the 165 universities and higher education institutes in the UK, 3 rank in the top 10 in the world and the best 3 universities in Europe are all British, with 5 UK institutions in the top 10 in Europe. In total, they produce more than 300,000 graduates, over 100,000 Masters graduates and 125,000 Doctoral postgraduates each year.



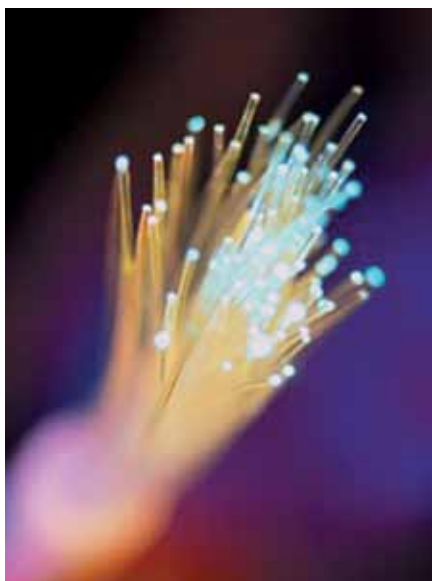
Science and innovation play a key role in promoting prosperity and improving our quality of life, as well as tackling the challenges facing us nationally and globally. Science and innovation are at the heart of UK government strategy for promoting sustainable economic growth and international collaboration is a vital part of this. Further, challenges such as pandemic disease, climate change, and food security, require engagement with other governments through sound science.

The UK is committed to maintaining a world class research base responsive to users and the economy, with sustainable and financially strong universities and public laboratories, and a strong supply of scientists, engineers and technologists.

There is a long history of world leading UK science ranging from the development of the foundations of physics and the first working steam locomotive, to the discovery of Penicillin, the molecular structure of DNA, the first cloned mammal and the mapping of the human genome. This continues across the breadth of science and today the UK is still a world leader in key areas.

Every one of the world's top pharmaceutical companies has links with the UK and, as a result, the UK has created one in four of the world's top 100 medicines and 45 percent of all pipeline products in Europe. The UK is a global leader on climate change and hosts the critical infrastructure needed to deliver scientific breakthroughs and practical solutions. There is substantial research in advanced materials which secures competitive advantage in traditional materials as well as driving world-class developments in newer areas such as biomaterials, nanomaterials and polymers. Andre Geim and Konstantin Novoselov were awarded the Nobel Prize for physics in 2010 for their work at Manchester University on the groundbreaking experiments on the two-dimensional material graphene.

The UK's outstanding universities are at the heart of this strength in science. Their expertise and engagement with industry drives not only scientific discoveries, but thousands of new inventions and patents every year. Many of these are created through collaborations with industry including high-tech, small and medium sized enterprises as well as large multinationals from around the world.



Affiliates of the University of Cambridge have won more Nobel prizes than any other European institution – since 1904, 88 have won Nobel prizes.

The UK funds a network of Science Officers in British Embassies, High Commissions and Consulates around the world.

In Singapore, the Science and Innovation Network (SIN) team runs the UK-Singapore Partners in Science programme with A*STAR, NRF, local universities and companies. The programme was formalised in 2005 with an agreement signed by the Prime Ministers of the two countries. Since then, more than 7,000 people have attended 35 workshops and other events. There is continued high level engagement between the two countries and the relationship with Singapore forms the basis of the work that the SIN team does across Southeast Asia.

Recent successes of the UK-Singapore Partners in Science programme:

S\$5 million Joint UK-Singapore fund to fight Infectious Diseases

To harness the best quality science in tackling the global threat of infectious diseases, the SIN team facilitated a funding partnership between Singapore's A*STAR and the UK's Medical Research Council. Following a series of infectious disease workshops and travel grants, SIN worked with the organisations to earmark S\$5 million for joint research. Six initial projects have been selected to develop treatments and vaccines for diseases including gastric flu, hepatitis B, dengue and tuberculosis, which should save thousands of lives each year.

UK-EU-Southeast Asia team receive S\$12 million to tackle dengue

A consortium including partners from the UK, Vietnam, Malaysia, and Indonesia who met at a SIN organised workshop have joined forces with partners from Cambodia and various Latin American and EU countries and secured in principle funding of S\$12 million from the EU to carry out an integrated programme of research to tackle the dengue virus. The consortium will focus on risk assessment, management and surveillance of the disease.

New cancer insights from UK-Singapore-Sweden partnership

The Science & Innovation team organised workshop on cancer: "p53: The Next 30 Years" which has led to several new collaborative initiatives and the resulting partnerships have improved understanding of the mechanisms of cancer. One UK-Singapore-Sweden collaboration (between the University of Cambridge, A*STAR and Karolinska Institutet) led to an article in the prestigious journal 'Nature'.

UK-Singapore-EU project receives S\$6 million from EU to fight mosquito-borne disease

A UK-led consortium formed at the SIN-organised "EU-Southeast Asia Vector Borne Diseases" workshop, was successful in securing S\$6 million funding under the European Commission's FP7 programme. The four-year project, led by the University of Edinburgh, with collaboration from A*STAR's Singapore Immunology Network, will focus on developing treatments for Chikungunya. Previously confined to Asia and Africa, the first outbreak of the disease hit Europe in 2007.

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