

PRESS RELEASE

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NEW CREATE CENTRE SET UP BY TOP SWISS UNIVERSITY ON GLOBAL ENVIRONMENTAL SUSTAINABILITY AND THE FOURTH RESEARCH PROGRAMME ON FUTURE URBAN TRANSPORTATION APPROVED FOR SMART CENTRE

- *Swiss Federal Institute of Technology (ETH) Zurich to set up a CREATE research centre on Global Environmental Sustainability, starting with a Future Cities Laboratory programme*
- *The MIT SMART Centre at CREATE will embark on a fourth research programme in Future Urban Mobility to develop smart, sustainable urban transportation solutions*

1 The National Research Foundation (NRF) announced today the set up of a Singapore-ETH Centre (SEC) for Global Environmental Sustainability with Switzerland's top university, the Swiss Federal Institute of Technology (ETH) at Zurich. This is the third centre under the NRF initiative of CREATE – the Campus for Research Excellence And Technological Enterprise. At the same time, the NRF's ongoing partnership with the Massachusetts Institute of Technology (MIT) in the SMART Centre (which is a part of CREATE) was also augmented with the addition of a fourth research programme in Future Urban Mobility.

2 Dr Tony Tan, Chairman of NRF said: "We are very pleased to have this long term strategic partnership with renowned Swiss university ETH to address the very pressing global challenge of sustainable development. This close research cooperation would allow the scientists from Singapore and Switzerland to work on a range of climatic conditions, from the cool temperate climate in Switzerland to the hot and humid tropical conditions in Singapore. I am pleased too that the latest research programme from the SMART Centre is on yet another major global challenge – the development of sustainable urban transportation solutions. These 2 research programmes underscore the role that top research universities are increasingly playing – carrying out research to deliver high impact outcomes of economic and societal good. With the addition of these two significant programmes, we are on the right track to establish Singapore as a global player in the research and innovation landscape."

Singapore-ETH Centre (SEC) for Global Environmental Sustainability

3 In mega-cities¹ all over the world, high-rise buildings dominate the urban landscape. Managing energy consumption through improving efficiency is critical as infrastructure development continues to surge to satisfy the escalating demand for

¹ A mega-city is usually defined as a metropolitan area with a total population in excess of 10 million people. Source: "How Big Can Cities Get?" New Scientist Magazine, 17 June 2006, pg 41

public facilities. Maintaining a clean and reliable water supply, clean air and clean environment are major challenges.

4 Asia will be experiencing unprecedented urbanization in the coming years. While this will severely strain available resources, it will also create a huge market for industries involved with sustainable design, planning and construction. This is where new technologies developed through R&D can provide solutions to these urban challenges.

5 ETH Zurich is partnering the National University of Singapore (NUS) and the Nanyang Technological University (NTU) in research to develop innovative scientific methods, instruments, processes and products under the theme of Global Environmental Sustainability. The SEC will draw on the best scientists and engineers from the three institutions to work on problems of global significance and relevance to Singapore. It will be a platform for a unique and long-term inter-disciplinary and trans-continental research and education co-operation between Singapore and Switzerland.

6 The SEC will start with the Future Cities Laboratory (FCL) programme. The FCL programme will undertake cutting-edge research in disciplines ranging from material science, engineering and environmental technologies to communications technology and architecture. The FCL aims to research and develop solutions and guidelines directed towards the sustainable development of buildings, districts and regions (see **Annex A** for a brief writeup of the FCL programme).

7 ETH Zurich President Professor Ralph Eichler said, "SEC will provide excellent opportunities to develop, test models and simulation platforms developed for temperate climates, in a tropical Asian city. In doing so, useful lessons could be drawn and solutions offered for a wide range of geography and culture. We look forward to having SEC's research create outcomes that would make a significant difference to Switzerland, Singapore and the world."

Future Urban Mobility IRG

8 The SMART Centre will establish its 4th inter-disciplinary research group (IRG) on future urban mobility. This IRG aims to develop a new paradigm for the planning, design and operation of future urban mobility systems (see **Annex B** for a brief write-up of the research programme).

9 "The project will bring together some of the best people in Singapore and at MIT in the fields of networked computing and control, transportation systems analysis, operations research, and urban studies to address this big challenge. We look forward to working closely with several agencies in Singapore, such as the Land Transport Authority (LTA), Urban Redevelopment Authority (URA) and DSO National Laboratories in this complex project," said Professor Amedeo Odoni, lead principal investigator for the IRG from the Department of Aeronautics & Astronautics and the Department of Civil & Environmental Engineering at MIT.

10 Up to five interdisciplinary research groups (IRGs) will be established under the SMART Centre. The research themes will be on problems which are of global economic and societal significance. Three IRGs have already been established –

Infectious Diseases, Centre for Environmental Sensing and Modelling (CENSAM) and BioSystems and Micromechanics (BioSyM) (see **Annex C** for details on the SMART Centre's progress), all operating in temporary premises at the NUS. The three IRGs involve some 36 principal investigators from MIT working alongside 67 collaborators from Singapore's universities and research institutions, together with another 70 post-doctoral fellows and a similar number of research students.

Campus for Research Excellence And Technological Enterprise (CREATE)

11 ETH Zurich is the third renowned institution to set up a research presence under NRF's CREATE initiative (see **Annex D** for more information on CREATE), after the Massachusetts Institute of Technology (MIT) and the Technion-Israel Institute of Technology. These research centres will be relocated to the CREATE campus when it is completed in 2011. Located at the southern end of the new National University of Singapore (NUS) University Town (former site of the Warren Golf Course), CREATE will have a gross floor area of over 60,000 m² to house 1,000 researchers at steady state.

12 Several other top research universities are in varying stages of discussion with NRF on their intentions to set up similar centres. The concentration of diverse talents doing cutting-edge research in CREATE would act as a magnet for attracting more research talent locally and from all over the world, making Singapore perhaps the first R&D hub that congregates the best of research talent from diverse cultures and background.

The National Research Foundation (NRF)

The National Research Foundation (NRF), set up on 1 January 2006, is a department within the Prime Minister's Office.

The NRF sets the national direction for research and development (R&D) by developing policies, plans and strategies for research, innovation and enterprise, funds strategic initiatives, builds up R&D capabilities and capacities through nurturing our own and attracting foreign talent, and coordinates the research agenda of different agencies to transform Singapore into a knowledge-intensive, innovative and entrepreneurial economy. It provides secretariat support to the Research, Innovation and Enterprise Council (RIEC), chaired by the Prime Minister. A five-year budget of S\$5 billion has been allocated to the NRF in 2006 to achieve this mission.

The NRF aims to:

- Transform Singapore into a vibrant R&D hub that contributes towards a knowledge-intensive, innovative and entrepreneurial economy; and
- Make Singapore a talent magnet for scientific and innovation excellence.

For more information, please visit www.nrf.gov.sg.

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Fact Sheet on the Future Cities Laboratory Programme

The Future Cities Laboratory (FCL) is a research platform under the Singapore-ETH Centre (SEC) for Global Environmental Sustainability. It is headed by an interdisciplinary team of researchers, architects, planners and engineers from the Swiss Federal Institute of Technology Zurich (ETH), working with Singapore universities (NUS and NTU) and research institutions. It is an interdisciplinary research group dedicated to sustainable development and the advancement of knowledge to promote future-oriented strategies in building technology, urban design, and territorial planning that implement new aptitudes regarding sustainability.

Research will focus on the three vectors: territorial planning (L-scale); urban design (M-scale) and building technology (S-scale) and seven research streams; involving stocks and flows of (i) People; (ii) Energy (iii) Water; (iv) Materials (v) Capital (vi) Space; and (vii) Information.

The People stream will produce interactive models based on population fluxes which will increase the effectiveness of city development. The Energy stream will develop potential products for intelligent and green building technology. The Water stream will focus on landscape ecology which will lead to better reuse and conservation of scarce water resources, thereby improving their availability and quality. The Materials stream will contribute to value creation through new lightweight recycled concrete, ultra-high selectivity glazing, lifecycle optimisation, and more efficient construction processes. The Capital stream will lead to affordable improvements to the quality of urban life in a combined effort to establish a balance between the private and public sectors, between investment opportunities and social stability. The Space stream will ensure efficient territorial organization, the long-term attractiveness of city development, reduce urban sprawl and offer strategies for transportation pollution reduction. The Information stream will provide an integrated simulation and scenario planning for all research projects and develop the method of the digital chain on the urban scale. It will also create a long-term database and communication environment for future cities planning.

Using Singapore and other cities as case studies, the objective is to promote through comparative analysis, methods and techniques for achieving ecologically balanced urban settlements worldwide.

Fact Sheet on Future Urban Mobility IRG

Ensuring the sustainability and the effectiveness of the urban mobility systems is one of the greatest challenges facing the global community. With the vast majority of the world's population increasingly residing in ever-expanding urban and metropolitan areas, sustainable urban mobility systems are essential to the well-being of contemporary societies and economies. With this in mind, the goal of the Future Urban Mobility IRG is to develop in and beyond Singapore new paradigms for planning, design and operation of future urban passenger and freight transportation systems that enhance sustainability and societal well-being in a high density but people friendly urban environment.

The project is structured around three areas: (i) networked computing and control; (ii) integrated modeling of mobility, land use, environmental, and energy-use impacts; and (iii) performance assessment and implementation.

The objectives of the three focused areas are to develop some foundational capabilities, test innovative approaches to urban mobility, demonstrate their feasibility and performance, assess the results of the experiments, evaluate the potential of the proposed urban mobility approaches and explore the adaptability and applicability of these innovations to Singapore and to other urban context.

The multi-disciplinary team is drawn from the MIT Engineering, Architecture and Business Schools. The project integrates a comprehensive set of skills and knowledge including expertise in network computing and control, land use and transportation planning, policy, design, intelligent transport systems and activity modeling and operations research.

Fact Sheet on SMART Centre

SMART Centre Progress

The SMART Centre started its research activities in temporary premises in the NUS in July 2007. The Centre currently has over 30 MIT faculty members working with around 80 local collaborators and supported by over 90 PhD students and 78 post-doctoral fellows and researchers, of which 54 were hired by the SMART Centre. Research over the last 2 years has produced 13 invention disclosures and 6 provisional patent filings.

MIT proposed to set up 5 inter-disciplinary research groups (IRG) in total at the SMART Centre. Three IRGs are presently operating from temporary lab premises at the NUS. They are described below:

- a. The **Infectious Diseases** IRG, approved in June 2007, focuses on 4 main diseases namely 1) malaria; 2) influenza; 3) respiratory syncytial virus and; 4) tuberculosis. This IRG started in July 2007. The lead Principal Investigator (PI) is Prof Jianzhu Chen, who is supported by a team of 7 MIT PIs and over 30 Singapore co-PIs and collaborators. There have been 7 invention disclosures to date and 4 patent filings.
- b. The IRG on the **Centre for Environmental Sensing and Modelling (CENSAM)** was approved in June 2007, with the aim to develop proof-of-concepts in the paradigm of pervasive monitoring, modelling and control in highly developed and carefully managed urban environments, such as Singapore. The IRG started in January 2008 and has a team of 12 MIT PIs and 30 Singapore co-PIs and collaborators. It has 5 inventions disclosures and 2 patents filed to date.
- c. The **BioSystems and Micromechanics (BioSyM)** IRG, approved in July 2008, seeks to develop new technologies that address critical medical and biological problems, applicable to a variety of diseases. It also seeks to further develop these technologies to provide novel solutions for the healthcare industry. The IRG started in January 2009. The lead PI is Prof Roger Kamm, who is supported by another 7 MIT PIs and 25 Singapore co-PIs and collaborators. The IRG has 1 invention disclosure to date.

Fact Sheet on CREATE

Aim

The Campus for Research Excellence And Technological Enterprise (CREATE) aims to be a world-class research facility in a tropical garden setting. Co-located with NUS' University Town at the former Warren golf course, CREATE will host research centres which will undertake cutting-edge research in areas that are aligned to Singapore's strategic interests.

Design of CREATE

The CREATE building complex is designed with the following considerations:

(a) Pioneering environmental sustainability technologies in the tropics

CREATE will pioneer the use of environmental sustainability and energy efficient technologies in buildings in the tropics. The laboratory core spaces and corridors will be located at the perimeter to introduce maximum daylight and reduce significantly the need for artificial lighting. The dependence on municipal water will be reduced by the collection, storage, treatment and re-use of rainwater and grey water from showers and lavatories. The use of photovoltaic panels on the building is also being explored and provides an opportunity for the test bedding of the latest solar technologies.

(b) Strong interaction & collaboration

The campus will house a multi-cultural and multi-disciplinary research community. CREATE will be designed to maximize the interaction among these diverse individuals.

(c) Flexible Configuration

CREATE laboratories would be built with flexibility to cater to the different needs of researchers. Laboratories would be reconfigured quickly in response to the dynamic requirements and varied needs of the research groups.

(d) Magnet for global research talent

Through the presence of world class research universities and research facilities, and the proximity of the National University of Singapore, the Science Parks and the One-North developments of Biopolis and Fusionopolis, CREATE will be a magnet for attracting scientific talent from all over the world

Fact Sheet on ETH Zurich

Pioneering basic research, top-quality teaching and a committed exchange both within science and with the decision makers in economy and politics

For more than 150 years, ETH Zurich has lived up to its social responsibility. Researchers from all over the world develop at ETH Zurich the basis and sustainable solutions for current and future global challenges - as part of an international network.

ETH Zurich has a student body of fifteen thousand students from 80 nations, including 3,500 doctoral students. 410 professors mainly teach engineering sciences and architecture, system-oriented sciences, mathematics and natural sciences, as well as carry out research that is highly valued worldwide. According to the Times Higher Education-QS Ranking 2009, ETH Zurich is the top ranked continental European university at 20th place worldwide. Distinguished by the successes of 21 Nobel laureates, ETH Zurich is committed to providing its students with an unparalleled education and with outstanding leadership skills.

Turning knowledge into business is a top priority for ETH Zurich. Between 1998 and 2007, no fewer than 130 spin-off companies were founded and a record 23 spin-offs were established in 2008 alone. Furthermore, about 80 patents are registered annually. ETH Zurich enjoys numerous collaborations in different fields with Swiss and foreign companies and has developed various strategic partnerships with global companies such as IBM, Roche or Disney.

For more information on ETH Zurich, please visit: www.ethz.ch/index_EN