
PRESS RELEASE

16 March 2007

RESEARCH, INNOVATION AND ENTERPRISE COUNCIL FOCUSES ON HIGH-IMPACT RESEARCH AND R&D TALENT

- *The Research, Innovation and Enterprise Council (RIEC) approved a Competitive Research Programme funding scheme to encourage a broader range of high-impact research ideas.*
- *Three initiatives were approved to enhance intellectual and human capital for R&D: Research Fellowship scheme to attract and develop young R&D talent; research programme on infectious diseases in the Singapore-MIT Alliance for Research and Technology (SMART) Centre; and Research Centres of Excellence in our universities with the first in Quantum Information Science and Technology at the National University of Singapore (NUS).*
- *The RIEC noted that good progress has been made in the three strategic research programmes - Biomedical Sciences, Environmental and Water Technologies, and Interactive and Digital Media - approved at its first meeting last year. A new area, Clean Energy, focusing on solar energy, has been added to the Environmental and Water Technologies programme.*

The Research, Innovation and Enterprise Council (RIEC) concluded its second meeting today. RIEC members discussed the need to focus on high-impact research to generate new breakthroughs. High-impact research refers to research aimed at solving significant practical problems while seeking to extend the boundaries of understanding. It embraces both elements of basic research (which is directed at creating new knowledge) and applied research (which is directed at finding applicable technologies).

2. RIEC Chairman, Prime Minister Lee Hsien Loong, said, "To transform Singapore into a knowledge-intensive economy, we have to build up our capabilities, enhance our competencies in existing technologies, and seek out promising new areas. This means strengthening our human capital in R&D by grooming local research talents and attracting top-rate scientists to work here. They will raise Singapore's profile as a vibrant centre for R&D and technological applications."

**Supporting a Broader Range of Research Initiatives:
Competitive Research Programme Funding Scheme**

3. The RIEC emphasized the importance of encouraging a broader range of high-impact research programmes. New ideas, not currently on our radar screens, could emerge through a bottom-up approach. To facilitate this, the RIEC approved the National Research Foundation's (NRF) Competitive Research Programme (CRP) to fund a broad base of research ideas at the programme level with a four-year budget of S\$250 million. Dr Rita R. Colwell, former director of the US National Science Foundation, will head a panel of international and local experts to evaluate proposals submitted. **Annex A** contains a Fact Sheet on the scheme.

Enhancing our Research Capacity through Human Capital Development:

4. The RIEC stressed the need to enhance our research capacity by growing a pool of top research talent and developing the platforms on which they could create research breakthroughs. This will be done by setting up a Fellowship Programme, attracting world renowned research universities to establish research centres here, and helping our local universities to establish Research Centres of Excellence.

- ***NRF Research Fellowship Scheme***

The RIEC recognised that Singapore needed a concentration of top research talent to become a global R&D hub. To attract and retain such talent, a scheme to award globally competitive research fellowships will be launched. The NRF Research Fellowship award provides a grant of up to US\$1.5 million over three years to enable the recipient to assemble and lead a small research team at a Singapore-based research organisation of his or her choice. Promising Fellows will be offered tenure-track or permanent positions at our local universities or research institutions. The RIEC approved a five-year budget of S\$160 million for the NRF Research Fellowship Scheme. **Annex B** contains a Fact Sheet on the NRF Research Fellowship Scheme.

- ***Campus for Research Excellence and Technological Enterprise (CREATE)***

The concept of CREATE for a select few of the top research universities in the world to set up research centres was endorsed at the RIEC meeting last year. The RIEC envisioned that such a campus would play a pivotal role in helping Singapore attract research talent and provide them the environment to carry out their research. The Council approved the first research programme on infectious diseases in the Singapore-MIT Alliance for Research and Technology (SMART) Centre¹ to start in July 2007.

¹ The SMART Centre was approved as the first research centre in CREATE at the first RIEC meeting in July 2006.

Annex C contains a Fact Sheet on the SMART Centre and the programme on infectious diseases.

- ***Research Centres of Excellence (RCEs)***

To step up research efforts in our local universities, the RIEC approved a joint proposal from the NRF and Ministry of Education (MOE) to establish a small number of RCEs within the local universities. RCEs will focus on investigator-led research and graduate education in areas that are aligned to Singapore's strategic interests. A five-year budget (from 2007 to 2011) of S\$500 million has been approved for NRF to co-fund RCEs with MOE. The first approved RCE is on Quantum Information Science and Technology, and will be established at the National University of Singapore. **Annex D** contains a Fact Sheet on RCEs.

Strategic Research Programmes and New Strategic Area on Clean Energy

5. The RIEC noted the good progress (see **Annex E** for details) made in the three strategic research programmes approved at the first meeting – Biomedical Sciences (BMS) Phase II, Environmental and Water Technologies (EWT) and Interactive and Digital Media (IDM).

6. In BMS, the RIEC noted that to increase focus on translational research, it was important to incorporate clinical trials into the research activity, develop the ability to precisely diagnose diseases to identify focus areas of research and increase activities in medicinal chemistry and pre-clinical development. In view of growing concerns on ethical issues relating to animal testing, the RIEC commented that Singapore should maintain our good animal experimentation policies.

7. The RIEC noted the increasing concerns of climate change and its potential impact on the global need for clean water. The EWT programme's focus on clean water was very timely and the RIEC felt that Singapore's holistic programme to develop into a hydro-hub was unrivalled. Singapore should play a more prominent role at global forums on water management and security of water supply. The RIEC was pleased that international companies had been attracted here to undertake significant R&D activities in clean water.

8. The RIEC recommended a sharper focus on leveraging IDM in education. IDM technologies should be directed to transform teaching of mathematics, science and languages in more effective and affordable ways for the global market. The use of IDM for learning languages would leverage our multi-lingual capabilities to enable the West to learn Asian languages and for the East to learn the English language. The RIEC also felt that the initiative to encourage the exploration of new ideas for IDM by individuals and start-up companies was appropriate given that most innovations in IDM came from non-incumbents.

9. The RIEC noted the rapidly growing market for Clean Energy in view of rising global concerns of the impact of burning fossil fuels on our environment. Singapore has the competitive advantage to undertake R&D in this area and to commercialise the R&D outcome. The RIEC approved funding of S\$170 million for a Clean Energy initiative under the EWT strategic research programme with a focus on solar energy. The goal is to develop a Clean Energy industry in Singapore that would generate S\$1.7 billion of value-added and create 7,000 new jobs by 2015. The Clean Energy initiative will be overseen by a Clean Energy EXCO whose composition is detailed in **Annex F**.

10. The RIEC will meet next year for its third meeting in March 2008 in Singapore.

Fact Sheet on the Competitive Research Programme Funding Scheme

Aim

1. The NRF Competitive Research Programme (CRP) Funding Scheme aims to support programmes, each comprising multiple related projects under a unifying theme, through a bottom-up approach. This complements the strategic research programmes that have been identified top-down and will serve to identify potential strategic research areas in which Singapore can invest to develop new industries for the future.

Background

2. Instead of funding individual projects, CRP will fund programmes or groups of related projects through a competitive process. Programme funding will allow a more coordinated, integrated and sustained way of supporting high-impact interdisciplinary research because a larger budget can be allocated to fund a number of related projects that address a given problem. The tight linkages amongst the projects in a programme will also make commercialisation of the research results easier. This scheme is a useful mechanism to identify potential strategic areas in the future.

Terms and Conditions

3. CRP is open to all areas of science and technology. Multi-disciplinary programmes of up to five years in duration are encouraged. There will be two grant calls per year with a maximum of S\$10 million per award.

Evaluation Processes

4. CRP proposals will be assessed by an eminent Evaluation Panel chaired by Dr Rita R. Colwell, a member of the National Research Foundation's Scientific Advisory Board and a former Director of the US National Science Foundation.

5. Interested applicants will be required to submit a **White Paper** of up to five pages detailing their research plan, research aims and outcomes to NRF in response to a grant call.

6. The Evaluation Panel will select promising white papers to be further developed into **Full Proposals**.

7. Full proposals will be sent for international peer review. Top ranked proposals will be submitted to the Evaluation Panel for final selection.

Assessment Criteria

8. Proposals will be evaluated on the criteria of research excellence, manpower development, economic impact and industry involvement (where relevant).

Budget

9. RIEC has approved a budget of S\$250 million over four years for this scheme.

Fact Sheet on the NRF Research Fellowship Scheme

Aim

1. To attract promising young scientists from all over the world to conduct independent research in Singapore.

Background

2. The NRF Research Fellowship will provide attractive funding to brilliant, young scientists to carry out independent, cutting edge research in Singapore. Appointees could be offered concurrent faculty positions at local universities or other research organisations. This will build up a pool of bright, passionate researchers in various fields to augment Singapore's research talent pool.

Terms and Conditions of the NRF Research Fellowship

3. The NRF Research Fellowship is open to all areas of science and technology with no quota on specific disciplines.

4. The NRF Research Fellowship, targeted at young talented post-doctoral fellows at or below the age of 35, is open to all nationalities.

5. Appointed Fellows will be given complete independence and freedom to pursue their own research directions.

6. Appointed Fellows will be free to choose the host organisations to work in.

7. Each appointed Fellow will be provided with a research grant of up to US\$1.5 million over three years with the option of a second round of three-year funding provided at the discretion of NRF to support projects that exhibit a high likelihood of a research breakthrough.

8. The salary of an appointed Fellow will be covered over and above the research grant, pegged to that of an Assistant Professor at a local university.

Identification and Selection Processes

9. NRF will invite applications twice a year through open advertisements in prestigious scientific publications, as well as tap on local research organisations and other contacts to identify potential candidates.

10. A Review Panel comprising representations of local research organisations will shortlist applicants who qualify. Shortlisted candidates will be invited to Singapore to present their proposals and visit local research organisations to identify potential hosts.

11. The NRF Scientific Advisory Board will interview the shortlisted candidates and make the final selection of applicants for the awards.

Fact Sheet on Campus for Research Excellence and Technological Enterprise and the Singapore-MIT Alliance for Research and Technology Centre

Campus for Research Excellence and Technological Enterprise

1. The concept for the Campus for Research Excellence and Technological Enterprise (CREATE) was approved by the RIEC in July 2006. CREATE will foster joint research between a select few of the world's top research universities and Singapore-based research organisations. It will be a platform to attract and nurture young graduate and postdoctoral talent to build up a cadre of extraordinary scientists, whose discoveries and innovations could generate new growth engines for Singapore.

Singapore-MIT Alliance for Research and Technology Centre

2. The Singapore-MIT Alliance for Research and Technology (SMART) Centre was endorsed by the RIEC in July 2006 as the first centre within CREATE.

3. MIT plans to start the SMART Centre on 1 July 2007, with one interdisciplinary research group (IRG) on Infectious Diseases. A second IRG on Environmental Sensing and Modelling is under discussion. The two IRGs will have MIT faculty working with local faculty and researchers from local universities and research institutes as well as corporate laboratories.

4. The SMART Centre will be located at the NUS University Town at the site of the former Warren golf course. This location will provide the SMART Centre convenient access to the research resources, students and faculty of NUS as well as the scientific community in One-North. The SMART Centre will engage the whole Singapore research community through shared facilities and research space. The facilities for the SMART centre are expected to be ready in year 2010. Interim arrangements have been made to house the SMART Centre in temporary facilities in NUS so that research activities can commence in July 2007.

Inter-disciplinary Research Group (IRG) on Infectious Diseases

5. The IRG on Infectious Diseases aims to develop an integrated, cutting edge research programme to study pathogen-host interactions of infectious diseases. It will focus on infectious diseases of importance to Singapore, Asia and the world. These diseases are respiratory syncytial virus, influenza, tuberculosis and malaria.

6. The IRG involves eight senior MIT faculty members and 17 Singapore collaborators from NUS, NTU, Temasek Life Sciences Laboratory and

A*STAR research institutes. It is an interdisciplinary endeavour with expertise from biology, engineering, medicine and computing.

Fact Sheet on Research Centres of Excellence

Background

1. Research Centres of Excellence (RCEs) are research centres that focus on medium to long term world-class investigator-led research aligned with the long-term strategic interests of Singapore.

Objectives

2. The objectives of RCEs are to:
- Attract, retain and support world-class academic investigators;
 - Catalyse the development of Singapore's autonomous universities (AUs) into research-intensive universities and strengthen their prestige globally;
 - Enhance graduate education in the AUs and train quality research manpower;
 - Engender interest in research among local students and encourage them to pursue research careers; and
 - Create new knowledge in selected areas of focus.

Governance and Management

3. RCEs will have significant autonomy in pursuing their own research mission and objectives, while being co-located in and working closely with the AU. A Governing Board (GB) will be established for each RCE to provide strategic direction and good stewardship.

Structure and Organisation

4. The RCE will be headed by a Director who will report to the GB in the development, research performance and administration of the RCE.

5. Each RCE will typically have 15 to 20 principal investigators (PIs), each leading a research team of post-doctoral fellows, postgraduate research students and support staff (technicians and administrative staff). A typical RCE will have about 200 staff and require a physical space of about 5,000 m².

6. RCE PIs will hold joint-faculty appointment (with teaching responsibilities) at the host university or one of the other local universities.

Funding

7. NRF and MOE will co-fund the establishment of a few RCEs. A total of \$750 million (S\$500 million from NRF and S\$250 million from MOE) has been set aside by NRF and MOE for this initiative.

Selection and Review

8. MOE will administer the selection of quality RCE proposals through a two-stage selection process involving its Academic Research Council (ARC). In the first stage, universities will submit whitepapers stating the vision of the proposed RCE and an indication of the resources and budget required. The ARC will shortlist RCE whitepapers to be developed into full proposals. In the second stage, the ARC will evaluate the full proposals, with input from external reviewers if necessary. The ARC will recommend supported RCE proposals to MOE's Academic Research Board (ARB) and the NRF Board for funding approval.

9. Each RCE will be subject to an annual performance management review process. The RCEs will submit annual reports, tabled at the GB, ARC and NRF Board meetings, as part of its accountability framework. MOE, through its ARC, will provide oversight of the desired research and educational outcomes of the RCE.

10. A mid-term review of the RCE will be convened by MOE in the third year, and thereafter, on a two-year cycle. The mid-term/biennial review will be conducted by an International Review Panel (IRP) established by MOE. The ARC will recommend the continuation or termination of the RCE to the ARB and the NRF Board.

First RCE on Quantum Information Science and Technology

11. The first RCE to be established in on Quantum Information Science & Technology (QIST). The RCE on QIST will conduct interdisciplinary theoretical and experimental research aimed at overcoming the fundamental limits to information processing. It will develop quantum technologies that will be crucial in both cryptography and computation. In this respect, Singapore, in the last two years, has joined a small group of nations that are capable of developing quantum information technology. With appropriate research infrastructure and suitable funding, it has the potential to be among the world leaders in quantum information science and technology.

12. The RCE on QIST will be led by Professor Artur Ekert, Professor of Quantum Physics at Oxford University and the co-inventor of Quantum Cryptography.

Progress made in the Three Strategic Research Programmes

BMS

1. The BMS Phase II strategic research programme has launched two initiatives:

- The Singapore Translational Research (STaR) Investigator Awards, which is aimed at recruiting and nurturing world-class clinician scientists and clinician investigators to undertake cutting-edge translational and clinical research in Singapore.
- The Translational and Clinical Research Flagship Programme, which will fund research to translate basic scientific advances into clinical applications in a selected number of disease areas, for which Singapore could be a world leader, such as cancer, cardiovascular diseases, neurosciences, infectious diseases and eye diseases.

EWT

2. The EWT strategic research programme has launched a number of initiatives to develop and accelerate the introduction of new innovative water technologies and solutions to the market:

- The Environment and Water Research Programme to fund private and public sector research was launched in September 2006 and garnered enthusiastic response from the research community, with more than 120 proposals received.
- The Manpower Receptacles Programme to set up a number of specialist centres for graduate manpower training and R&D was recently started. The Singapore-Delft Water Alliance involving the Public Utilities Board, National University of Singapore and Delft Hydraulics was the first centre funded under the programme.
- The Technology Pioneer scheme aimed at commercialising locally-developed technologies by encouraging their early adoption by both the public and private sectors was also introduced.

IDM

3. The IDM strategic research programme has identified education; animation, games and effects; on-the-move technologies; and media intermediary services as focus areas for IDM R&D. Several initiatives were introduced:

- A public sector R&D scheme to fund investigator-led research in these areas. In education, funding will support projects aimed at developing innovative teaching approaches using IDM-based tools and media.
- An online platform has been created to encourage and allow individuals to share and experiment with innovative ideas in IDM.
- In the area of animation, games and effects, the Singapore-MIT GAMBIT² Game Lab is being established with MIT. The Game Lab will enable Singapore and MIT graduate students and faculty to collaborate on multi-disciplinary games research. It will train undergraduates in game programming techniques for new genres of digital games.

² Gamers, Aesthetics, Mechanics, Business, Innovation, Technology

Composition of the Clean Energy EXCO

Chairmen

1. Co-Chairman – Chairman, EDB, Lim Siong Guan
2. Co-Chairman – Chairman, EMA, Chiang Chie Foo

Members

1. Deputy Chairman, A*STAR, LG (NS) Lim Chuan Poh
2. Managing Director, EDB, Ko Kheng Hwa
3. Chief Executive Officer, IE Singapore, Chong Lit Cheong
4. Chief Executive Officer, NEA, Lee Yuen Hee
5. Chief Executive Officer, BCA, Dr John Keung
6. Chief Executive Officer, HDB, Tay Kim Poh
7. Chief Executive Officer, URA, Cheong Koon Hean
8. Chief Executive, EMA, Khoo Chin Hean

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