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**SPEECH BY DR TONY TAN KENG YAM,CHAIRMAN FOR NATIONAL RESEARCH FOUNDATION, AT THE 5TH INTERNATIONAL SYMPOSIUM OF NANO-MANUFACTURING, 23 JANUARY 2008, 9.00 AM AT GRAND COPTHORNE WATERFRONT HOTEL**

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***Globalisation of the Research University –***
***Singapore's experiment of a global knowledge and innovation enterprise,***
***A radical new venture for Singapore and MIT***

**Professor Shih Choon Foong**
**President of the National University of Singapore**

**Professor Su Guaning**
**President of the Nanyang Technological University**

**Professor Rafael Reif**
**Provost of MIT**

**Professor Hardy Chan**

**Professor Tom Magnanti**

**Professor Yue Chee Yoon**
**Co-chairs of ISNM5 organising committee**

**Distinguished speakers and guests**

**Ladies and Gentlemen**

It gives me great pleasure to welcome all of you to the 5th International Symposium of Nano-Manufacturing, held in conjunction with the SMA International Conference.

For those who have travelled a long distance to join us here in Singapore, let me extend to you a very warm welcome.

This Symposium brings together key thinkers, industry experts, academia and researchers to discuss important issues related to the production of devices and products that exploit nanoscale phenomena, in particular for the life science and biomedical industries.

I am confident that this exchange of knowledge, ideas and experiences, with inspiration drawn from internationally renowned experts, will lead to further advances in research, education, implementation and cooperation in nano-manufacturing.

<u>Globalisation and what it means for research universities</u>

In June last year, I attended a Colloquium on University education in a small town called Glion in Switzerland.

The Glion Colloquium, a gathering of leaders from universities, business and government, meets every other year, i.e. biennially, to discuss issues concerning university education and its impact on society and the economy.

The subject of our discussion last year was "Globalisation of Higher Education and its impact on the research universities of the world".

Globalisation is a phenomenon which has affected all of us.

While we are all aware of the influence of globalisation on the economy, less attention has been paid to what globalisation means for research universities.
This is a very important topic and I would like this morning to briefly mention the key points from the discussion at the Colloquium.

The drivers of globalisation can be categorised into four areas:

1. Expansion of activities beyond national boundaries – The expansion of economic activities and the influence of market forces have diluted the significance of national boundaries and intensified competition.
Many more opportunities for collaboration have also been generated.
As a result, research is now an international enterprise which brings together talent from around the world.
This International Symposium on Nano-manufacturing is a good example of this.
Today, we have some 300 participants from more than 20 countries all gathered in Singapore to advance the state of the art in nano-manufacturing.
The gathering of global research talent for such meetings of the mind is no longer the exception but rather the norm as the competition and sharing of knowledge have long transcended national boundaries.

2. Technological Revolution – Technological advances in transport and communications have made communications and trade faster, easier and cheaper.
It has also enhanced the ability to collaborate across national boundaries and various time zones.

The organiser of this Symposium, the Singapore-MIT Alliance, is a good example of how technology has enabled long-distance education and research collaborations to be carried out across 12 time zones.

3. Large Societal Issues. Researchers from top universities have long placed large societal issues at the centre of their research problem formulation.

Environmental Sustainability, Infectious Diseases, Interactive and Digital Media, are grand global challenges that challenge the world's researchers to find solutions.

The increase in both volume and speed of movement of talent and information has resulted in the formulation of more research collaborations. It has necessitated multi-disciplinary, multi-institutional and cross-border research, the coming together of people with a diversity of background and capabilities to work hand-in-hand to solve the big problems of the world.

4. Emergence of new markets – The rise of China, India and generally the Asian region has given rise to new markets with many opportunities for trade, investments and other economic activities.

Such new markets and opportunities will require innovative new products and solutions.

As R&D is the driver behind the development of new products in the knowledge-based economy, universities will have to play an even bigger role as knowledge creators and transmitters.

The concept of CREATE

To develop R&D as a key pillar of Singapore's competitiveness, the National Research Foundation (NRF) announced in March 2006 that it would be embarking on a bold experiment of global knowledge creation and innovation, in a project known as CREATE, which stands for Campus for Research Excellence And Technological Enterprise.

CREATE will be a complex of research centres from world-class research universities and corporate labs, pursuing research programmes in areas that are of mutual interest to these institutions and Singapore.
CREATE aims to be a magnet for global research talent.
CREATE centres will have faculty, researchers, graduate students and post-doctoral students from top research institutions around the world collaborating with their counterparts from universities, polytechnics, research institutes and corporate labs in Singapore and Asia.
This will be done through interdisciplinary research groups which will be staffed by a continuous cohort of researchers and students.

CREATE will therefore also serve as a research and innovation hub in Asia for these research institutions.
Through innovation centres, incubators and other academic entrepreneurial activities, CREATE aims to promote not only cutting-edge research but also innovation and entrepreneurship, thus creating value to enrich the society and economy.

<u>Why Singapore chose to work with MIT</u>

MIT's motto is "Mens et Manus" – Latin for "Mind and Hand".

This motto reflects the educational ideals of promoting education and research for practical applications.
Indeed, the Institute's official seal has the picture of a scholar and a labourer, to signify the union of knowledge with the mechanical arts.
MIT's commitment to marry teaching and research with innovation and entrepreneurship has spawned a host of scientific breakthroughs, technological advances and high-growth companies.
Past achievements include the creation of modern food preservation processes, the first chemical synthesis of penicillin and vitamin A, the development of inertial guidance systems, modern technologies for artificial limbs, high-speed photography and the magnetic core memory that made possible the development of digital computers.

If the companies founded by MIT graduates and faculty formed an independent nation, the revenues produced by the companies would make that nation the 24$^{th}$ largest economy in the world.
The 4,000 MIT-related companies employ 1.1 million people and have annual world sales of US$232 billion.
MIT is thus a good example to illustrate the impact and contribution that research universities can bring to the economy.

MIT has also clearly shown that use-inspired research does not compromise the quality of scientific research.
On the contrary, MIT continues to push the frontiers of basic science and continues to produce Nobel Prize laureates.
Sixty-four current or former members of the MIT community have won the Nobel Prize, including 12 who are current members of the MIT community.

The effective integration of excellent teaching and research with innovation and entrepreneurship is what makes MIT a worthy pioneering member of CREATE and a partner of Singapore.

Official launch of SMART

This morning, I am very pleased to announce the official launch of the Singapore-MIT Alliance for Research and Technology Centre (or SMART Centre for short), the first entity of CREATE.

2008 marks 10 years of engagement between Singapore and MIT through SMA. The success of this engagement has made it possible to elevate the relationship to a higher level.

There is considerable enthusiasm on the MIT campus for international engagements, and many would assert that MIT must be engaged internationally if it is to maintain its status as one of the world's great educational institutions.

The question MIT asked itself was not whether it should be engaged internationally, but how and with whom it should engage.

MIT's global involvement already takes place in nearly every continent, and is carried out at many levels – from individual faculty collaborations to institutional partnerships.

Notwithstanding this, SMART will be MIT's largest international venture and one of special significance.

SMART has the long-term commitment of both MIT and Singapore.

SMART offers MIT a unique opportunity for a major experiment in global research and to perform interdisciplinary experimental, computational and translational research that presently cannot be conducted at MIT. SMART also provides MIT an opportunity to be a pioneer in an international research campus of distinguished institutions in a strategic location within a rapidly-growing region of the world that is set for unprecedented economic and technological growth in the 21st century.

The research themes would be targeted at topics providing unique opportunities for MIT and Singapore to conduct research on problems of societal significance.
Two Interdisciplinary Research Groups (IRGs) have already been formed. One is on Infectious Diseases and another is a Centre for Environmental Sensing and Modelling (CENSAM).
Both have the strong commitment of senior MIT faculty who will be spending extended stays at SMART.
The programmes also involve strong collaboration with Singapore research institutions, universities and industry.

There will be ample opportunities for SMART and MIT to facilitate technology transfer in the region, through the creation of an Innovation Centre, similar to the Deshpande Centre for Technological Innovations at MIT.

Universities have the greatest capacity for knowledge creation through research.

It is important to infuse a culture of academic entrepreneurship among faculty in our universities as has been successfully achieved at MIT so that our universities play an active role in contributing to the economic growth of Singapore.

In recognition of the close collaboration between NRF, the Ministry of Education (MOE) in Singapore and MIT, I am pleased to announce that MOE will match dollar-for-dollar gifts and donations to SMART for the establishment of Singapore Research Professorships to be held by senior MIT faculty or scientists who are actively involved with the SMART Centre research programmes in Singapore.
Each of these professors will also hold a joint appointment at one of the local universities.

Research as a global enterprise

In closing, let me reiterate that globalisation has enabled the establishment of initiatives like CREATE and SMART which bring together the best and brightest from all over the world to engage in cutting-edge research that has societal and economic impact.
For the SMART initiative, we have no doubt that by leveraging on each other's strengths, we stand a better chance of delivering exciting opportunities for MIT and Singapore, and for science and technology worldwide.

Research is a resource intensive enterprise, and the Singapore Government, through the NRF and other public agencies, will continue to invest heavily in R&D.

This is also a great opportunity for industry to leverage on the R&D capabilities of the world brought to Singapore through CREATE. We encourage corporations to tap on the strong research expertise of CREATE entities like SMART and initiate R&D programmes that will lead to better and more innovative products and services.

Finally, I wish all participants a very fruitful and successful symposium.

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