

The logo for the 2nd World Conference on Research Integrity features the text '2ND WORLD CONFERENCE ON RESEARCH INTEGRITY'. The '2ND' is in blue, 'WORLD' is in blue with a globe icon, 'CONFERENCE' is in blue, 'ON' is in green, 'RESEARCH' is in green, and 'INTEGRITY' is in green. The background is a white shape with yellow and blue curved borders.

**2ND WORLD
CONFERENCE
ON RESEARCH
INTEGRITY**

PAN PACIFIC HOTEL SINGAPORE
21-24 JULY 2010

**OPENING SPEECH BY DR NG ENG HEN, MINISTER FOR EDUCATION AND
SECOND MINISTER FOR DEFENCE, AT THE 2ND WORLD CONFERENCE ON
RESEARCH INTEGRITY AT THE PAN-PACIFIC HOTEL ON THURSDAY, 22 JULY
2010, 9 AM**

Mr Lim Chuan Poh, Chairman, Agency for Science, Technology & Research (A*STAR),

Dr Su Guaning, President, Nanyang Technological University (NTU),

Professor Howard Hunter, President, Singapore Management University (SMU),

Distinguished speakers,

Conference delegates,

Ladies and gentlemen,

1. I am pleased to join you here today for the opening of the Second World Conference on Research Integrity. I am also glad that NTU, NUS and SMU are hosting this conference.

2. In relative terms, Singapore entered the R&D arena only recently compared with other developed countries with established centres and on-going investments in diverse scientific fields. To gain credibility and be among the leaders in R&D globally, Singapore must build a reputation of being able to produce high quality scientific outputs under strict ethical standards and academic integrity.

Science and Research as a Buttress for Economic Growth

3. The journey for Singapore to venture into R&D was not an intuitive one, 45 years ago at our founding. Our forays into this field were as much a response to competition as it was a default choice when looking at limited options for our economic strategy. Fortuitously, we had started well by ensuring that our students had good capabilities in science and technology. This was a necessity because bereft of natural resources apart from human capital and without a hinterland, our economic strategies necessarily focused on providing highly skilled labour selling products to global markets. As we

could not compete on size, we needed to leverage on science and technology to amplify our strengths and extend our reach.

4. This explains why barely two years after Singapore gained independence, we created a Science Council to advise the Government on matters relating to science and technology. But it would take longer, before the necessary conditions were in place for impactful R&D to be done here.

5. It was later in 1991, that the Government launched the first National Science and Technology 5-year Plan, which established the National Science and Technology Board, the successor to the Science Council. This Board was later reorganised to become the Agency for Science and Technology, or A*STAR, in 2001.

6. Part of this evolution to an economy centred on creating value through innovation and new ideas, was and is still driven by our neighbouring countries with cheaper factors of production, like land, labour and energy. Will Singapore succeed in this next lap where more is required of our human capital and with our competitive edge in traditional industries being eroded? We certainly hope so, because much of our economic progress depends on it.

7. But we have to be proactive and there are encouraging signs that we have at least, strong fundamentals in place. First, we have achieved high standards in maths and science among students, as shown in international comparisons such as the Trends in International Mathematics and Science Study or TIMSS. Their most recent report ranked Singapore students amongst the top 3 in the world for both maths and science achievement.

8. All of our Grade 10 students offer Mathematics and Science. More than 97% of our Grade 12 students offer Mathematics and 86% offer at least one Science subject. In Great Britain, this percentage drops to less than 15% for science and in America, the percentage of students offering Advanced Placement in science subjects is as low. We are fortunate to have a wide and high base to draw from and which must be continually cultivated to maintain that interest and edge for Singapore.

9. MOE will continue to put in resources to enhance the interest in and the learning of STEM – science, technology, engineering and maths at all levels – beginning from primary schools right through to our vocational institutes, polytechnics and universities. All our schools are equipped with science labs and resources. Our teachers are trained to elicit feedback and critique their delivery of content, to ensure that concepts are understood and better still visualised.

10. Part of the strategy to embed STEMs in our culture is to stretch our ablest. We encourage and facilitate for our top students to take part in the various International Science and Maths Olympiads and participate in overseas events such as the Intel International Science and Engineering Fair. The NUS Maths and Science High School is a specialised school for such talents.

11. These various initiatives have persuaded more than half of our students to pursue a science and technology degree at our universities. This is well above the average of 25% in OECD countries.

12. But these efforts will need to be maintained as the natural inclination for developed countries is a decline in the interest of STEM subjects. With economic prosperity and political stability, the motivation for students to study STEM subjects diminishes. Gradually, students will turn to study other subjects which they find intrinsically motivating and would lead to careers in finance and commercial sectors which offer higher monetary rewards. At the same time, we have to evolve our education system to facilitate creative thinking, refine thought processes and sharpen communication skills.

13. But to build expert mountain climbers in R&D, Singapore will also have to build not more petrochemical islands, airports or seaports as we did in the past when we needed them, but R&D peaks. Over the last four years, five Research Centres of Excellence have been established within NUS and NTU, with topics ranging from Quantum Physics to Mechanobiology.

14. We are thankful that we have been able to attract leading experts in these fields of study, who will help us develop a broad and deep spread of scientific talent here. To name a few, we have Dr Edison Liu, Executive Director of the Genome Institute of Singapore and ex-President of the Human Genome Organisation who is a top cancer researcher. We have Prof Artur Ekert, a leading expert of quantum computing and cryptography now at NUS. We also have Prof Staffan Kjelleberg starting up the Singapore Centre on Environmental Life Sciences Engineering at NTU, who is internationally recognised for his studies in biofilms.

15. In this quest to scale new heights at rarefied atmospheres, joint efforts and partnerships are crucial. We would be short-sighted and plain silly to try to do this alone. Locally, our universities, A*STAR and industry need to form strong bonds to form a triumvirate. A*STAR supports a wide range of industry-oriented research through its 14 research institutes and extramural research at our universities and hospital research centres. Collectively, the talent pool consists of bright graduates working side-by-side with leading scientists from around the world.

16. This wider economic strategy aimed at transforming Singapore into a knowledge-driven economy is driven at the highest levels of leadership through the Research, Innovation and Enterprise Council or RIEC, chaired by the Prime Minister.

17. Needless to say, R&D is an expensive investment with long time lines. In 1991, Singapore's Gross Expenditure in R&D, or GERD, was just half a billion, less than 1% of Singapore's GDP then. We had only 28 research scientists and engineers per 10'000 labour force. Today, our GERD at \$7 billion dollars annually is almost 3% of GDP. Nearly 1% of Singapore's workforce, or 26,000, are research scientists and engineers.

Singapore's Continued Commitment to Research Investment

18. As with most long-term ventures, early harvests sustain both morale and commitment, and thankfully we have a few. Take electronics for example. We are one of the world's leading manufacturing sites for research tools and diagnostics instruments, supplying more than half of the world's micro-arrays and the global demand for thermal cyclers. Singapore also accounts for 40% of the world's HD media volume. This advantage can be sustained by the presence of corporate labs from electronics powerhouses like Seagate and Showa Denko.

19. Clean technology, or cleantech, is another example. Many global players have recognised the research potential at our universities, and have set up corporate labs at their campuses. GE Water set up a \$130 million dollars R&D centre in NUS, while Bosch is investing \$30 million dollars in a lab looking at organo-photovoltaics in NTU. These have also drawn in leading wind and solar companies like Vestas and REC to set up a manufacturing presence in Singapore. Altogether, the cleantech industry in Singapore is expected to generate \$3.4 billion dollars a year in value-add and employ 18,000 people by 2015.

20. Singapore will also soon build up a 50-hectare CleanTech Park, our first eco-business park, immediately adjacent to NTU. This is part of the \$1 billion dollars Singapore Sustainable Blueprint announced last year that will hopefully put Singapore on the world map as a centre for developing, testing and commercialising green technology.

21. Singapore is also making head-way in the field of Bio-Medical Science. A*STAR's Institute of Materials Research and Engineering for example is working with Advanced Technologies & Regenerative Medicine through its Singapore affiliate Johnson & Johnson to develop customised artificial "nano-skin" for implantable medical devices to make them more biocompatible. Researchers at the Cancer Science Institute, another Research Centre of Excellence in NUS, have recently reported a novel combination of drugs that can potentially halve therapy costs and decrease the side effects of treatment for advanced breast cancer patients. We hope for more such innovative scientific breakthroughs from our universities and research institutes working with multinational giants like Roche, Novartis and GlaxoSmithKline here.

Research Integrity as Public Trust

22. I mentioned earlier that Singapore was a relative newcomer in this high-stakes game. We should note that competitors, with much larger economies, are not standing still. The Obama Administration has pledged to devote more than 3% of America's GDP to R&D. South Korea is aiming for 5%. France is spending €4.4 billion euros on a new "super university" to rival the top universities of today. But this race is virtuous and Singapore will form more linkages for international collaboration and cooperation.

23. High standards of integrity and ethics in research are crucial in Singapore's quest to be a R&D node in this global network. Knowledge without integrity can harm. The 2nd

World Conference on Research Integrity is therefore timely and will assist us in reviewing our systems and procedures for our universities and research institutes.

Conference Outcomes

24. To this end, I am glad that this conference has already set itself a discrete deliverable. It aims to crystallise one of the main recommendations from the First World Conference on Research Integrity, which is the need for consistent institutional and national policies. It will work towards developing a set of fundamental and basic principles to be agreed by consensus at this meeting, and which will be known collectively as the 'Singapore Statement'. It is my hope that this Statement will serve as a basic document for a global code of conduct and protocols, from which individual countries can adapt and use for their own institutions to address the issues pertaining to research integrity and good research practices.

Conclusion

25. I wish to thank all the sponsors of this conference, and NTU, NUS, SMU and A*STAR. And also the US Office of Research Integrity and the European Science Foundation, which initiated the inaugural World Conference on Research Integrity in 2007. I want to thank all the other major contributors who have provided support for this meeting in one way or another.

26. I wish you all exciting, engaging and enlightening discussions throughout the next few days. To our guests from all over the world, I wish you a most pleasant stay in Singapore.

27. It gives me great pleasure to declare the 2nd World Conference on Research Integrity officially open.

Thank you.