

SIXTH INTERNATIONAL SYMPOSIUM  
ON CATASTROPHE RISK MANAGEMENT

MEGACITIES OF ASIA AND  
THEIR EVOLVING RISKS  
ARE THESE RISKS MANAGEABLE?

23-24 APRIL 2015, THU-FRI

NANYANG TECHNOLOGICAL UNIVERSITY  
SINGAPORE



ACADEMIC PARTNER



Centre for  
**Risk Studies**

ACKNOWLEDGEMENTS



# MegaCities of Asia and their Evolving Risks – Are these Risks Manageable?

23 – 24 April 2015

Nanyang Technological University, Singapore

## Welcome Messages



### Prof Haresh Shah

Founding Chairman, ICRM International Advisory Board, NTU  
Emeritus Member, Board of Trustees, NTU  
Emeritus Professor, Stanford University  
Founder & Senior Advisor, RMS Inc., USA

My heartiest greetings and welcome to participants to our Sixth International Symposium on Catastrophe Risk Management. We are delighted that you are able to take time from your busy schedules to come and share your experiences in catastrophe risk management. Particular welcome goes to our Guest-of-Honour Mr Lim Chuan Poh, Chairman, Agency for Science, Technology and Research, Singapore. The Institute of Catastrophe Risk Management (ICRM) has been organizing this symposium series for six years now, and it is most satisfying to see that the symposium series has helped ICRM to develop its research portfolio, starting from developing cat risk models to now thinking about issues regarding the evolving risks of Asia's growing megacities, which is this year's Symposium theme. We are certain that with your participation, the discussions over these two days will help develop key understandings of the pressing issues of megacities and the risks they face going forward. On this, I wish you a most fruitful two days, and to our overseas guests, a most wonderful and pleasant time in Singapore.



### Prof Tso-Chien Pan

Executive Director  
ICRM, NTU, Singapore

On behalf of NTU's Institute of Catastrophe Risk Management (ICRM), I am most happy to extend our warmest greetings to our Guest-of-Honour Mr Lim Chuan Poh, Chairman, Agency for Science, Technology and Research, Singapore, as well as Speakers and Delegates to the 6<sup>th</sup> ICRM International Symposium on "MegaCities of Asia and their Evolving Risks – Are these Risks Manageable?".

ICRM has been undertaking multidisciplinary research work to understand and manage catastrophe risk arising from natural hazards and man-made disasters, since established in 2010. A part of this is the annual symposium that we have been organizing. This 6<sup>th</sup> Symposium has its theme focused on the evolving risks of megacities in Asia. We believe that this is particularly relevant due to the rapid economic growth of the Asia-Pacific region, thus creating regions of high vulnerability with population, infrastructure and societies exposed to extreme events. We hope, via the Symposium, to have a rigorous discussion on how to understand and perhaps manage such a complex landscape of evolving risks, propose effective mitigation strategies and regulatory framework, and thus help societies understand and deal with the rapidly growing risks of megacities in Asia.

We at ICRM are thankful for the continuous support that we have received from the government, our university, and the private sector. We are also thankful for your presentations and discussions over these days. I am sure your participation will make the Symposium rewarding and guide our coming work. Have a good time and, to our overseas guests, a most wonderful time in Singapore as well.

## Symposium Synopsis

The Institute of Catastrophe Risk Management (ICRM) was launched by Nanyang Technological University in January 2010 with a vision to become Asia's leading research institute in catastrophe risk management. Since its launch, ICRM has conducted five Annual Symposia on various topics including Food and Water Security and Climate Change, Black Swan Events, Extreme Events in Asia Pacific, Financing Natural Catastrophes in Asia, and the Public-Private Partnership in Managing Catastrophe Events. This Sixth Annual Symposium will focus its attention to the evolution of megacities and special risks that are evolving due to such large concentration of people, infrastructure, economy and socio-political impacts. Managing those risks poses special challenges and innovative solutions.

Growth of megacities (population with 10 million or more) is relatively a modern trend. Whereas in 1950, there were only two megacities (New York and Tokyo), this number has increased to more than 25 by the year 2010. Two thirds of those twenty five are in Asia. This trend of increasing number of megacities in Asia is going to continue well into the 21st century. With this increase, the task for local, state and central governments, businesses, social and political bodies and citizens to manage a variety of risks that pose a threat is getting more and more complex.

The list of risks include socio-economic risk (crime, poverty), political risk, health related risk, environmental risk, risk due to climate change, terrorism risk, pandemic risk, quality of life risk and so on. The immense complexities of interplay between various risks and our understanding of those complexities are the challenges at hand. Risks in each of the megacities mutate and grow in specific ways for each of those cities. It is almost impossible to do proper justice to the whole landscape of risks in a single conference. Keeping this in mind, the Sixth Annual Symposium has the following theme:

### "MegaCities of Asia and their Evolving Risks – Are these Risks Manageable?"

Due to the immensity of issues related to megacities, this symposium will focus on the following topics as sub-themes:

- Evolving Risk and Sustainability of Megacities
- Industry Perspectives
- Building Resilience
- Natural hazards and Megacities
- Terrorism and Pandemics
- Science and Paleo-Science of Natural Hazards

No single entity, private or public, can manage these risks. Multiple stakeholders and their alliances must be created to understand and manage those risks. Asia is the "region of megacities" and it is most appropriate that ICRM will focus on that problem and bring together experts from around Asia and the World. Through this Symposium, we hope to articulate current views, to provide insights into current work and prevailing ideas and to provide possible solutions for this most interesting and challenging landscape of risks.

# Programme

\* ICRM Symposium 2015 and Industry Seminar: Qualified for 13 PDUs by PE Board

## Day 1 – Thursday, 23 April 2015

### Session 1 – Opening Session: Evolving Risk and Sustainability of MegaCities

- 0830 Registration and Arrival
- 0930 **Welcome Greetings**  
**Prof Tso-Chien Pan**  
Executive Director, Institute of Catastrophe Risk Management, NTU, Singapore
- 0940 **Opening Address**  
Guest-of-Honour: **Mr Lim Chuan Poh**  
Chairman, Agency for Science, Technology and Research (A\*STAR), Singapore  
Member, Board of Trustees, NTU
- 0950 **Presentation 1**  
**Joys, Trials and Tribulations of Living in one of Asia's MegaCities – Evolving Risks and Rewards**  
**Prof Haresh Shah**  
Founding Chairman, ICRM International Advisory Board, NTU  
Emeritus Member, Board of Trustees, NTU  
Emeritus Professor, Stanford University  
Founder & Senior Advisor, RMS Inc., USA
- 1010 **Presentation 2**  
**Risk Management of MegaCities – Who is Responsible?**  
**Mr Malcolm Steingold**  
Chief Executive Officer, Aon Benfield, Asia Pacific, Singapore  
Member, ICRM International Advisory Board, NTU
- 1030 Morning Refreshment
- 1100 **Presentation 3**  
**Disaster Risk Reduction and Resilience in Taipei**  
**Prof Yen-Shiang Shih**  
Chair Professor, Chung Yuan Christian University  
Chairman, Sinotech Engineering Consultants, Inc.  
Ex-Minister, Economic Affairs, Taiwan
- 1120 **Presentation 4**  
**Mainstreaming Resilience Parameters in MegaCities: From Concepts to Implementation**  
**Dr Fouad Bendimerad**  
Board Chairman, Earthquakes and Megacities Initiative, USA
- 1140 **Presentation 5**  
**Flood Resilience Challenges for Urban Areas**  
**Prof Chris Zevenbergen**  
Professor, Water Engineering Department  
UNESCO-IHE Institute for Water Education  
TU Delft, The Netherlands
- 1200 **Panel Discussion 1**  
Session Chairman: **Dr Reto Brosi**  
Chief Executive, Asia Capital Reinsurance Group Pte. Ltd., Singapore  
**Panelists:**  
1. **Prof Haresh Shah**, Founding Chairman, ICRM International Advisory Board, NTU; Emeritus Member, Board of Trustees, NTU; Emeritus Professor, Stanford University; Founder & Senior Advisor, RMS Inc., USA  
2. **Mr Malcolm Steingold**, Chief Executive Officer, Aon Benfield, Asia Pacific, Singapore; Member, ICRM International Advisory Board, NTU  
3. **Prof Yen-Shiang Shih**, Chair Professor, Chung Yuan Christian University; Chairman, Sinotech Engineering Consultants, Inc.; Ex-Minister, Economic Affairs, Taiwan  
4. **Dr Fouad Bendimerad**, Board Chairman, Earthquakes and Megacities Initiative, USA  
5. **Prof Chris Zevenbergen**, Professor, Water Engineering Department, UNESCO-IHE Institute for Water Education, TU Delft, The Netherlands
- 1240 Lunch

### Session 2 – Industry Perspectives

- 1340 **Presentation 6**  
**Urbanisation: A Trend where (Re)Insurance can Support with Risk-Solutions**  
**Mr Thomas Peter**  
Chief Underwriting Officer (Non-Life), Munich Re, Singapore
- 1400 **Presentation 7**  
**The Role of Insurance and Reinsurance in City Risk Management and Risk Mitigation**  
**Mr David Simmons**  
Managing Director, Analytics, Willis Re International & Specialty, UK
- 1420 **Presentation 8**  
**An Insurer's View of Terrorism Risk in MegaCities**  
**Mr Soeren Soltysiak**  
Chief Underwriting Officer, Reinsurance, Asia Pacific, Catlin Singapore Pte. Ltd., Singapore
- 1440 **Panel Discussion 2**  
Session Chairman: **Dr Pane Stojanovski**  
Adjunct Professor, ICRM, NTU, Singapore  
Founder, CatRisk Research, USA  
**Panelists:**  
1. **Mr Thomas Peter**, Chief Underwriting Officer (Non-Life), Munich Re, Singapore  
2. **Mr David Simmons**, Managing Director, Analytics, Willis Re International & Specialty, UK  
3. **Mr Soeren Soltysiak**, Chief Underwriting Officer, Reinsurance, Asia Pacific, Catlin Singapore Pte. Ltd., Singapore  
4. **Mr Fiza Wira Atmaja**, Head of Research, Development & Innovation Division, PT Asuransi MAIPARK Indonesia
- 1520 Afternoon Refreshment

### Session 3 – Building Resilience

- 1540 **Presentation 9**  
**MegaCity Risks – Dhaka's Experience**  
**Prof Jamilur Reza Choudhury**  
Vice Chancellor, University of Asia Pacific, Bangladesh
- 1600 **Presentation 10**  
**Natural Catastrophe Risk Management of Urban Agglomerations in Taiwan**  
**Prof Hongey Chen**  
Director, National Science & Technology Center for Disaster Reduction, Taiwan
- 1620 **Presentation 11**  
**Multi-Decadal Variations in Damage Caused by Typhoons Making Landfall in East Asia – Has it been Increasing?**  
**Prof Johnny C. L. Chan**  
Dean, School of Energy & Environment, City University of Hong Kong, Hong Kong SAR, China
- 1640 **Presentation 12**  
**Holistic Solutions to Uplift City Resilience**  
**Dr Ricky Tsui**  
Director, R&D, East Asia Arup, Hong Kong SAR, China
- 1700 **Panel Discussion 3**  
Session Chairman: **Prof Kimiro Meguro**  
Director, International Center for Urban Safety Engineering Institute of Industrial Science, University of Tokyo, Japan  
**Panelists:**  
1. **Prof Jamilur Reza Choudhury**, Vice Chancellor, University of Asia Pacific, Bangladesh  
2. **Prof Hongey Chen**, Director, National Science & Technology Center for Disaster Reduction, Taiwan  
3. **Prof Johnny C. L. Chan**, Dean, School of Energy & Environment, City University of Hong Kong, Hong Kong SAR, China  
4. **Dr Ricky Tsui**, Director, R&D, East Asia Arup, Hong Kong SAR, China
- 1740 **End of Day 1 Symposium**
- 1750 **Cocktail (NEC Auditorium Foyer)**
- 1830 **Symposium Dinner (Function Hall 1, Level 3, NEC)**

## Day 2 – Friday, 24 April 2015

0830 Registration

### Session 4 – Natural Hazards and MegaCities

- 0915 **Presentation 13**  
**Growing Exposures of MegaCities – China Study**  
**Prof Edmond Lo**  
Deputy Director, ICRM, NTU, Singapore
- 0935 **Presentation 14**  
**The 2011 Great East-Japan Earthquake and Tsunami Disaster – Lessons Learned and Countermeasures against Future Catastrophes**  
**Prof Kimiro Meguro**  
Director, International Center for Urban Safety Engineering Institute of Industrial Science, University of Tokyo, Japan
- 0955 **Presentation 15**  
**Future Seismic Challenges for Growing Cities**  
**Prof Domenico Giardini**  
Chair, Seismology and Geodynamics, ETH, Zurich  
President, International Association of Seismology & Physics of the Earth's Interior  
Head, Swiss Competence Center on Energy Research – Supply of Electricity
- 1015 Morning Refreshment
- 1035 **Presentation 16**  
**Supply Chain Risk – Expecting the Unexpected**  
**Dr Robert De Souza**  
Chief Executive & Professor, The Logistics Institute – Asia Pacific, National University of Singapore
- 1055 **Presentation 17**  
**Building Resilience in MegaCities for Global Change Impacts**  
**Prof Srikantha Herath**  
Academic Director/Senior Academic Programme Officer  
Institute of Advanced Study of Sustainability, United Nations University, Japan  
Member, ICRM International Advisory Board, NTU
- 1115 **Panel Discussion 4**  
Session Chairman: **Prof Domenico Giardini**  
Chair, Seismology and Geodynamics, ETH, Zurich  
President, International Association of Seismology & Physics of the Earth's Interior  
Head, Swiss Competence Center on Energy Research – Supply of Electricity
- Panelists:**
1. **Prof Edmond Lo**, Deputy Director, ICRM, NTU, Singapore
  2. **Dr Robert De Souza**, Chief Executive & Professor, The Logistics Institute – Asia Pacific, National University of Singapore
  3. **Prof Srikantha Herath**, Academic Director/Senior Academic Programme Officer; Institute of Advanced Study of Sustainability, United Nations University, Japan; Member, ICRM International Advisory Board, NTU
  4. **Prof Kimiro Meguro**, Director, International Center for Urban Safety Engineering, Institute of Industrial Science, University of Tokyo, Japan
- 1155 Lunch

### Session 5 – Terrorism & Pandemics

- 1300 **Presentation 18**  
**Understanding the Principles of Terrorism Risk Modelling from the Charlie Hebdo Attack in Paris**  
**Dr Gordon Woo**  
Adjunct Professor, ICRM, NTU, Singapore  
Catastrophe Risk Consultant, RMS, Inc., UK
- 1320 **Presentation 19**  
**Terrorist Threats and Trends in Asia: Threat to MegaCities and Critical Information Infrastructures**  
**Dr Jolene Anne Jerard**  
Manager, Capacity Building, International Centre for Political Violence & Terrorism Research, S. Rajaratnam School of International Studies, NTU, Singapore
- 1340 **Presentation 20**  
**MegaCities & Urbanisation in Asia: Implication for Non-Life Insurers**  
**Mr Amitabha Ray**  
Head, Property Treaty Underwriting, Southeast Asia and India, Swiss Re, Singapore

- 1400 **Presentation 21**  
**Biomedical Aspects of Pandemic Risk Assessment, Response and Mitigation**  
**Prof Yap Peng Huat, Eric**  
Human & Microbial Genetics, Lee Kong Chian School of Medicine, Imperial College London – Nanyang Technological University, NTU, Singapore
- 1420 **Presentation 22**  
**Pandemics Risk Quantification – The MegaCities Factor**  
**Dr Pane Stojanovski**  
Adjunct Professor, ICRM, NTU, Singapore  
Founder, CatRisk Research, USA
- 1440 **Panel Discussion 5**  
Session Chairman: **Dr Suzanne Corona**  
Head of Natural Perils, Asia Capital Reinsurance Group Pte. Ltd., Singapore
- Panelists:**
1. **Dr Gordon Woo**, Catastrophe Risk Consultant, RMS, Inc., UK; Adjunct Professor, ICRM, NTU, Singapore
  2. **Dr Jolene Anne Jerard**, Manager, Capacity Building, International Centre for Political Violence & Terrorism Research, S. Rajaratnam School of International Studies, NTU, Singapore
  3. **Mr Amitabha Ray**, Head, Property Treaty Underwriting, Southeast Asia and India, Swiss Re, Singapore
  4. **Prof Yap Peng Huat, Eric**, Human & Microbial Genetics, Lee Kong Chian School of Medicine, Imperial College London – Nanyang Technological University, NTU, Singapore
  5. **Dr Pane Stojanovski**, Adjunct Professor, ICRM, NTU, Singapore, Founder, CatRisk Research, USA;
- 1520 Afternoon Refreshment

### Session 6 – Science and Paleo-Science of Natural Hazards

- 1540 **Presentation 23**  
**Using Paleoclimate Records to Inform Risk Assessment**  
**Prof Nathalie Goodkin**  
Nanyang Associate Professor, Asian School of the Environment, College of Science, NTU, Singapore
- 1600 **Presentation 24**  
**Climate Change Effects on the Rise and Fall of Chinese Dynasties**  
**Prof Wang Xianfeng**  
Nanyang Assistant Professor, Earth Observatory of Singapore, NTU, Singapore
- 1620 **Presentation 25**  
**Historical Records and Disaster Management: Comparing Typhoon Haiyan and its 1897 Predecessor in the Philippines**  
**Ms Janneli Lea Acierto Soria**  
Earth Observatory of Singapore, NTU, Singapore
- 1640 **Panel Discussion 6**  
Session Chairman: **Prof Srikantha Herath**  
Academic Director/Senior Academic Programme Officer  
Institute of Advanced Study of Sustainability, United Nations University, Japan  
Member, ICRM International Advisory Board, NTU
- Panelists:**
1. **Prof Nathalie Goodkin**, Nanyang Associate Professor, Asian School of the Environment, College of Science, NTU, Singapore
  2. **Prof Wang Xianfeng**, Nanyang Assistant Professor, Earth Observatory of Singapore, NTU, Singapore
  3. **Ms Janneli Lea Acierto Soria**, Earth Observatory of Singapore, NTU, Singapore
- 1720 **Close of Symposium**  
**Prof Tso-Chien Pan**  
Executive Director, Institute of Catastrophe Risk Management, NTU, Singapore
- 1730 **End of Symposium Programme**

### ICRM Industry Seminar

- 1730 Evening Refreshment
- 1745 **Progress of ICRM Projects on the Development of**
1. **Singapore Earthquake Risk Assessment Model**  
**Prof Tso-Chien Pan and Assoc Prof Bing Li**  
Institute of Catastrophe Risk Management, NTU, Singapore
  2. **Jakarta Flood Risk Assessment Model**  
**Prof Charng Ning Chen and Assoc Prof Edmond Lo**  
Institute of Catastrophe Risk Management, NTU, Singapore
- 1815 **End of ICRM Industry Seminar**