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Future Issues and Quantum | Karryl Kim Sagun Trajano and Ysa Marie Cayabyab

For the fourth issue of the *Science, Technology, and Security (STS) Bulletin*, we focus on quantum technologies from three key perspectives: (1) their intersection with global supply chains and international security; (2) a case study on Malaysia; and (3) setting a direction for collective success in the field. This issue features expert contributions from Dongyoun Cho, a Senior Researcher at the United Nations Institute for Disarmament Research (UNIDIR), an autonomous UN institution conducting research on pressing global challenges related to disarmament, arms control, and international security; Clarissa Ai Ling Lee, a lecturer at the research-intensive Monash University Malaysia; and Alexander Ling, a Principal Investigator at the Centre for Quantum Technologies and a member of the Department of Physics at the National University of Singapore (NUS).

While the first commentary examines the global policy and security context of quantum technology, the second commentary takes a specific look at one national example and the experiences of one state (Malaysia). Finally, the third commentary suggests a way forward for international cooperation to face the global challenges.

Edited by the Future Issues and Technology (FIT) cluster, the *STS Bulletin* provides insights into emerging technologies, including artificial intelligence (AI), space, quantum technologies (QTs), technology geopolitics, and smart cities. Our goal is to bridge the gap between technology and policy, fostering informed discussions, knowledge-sharing, and cross-sector collaboration.

FIT actively contributes to the field of quantum technologies through publications, workshops, and webinars. Notable commentaries include *“The Cryptography Race: Securing Systems Before Quantum Computers Arrive”* by David Joseph (Product Manager, SandboxAQ), published in January 2023; and *“Rethinking the ‘Quantum Apocalypse’”* by Shantanu Sharma (Senior Policy Researcher, Quantum Ecosystems and Technology Council of India) and Manoj Harjani (Research Fellow, RSIS), released in May 2022. Additionally, in August 2022, Manoj Harjani and Shantanu Sharma

published “*Will Quantum Supply Chains Fall Victim to Geopolitics?*” as an Institute of Defence and Strategic Studies paper.

A recent workshop was hosted by FIT to discuss “*Responsible Quantum Technologies: Impact of Geopolitics in the Indo-Pacific Region.*” Held on 15 and 16 October 2024, the event brought together key stakeholders from the Indo-Pacific region, particularly ASEAN member states, to explore the geopolitical, diplomatic, security, and collaborative aspects of emerging and established QTs.

The two-day workshop featured a public session on the first day, where 100 participants discussed national QT initiatives and responsible QT efforts across the region. On the second day, a closed-door session allowed selected experts to examine in greater depth the geopolitical implications of QT in the Indo-Pacific region. The workshop was co-organised with SG Innovate, the Centre for Quantum Technologies, Karlsruhe Institute of Technology, the Quantum Young Researchers Association, and the Institute for Technology Assessment and Systems Analysis.

Held at SG Innovate’s offices in Singapore, the workshop featured several distinguished speakers. Professor Alexander Ling provided an overview of Singapore’s QT efforts, while Prateek Tripathi (Junior Fellow, Observer Research Foundation) and Worawat Meevasana (Associate Fellow, Suranaree University of Technology) discussed QT initiatives in India and Thailand. For Malaysia, Indonesia, and the Philippines, insights were shared by Yap Yung Szen (Senior Lecturer, Universiti Teknologi Malaysia), Dr Mohammad Hamzah Fauzi (Senior Researcher, BRIN Research Center for Quantum Physics), and Noelyn M. De Jesus (Director for Marketing and Relations, Quantum Computing Society of the Philippines). A session discussing responsible QT efforts in the Indo-Pacific region was led by Clara Yun Fontaine (PhD Candidate, Centre for Quantum Technologies, NUS), Rebecca Coates (Research Scientist, Commonwealth Scientific and Industrial Research Organisation), and Clarissa Ai Ling Lee. A panel discussion on “*Lowering Barriers for Indo-Pacific Collaboration*” was also held, featuring Prateek Tripathi, Rebecca Coates, and Worawat Meevasana.

Moreover, FIT has organised two webinars with support from the Centre of Excellence for National Security. The first webinar, “*Will Quantum Supply Chains Fall Victim to Geopolitics?*,” was held in September 2022. It explored how geopolitical rivalries impact QT supply chains and export controls. Speakers included Dr Celia Merzbacher (Executive Director, Quantum Economic Development Consortium), Dr Edward Parker (Physical Scientist, RAND Corporation), and Manoj Harjani. Meanwhile, the second webinar, “*Transitioning to a Quantum-Secure Future,*” was held in October 2022. It addressed challenges and strategies for implementing quantum-resistant cybersecurity, and featured Robert Bedington (Co-founder and CTO, SpeQtral), David Joseph, and Henning Soller (Partner, McKinsey & Company).

Through these workshop and webinars, we fostered meaningful dialogue and collaboration among regional stakeholders, reinforcing the importance of responsible QT development amid evolving geopolitical landscapes.

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