

Emerging Technologies and National Security



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SYNOPSIS

Emerging technologies bring not just novel societal benefits, but also unprecedented risks. A balance between embracing the future potential of technology and preparing for the challenges it poses to society, while avoiding the extremes of technological utopianism, technological dystopianism, technological determinism or even technolibertarianism is necessary. The profusion of various emerging technologies poses challenges to governments and think tanks in assessing opportunities and threats and determining policy imperatives, a challenge that the newly formed Future Issues and Technology (FIT) cluster at RSIS has boldly taken on.

ESSAY

The evolution of technology — from the invention of gunpowder and the use of electronic communications for espionage to the cyber and digital advances of today — has often had a profound impact on national security through the centuries. Emerging technologies like robotics, artificial intelligence (AI), biotechnology and nanotechnology, self-driving cars, neuro-technological brain enhancements and genetic editing¹ can bring huge benefits in development, but, on the other hand, can also create unprecedented risks or accelerate existing threats.

These technologies are emerging and diffusing at an unprecedented rate, partly because of the ease of distributing new digital capabilities to the public. For example, ChatGPT, a generative AI application that can turn users' prompts into huge amounts of text, is estimated to have reached 100 million active users monthly just two months after it was launched.² Singapore has recently announced that it is looking to increase cooperation with its allies, including the United States and Southeast Asian countries, and the Pacific Island states in areas such as AI, biotech, space and carbon energy.³

THE ROLE OF POLICY THINK TANKS IN STUDYING SCIENCE AND TECHNOLOGY

The profusion of new technologies creates a huge challenge for governments, and for the think tanks

that provide them with policy ideas and intellectual capital, to quickly assess those technologies, their opportunities and risks, and the policy imperatives that arise. A few think tanks have emerged in Singapore to meet the challenge: The NUS Faculty of Law's Centre for Technology, Robotics, Artificial Intelligence and the Law (TRAIL), the Academy of Engineering Singapore (SAEng), and the private sector Tech for Good Institute. For its part, the S. Rajaratnam School of International Studies, with a strong track record in studying defence and national security issues (both traditional and non-traditional), multilateralism and regional economic integration, among others, formed the Future Issues and Technology (FIT) cluster to study emerging cross-cutting issues and technological developments that have strategic impact and potentially disruptive national and international security implications.

National security think tanks in the United States, United Kingdom and Europe have been hiring dedicated science and technology researchers to study the regulation and governance of technology and even the appropriate tax regime for technology research and development.⁴ This pool of expertise is smaller in Southeast Asia, and often happily insulated from the national security and other implications of such technologies, given the narrow technical agendas of their respective organisations. One solution for Singapore-based teams like FIT has been to collaborate on projects, workshops and co-publication with a network of trusted science and technology experts from government, academia, civil society and tech companies, not only from Singapore but from around the world.

In the course of our work, we have found that private sector organisations, especially Big Tech companies like Amazon, Meta, Google, Zoom and Twitter, are very ready to fund science and technology policy research undertaken by think tanks, whether their own or external bodies.⁵ The support of such think tanks is welcome; we are not questioning their transparency with regard to their funding sources or the objectivity of their research. However, governments that already see the value of funding science and technology research should also consider supporting policy research in these fields to explore policy ideas that meet their needs.

For our part, as researchers in the field of science and technology policy, we need to ask the right questions.⁶ We cannot be swept up by "hype cycles" of technology development or blindly follow assumptions made popular in technology circles (e.g., technological utopianism, technological dystopianism, technological determinism, technolibertarianism). While we will not be able to master the myriad of innovations blooming every second, we must critically assess the inputs from science and technology experts, analyse them on the basis of our policy expertise, and create meaningful ideas or ask salient questions.

GEOPOLITICS AND EMERGING TECHNOLOGIES

For example, geopolitical conflicts and great power contestation have had a huge impact on the availability of emerging technologies in smaller states in Southeast Asia, like Singapore. AI models, and the underlying semiconductor chips that enable them, could be tied up by export restrictions. The United States continues to seek to restrict Chinese companies' access to American AI chips, even through third countries.⁷ The big data sets that AI is trained on, and the resultant AI models, could be subject to regulation in the leading economies, with knock-on effects in Southeast Asia.

Southeast Asian countries that are exploring the benefits of space technologies could leverage great power competition by cooperating with powerful space neighbours like China, India and Japan to obtain support for their own space programmes.⁸ Such moves could raise security issues such as safe conduct of activities and strategic rivalry in lunar exploration,⁹ sustainability risks like congestion in the earth's orbit owing to the growing number of space objects and the resulting problem of space debris,¹⁰ and even the dangers of an arms race in space involving anti-satellite weapons.¹¹

Geopolitics will also have an impact on the development of quantum technologies, not only because of the strategic and economic advantages that high-speed quantum computing can bring, but also because of the new security risks they entail owing to their ability to break many encryption algorithms that we rely on today to secure our financial, military, commercial and personal data.

Singapore has started to support network operators in deploying “quantum-safe networks” whose security will not be breakable by quantum computers.¹²

Beyond geopolitics and trade in such technologies, the use of AI raises issues even domestically, such as lack of transparency and ethical dilemmas in decision-making, bias and discrimination, concentration of power in corporations or wealthy states, overdependence on the technology, and misinformation and manipulation through AI-generated content.¹³

CONCLUSION

Although we have flagged national security issues arising from emerging technologies, we also acknowledge the huge benefits that they can bring to humanity. AI could help humankind solve complex problems like diseases and climate change. The power of quantum computing could be harnessed to boost the search for solutions to complex problems. Space research could bring scientific breakthroughs or untapped mineral resources.

Research into emerging technologies should then avoid the extremes of technological utopianism (where technology guarantees a utopian society) and technological dystopianism (where it destroys humanity), technological determinism (where technology shapes society without the agency of society) or even technolibertarianism (where technology is used in the name of freedom to minimise regulation, restrictions and cost).¹⁴ Instead, we should strike a balance between embracing the future potential of technology and preparing for the challenges it poses to society.

As the United Nations Department of Economic and Social Affairs has suggested, countries need to make informed decisions and build capacity to fully benefit from various technologies while mitigating the risks arising from misuse or abuse.¹⁵ Research organisations can support these goals by engaging actively with the public and private sectors and academia in a multi-stakeholder search for solutions.

- ¹ See UN Department of Economic and Social Affairs (Sustainable Development), “Work Stream 10: Analytical Work on Emerging Technologies and the SDGs”, n.d., <https://sdgs.un.org/tfm/interagency-task-team/workstream10>; and World Economic Forum, “The Fourth Industrial Revolution by Klaus Schwab”, n.d., <https://www.weforum.org/pages/the-fourth-industrial-revolution-by-klaus-schwab>.
- ² Krystal Hu, “ChatGPT Sets Record for Fastest Growing User Base – Analyst Note”, Reuters, 2 February 2023, <https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01/>.
- ³ Prime Minister’s Office, Singapore, “DPM Lawrence Wong’s Dialogue at the Centre for Strategic and International Studies (CSIS)”, 13 October 2023, <https://www.pmo.gov.sg/Newsroom/DPM-Lawrence-Wongs-Dialogue-at-the-Center-for-Strategic-and-International-Studies>.
- ⁴ Annabelle Dickson, “Britain’s Think Tanks Are Getting into Tech”, Politico, 12 March 2023, <https://www.politico.eu/article/uk-technology-policy-think-tank-innovation-artificial-intelligence-tony-blair-institute-global-change/>.
- ⁵ Dickson, “Britain’s Think Tanks”.
- ⁶ Vincent J. Carchidi, “Are Think Tanks Ready for the Age of AI”, *The National Interest*, 1 September 2022, <https://nationalinterest.org/blog/techland-when-great-power-competition-meets-digital-world-are-think-tanks-ready-age-ai-204565>.
- ⁷ Alexandra Alper and Karen Freifeld, “Biden Eyes Adding AI Chip Curbs to Chinese Companies Abroad”, Reuters, 13 October 2023, <https://www.reuters.com/technology/biden-eyes-adding-ai-chip-curbs-chinese-companies-abroad-2023-10-13/>.
- ⁸ Quentin Verspieren, “ASEAN Space Programmes: Navigating Regional Rivalries”, *RSIS Commentary* 8, 18 January 2023, <https://www.rsis.edu.sg/wp-content/uploads/2023/01/CO23008.pdf>.
- ⁹ <https://www.rsis.edu.sg/event/opportunities-and-challenges-in-cislunar-space-and-the-moon/>.
- ¹⁰ <https://www.rsis.edu.sg/event/rsis-webinar-on-ensuring-safe-and-sustainable-access-to-space-managing-an-increasingly-congested-orbital-environment/>.
- ¹¹ https://www.rsis.edu.sg/event/whither-space-security-reducing-space-threats-and-preventing-an-arms-race-in-outer-space/?doing_wp_cron=1698207650.0647919178009033203125.
- ¹² Infocomm Media Development Authority (IMDA), Singapore, “Singapore Launches Southeast Asia’s First Quantum-Safe Network Infrastructure To Help Businesses Tap on Quantum-Safe Technologies”, 6 June 2023, <https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/sg-launches-southeast-asias-first-quantum-safe-network-infrastructure>.
- ¹³ Bernard Marr, “The 15 Biggest Risks of Artificial Intelligence”, *Forbes*, 2 June 2023, <https://www.forbes.com/sites/bernardmarr/2023/06/02/the-15-biggest-risks-of-artificial-intelligence/?sh=5f4e09662706>.
- ¹⁴ Yu-Xiao Dai and Su-Tong Hao, “Transcending the Opposition between Techno-Utopianism and Techno-Dystopianism”, *Science Direct* 53 (2018), pp. 9–13, <https://doi.org/10.1016/j.techsoc.2017.11.001>.
- ¹⁵ UN Department of Economic and Social Affairs, “Work Stream 10”.