

The RSIS Working Paper series presents papers in a preliminary form and serves to stimulate comment and discussion. The views expressed in this publication are entirely those of the author(s), and do not represent the official position of RSIS. This publication may be reproduced electronically or in print with prior written permission obtained from RSIS and due credit given to the author(s) and RSIS. Please email RSISPublications@ntu.edu.sg for further editorial queries.

NO. 327

**THE INTERSECTION OF EMERGENT
TECHNOLOGIES AND GEOPOLITICS
IMPLICATIONS FOR SINGAPORE**

MUHAMMAD FAIZAL BIN ABDUL RAHMAN

**S. RAJARATNAM SCHOOL OF INTERNATIONAL STUDIES
SINGAPORE**

7 APRIL 2020

Abstract

This paper examines how Singapore as a small state will have to navigate a more contested world from a policy-relevant angle. A primary driver of geopolitical contestation today stems from emergent or Fourth Industrial Revolution (4IR) technologies contributing to the redistribution of geopolitical power to the disadvantage of the established western-led international order. Even as Singapore embarks on numerous programmes to invest in and adopt 4IR technologies, it has to consider geopolitics besides technical specifications and budgetary issues. A small state will have to face trade-offs when it engages the competing big powers to preserve its neutrality and balance relations. It is difficult for small states to emulate each other's strategies in balancing relations with the big powers given their varying levels of risk appetite and technological adoption, as well as their different geostrategic and geo-economic realities. Nevertheless, there are strategic steps that small states such as Singapore can take to defend its national interests better while investing in and adopting 4IR technologies.

Keywords: Singapore, small states, fourth industrial revolution, emergent technologies, investments, big-power rivalry, cold war, geostrategic imbalance, foreign interference, economic iron curtain.

Introduction

The Fourth Industrial Revolution (4IR) technologies are critical to the long-term efforts of some small states in ensuring their efficient provision of public services, economic security and growth, and relevance to the global economy. These technologies include autonomous vehicles, police robots, chatbots in the banking industry, smart utility grids, and smart port systems. New possibilities emerge as their current applications continue to undergo innovations while technologists and entrepreneurs discover new applications. They are influential across a broad range of public and private sectors given the fusion of physical, digital, and biological applications. Indeed, 4IR technologies are driving changes to society, security, economy, and politics. Small states — such as Singapore — have therefore embarked on numerous programmes to invest in and adopt 4IR technologies.¹ In this regard, Singapore's Prime Minister Lee Hsien Loong, while speaking at the Smart Nation Launch in 2014, said Singapore “must take full advantage of technology ... particularly IT ... this will make our economy more productive, our lives better, and our society more responsive to our people's needs and.”²

Emergent technologies, however, play an essential role in geopolitical contestations. The United States experienced the role of emergent technologies in the 1960s. According to an intelligence report by the Central Intelligence Agency (CIA), the technological gap between the Union of Soviet Socialist Republics (USSR) and the United States was widening during that period.³ Emergent technologies were diffusing faster in the United States and western Europe due to enabling factors such as tax incentives and financial support for innovators and multinational companies. During the Vietnam War, the then US Secretary of Defence Robert McNamara emphasised the pioneering use of mainframe computers to analyse military data and predict battlefield outcomes.⁴ In addition, the Vietnam War was the first armed conflict in which a military — the US Army — used helicopters for large scale transport and offensive purposes.⁵

From the United States' perspective today, China is a threat as it uses 4IR technologies to achieve strategic advantages over it in several domains.⁶ First, China is pursuing technological dominance to attain military superiority and expand its sphere of influence. Second, China is circumventing international rules on trade and investments to pursue technological dominance in an

¹ Tassel, Loic. “Why strive for Industry 4.0.” *World Economic Forum*, January 16, 2019. www.weforum.org/agenda/2019/01/why-companies-should-strive-for-industry-4-0/

² Smart Nation and Digital Government Office. “Transcript of Speech by Prime Minister Lee Hsien Loong at Smart Nation Launch.” November 24, 2014. www.smartnation.sg/whats-new/speeches/smart-nation-launch

³ Directorate of Intelligence. “The Technological Gap: The USSR vs the US and Western Europe.” June 1969: 1–3. www.cia.gov/library/readingroom/docs/DOC_0000499825.pdf

⁴ Madrigal, Alexis C. “The Computer That Predicted the U.S. Would Win the Vietnam War.” *The Atlantic*, October 05, 2017. www.theatlantic.com/technology/archive/2017/10/the-computer-that-predicted-the-us-would-win-the-vietnam-war/542046/

⁵ Keister, Isaac. “Technology and Strategy: The War in Vietnam.” *Student Theses, Papers and Projects (History)* (2016): 3–4. <https://digitalcommons.wou.edu/cgi/viewcontent.cgi?article=1050&context=his>

⁶ Kwang, Han Fook, and Hoo Tiang Boon. “RSIS Workshop on Geopolitics and Technology.” *RSIS Event Report* (2020): 8–9. www.rsis.edu.sg/rsis-publication/rsis/rsis-workshop-on-geopolitics-and-technology/#.XnRpGfZuJ_w

unfair manner. Third, China is able to conduct espionage and threaten the security and economic interests of the United States and its allies due to its extensive connections with global technology supply chains. From China's perspective, it is a target of United States' discriminatory and hostile actions because the latter perceives it as an adversary.⁷

The Chinese too perceive the United States at fault. First, the United States is similarly blameworthy of unfair practices that circumvent international rules on trade and investments. Second, the United States underestimates China's potential for innovation by accusing the it of western technology theft. Third, the United States fears China will eventually overtake it given the latter's significant technological advances, geographical and market sizes, different ideology, and political system. Specifically, on 5G technology, there are concerns that China's market lead in this 4IR technology will enable it to undermine the global security alliances that the United States underwrites and perhaps become "a peer competitor in global intelligence collection."⁸

Small states must prepare themselves for a more contested world that results from 4IR technologies contributing to the redistribution of geopolitical power to the disadvantage of the established western-led international order. For clarity and focus, this paper draws the definition of small states from Robert Keohane's category of "middle powers", which are states that "cannot act alone effectively but may be able to have a systemic impact in a small group or through an international institution".⁹ Singapore, Vietnam, Estonia,¹⁰ and most Nordic states such as Finland belong to this category. These states are influential members of regional institutions such as ASEAN and the European Union, ahead in terms of technological or economic capabilities as compared to other small states; and have been a part of big power rivalries. These states also have highly digitalised societies that have embraced Industry 4.0, and are "the weaker part in an asymmetrical relationship" with bigger powers such as China, Russia, and the United States.¹¹

It is increasingly crucial for state and industry decisions over the investments in and adoption of 4IR technologies to consider geopolitics besides technical specifications and budgetary issues. A small state will have to face trade-offs when it engages the big powers — which are competing for geopolitical influence — to preserve its neutrality and balance relations. Trade-offs may be inevitable if a small state is strategically exposed to competing big powers, and if its security and economy are dependent on cooperation and positive relations with them. Therefore, a small state may need to adopt

⁷ Ibid, pp. 12–13

⁸ Rahman, Muhammad Faizal Bin Abdul, and Russell Huang. "The Asia-Pacific's Huawei Conundrum." *The Diplomat*, March 12, 2020. <https://thediplomat.com/2020/03/the-asia-pacifics-huawei-conundrum/>

⁹ Edstrom, Hakan., Gyllensporre, Dennis, and Jacob Westberg,. *Military Strategy of Small States: Responding to External Shocks of the 21st Century*. New York: Routledge, 2019, p. 11.

¹⁰ This paper includes Estonia as a Middle Power as the state plays an outsized role as (i) a NATO member, (ii) a European Union member, and (iii) the host of NATO Cooperative Cyber Defence Centre of Excellence. See Long, Tom. "Small States, Great Power? Gaining Influence Through Intrinsic, Derivative, and Collective Power." *International Studies Review* 19 (2017): 185–205. <https://academic.oup.com/isr/article/19/2/185/2633350>

¹¹ Edstrom, Hakan, Gyllensporre, Dennis, and Jacob Westberg. *Military Strategy of Small States: Responding to External Shocks of the 21st Century*. New York: Routledge, 2019, p. 12

a hedging strategy to mitigate risks “by pursuing different options simultaneously” with the big powers.¹² For example, Singapore cultivates positive relations with the big powers while avoiding the situation of becoming too dependent on a single big power. Singapore renewed the “1990 Memorandum of Understanding Regarding United States Use of Facilities in Singapore” with the United States in 2019, and conducted a bilateral training “exercise cooperation” with China’s People’s Liberation Army (PLA) in the same year. In this regard, Singapore has sent both supportive and critical signals to the big powers — China and the United States — and has avoided becoming too closely associated with either.¹³

This paper examines from a policy-relevant angle the intersection of 4IR technologies and geopolitics in four sections. The first section discusses how 4IR technologies are emergent and shaping national interests too. The second section examines how Singapore, as a small state, is embracing the emerging technological landscape. The third section explores some plausible risk scenarios from the intersection of 4IR technologies and geopolitics. The fourth section concludes by summarising the main issues and recommending some strategic steps that small states such as Singapore can take to defend its national interests.

Fourth Industrial Revolution is Shaping National Interests

In a 2019 World Economic Forum (WEF) report, the top 10 emerging technologies — such as collaborative telepresence, social robots, DNA data storage, and utility-scale storage of renewable energy — that will shape tomorrow’s world relate to the 4IR.¹⁴ These 4IR technologies resulted from the convergence of various digital technologies — such as artificial intelligence (AI), Internet of Things (IoT), biometrics, and robotics — as also biotechnology and nanotechnology. They drive global interconnectivity and transformation in the way people, processes, infrastructure, and systems function. Given their pervasiveness, 4IR technologies form a megatrend that will determine the future of economic security and the efficient delivery of both public and private goods and services. Globally, industrial revolutions since the 18th century has caused monumental changes to society, security, economy, and politics.

¹² Ibid, p. 38

¹³ Lim, Darren J., and Zack Cooper. “Reassessing Hedging: The Logic of Alignment in East Asia.” *Security Studies* 24 (2015). www.tandfonline.com/eprint/Ine54cRVwsgmJcZSa5gF/full

¹⁴ World Economic Forum. “Top 10 Emerging Technologies 2019.” *Insight Report* (2019). www3.weforum.org/docs/WEF_Top_10_Emerging_Technologies_2019_Report.pdf

Innovative and dual-use

4IR technologies are influential across a broad range of public and private sectors as they fuse physical, digital, and biological applications. The possibilities are unending as their current applications continue to undergo innovations with technologists and entrepreneurs discovering new applications continually. They can offer solutions and strategies for cities to manage rapid urbanisation and population growth in the push for sustainable development.¹⁵ These strategies call for closer partnerships between the public and private sectors to maintain good governance on an ongoing basis.

The dual-use potential of 4IR technologies also make them relevant to geopolitical disagreements and asymmetric warfare and are, therefore, crucial to the defence and security sectors.¹⁶ Specifically, 4IR technologies in the fields of cyberwarfare, autonomous machines, and human enhancement can influence conflicts. For example, the US-Iran rivalry has seen new forms of attacks that are unique from conventional warfare. The United States reportedly launched a cyberattack on Iran in September 2019 in retaliation to Yemeni Houthi militants who are aligned with Iran. The Houthi militants had earlier launched drone attacks on oil facilities in Saudi Arabia, which is a United States ally.¹⁷

Given the importance of 4IR technologies — such as smart city systems — to people, governments, and industries, the G20 collaborated with the WEF in June 2019 to form the Global Smart Cities alliance. The alliance aims to “establish universal norms and guidelines” and promote “core principles including transparency, privacy, and security”.¹⁸ International experts are also reviewing Article 36 of the 1977 Additional Protocol to the 1949 Geneva Conventions to determine whether emerging technology adoption can give rise to new humanitarian issues and violations of international rules during armed conflicts.¹⁹ Norms, rules, and principles are vital to ensuring that the adoption of 4IR technologies brings more benefits than harm to states and societies.

¹⁵ Rubasundram, Geetha A. “The Complexity of Governing Smart Cities – An Integrated Approach.” In *Smart Technologies and Innovation for a Sustainable Future*, edited by Ahmed Al-Masri, and Kevin Curran, 367. Switzerland: Springer, 2019.

¹⁶ Prime Minister’s Office. “SM Teo Chee Hean at the Singapore Defence Technology Summit.” June 27, 2019. www.pmo.gov.sg/Newsroom/SM-Teo-Chee-Hean-Singapore-Defence-Technology-Summit-2019

¹⁷ TOI Staff. “US conducted cyberattack on Iran following strike on Saudi oil – report.” *The Times of Israel*, October 16, 2019. www.timesofisrael.com/us-conducted-cyberattack-on-iran-following-strike-on-saudi-oil-report/

¹⁸ Russo, Amanda. “World Economic Forum to Lead G20 Smart Cities Alliance on Technology Governance.” *World Economic Forum*, June 27, 2019. www.weforum.org/press/2019/06/world-economic-forum-to-lead-g20-smart-cities-alliance-on-technology-governance/

¹⁹ Boulanin, Vincent, and Maaïke Verbruggen. “Article 36 Reviews: Dealing with the challenges posed by emerging technologies.” *Stockholm International Peace Research Institute* (2017): 1. www.sipri.org/sites/default/files/2017-12/article_36_report_1712.pdf

Opportunities and risks to states

The opportunities and risks that 4IR technologies offer have driven big powers to emphasise them in the protection of national interests and in the pursuit of geopolitical influence. For example, China is focussing on digital technologies as part of President Xi Jinping's vision of a shared community for mankind's future. This vision encourages the international community to "advance development, safeguard security, participate in governance, and share the benefits" of digital technologies.²⁰ The United States is focussing on AI in President Trump's executive order to enhance economic and national security. This order seeks "an international environment that supports American AI research and innovation and opens markets for American AI industries while protecting our technological advantage in AI and protecting our critical AI technologies from acquisition by strategic competitors and adversarial nations."²¹ Both China and the United States are also increasingly competing for access to mineral resources that enable production of digital technologies hardware for both civilian and military purposes.²²

Small states — such as Singapore and Estonia — are leveraging 4IR technologies to sustain their visibility and soft power on the international stage in an era where technology is disrupting networks and relationships between states.²³ Investments and international collaborations on 4IR technologies can create more opportunities that will keep Singapore secure and relevant to the global economy going forward. On the domestic front, 4IR technologies are central to Singapore's vision of improved life and livelihood by becoming a Smart Nation. Regionally, Singapore promotes the Smart Cities Network to support sustainable urban development and enhanced connectivity between major cities in ASEAN. Internationally, Singapore promotes the use of digital technologies to enhance international relations — digital diplomacy — among smaller states.²⁴ 4IR technologies are critical to maintain Singapore's geo-economic status as a global trade-hub and become a premier tech-hub that connects Asia to the rest of the world.

²⁰ "Jointly Build a Community with a Shared Future in Cyberspace." *China Daily*, October 17, 2019.

www.chinadaily.com.cn/a/201910/17/WS5da7d7b3a310cf3e3557106a.html

²¹ The White House. "Executive Order on Maintaining American Leadership in Artificial Intelligence." February 11, 2019. www.whitehouse.gov/presidential-actions/executive-order-maintaining-american-leadership-artificial-intelligence/

²² Easton, Ian. "What Rare Earths Tell Us about China's Competitive Strategy." *The National Interest*, July 17, 2019. <https://nationalinterest.org/feature/what-rare-earth-tell-us-about-chinas-competitive-strategy-67507>

²³ Jermalavicius, Tomas. "Small State Power in the Digital Era." Accessed March 31, 2020. <https://www.americanacademy.de/small-state-power-in-the-digital-era/>

²⁴ Ministry of Foreign Affairs Singapore. "Singapore and DiploFoundation partner to unlock the potential of Digital Diplomacy for Small States." May 08, 2018. www.mfa.gov.sg/Overseas-Mission/Geneva/Mission-Updates/2018/05/press_20180508

How 4IR Technologies Diffuse in Singapore

Diffusion of technology

The diffusion of 4IR technologies is happening worldwide, albeit at different paces in different states. This process entails the technological hardware, tools, and knowledge of applications spreading from its original innovators to other users including individuals, public, and the private sector. Technology diffuses faster in the United States and some western states since they were ahead in the manufacturing and knowledge-intensive industries during the 1970s and 1980s.²⁵ Over the last decade, technology diffusion in China has been swift because it is an economic behemoth with considerable resources and ambitious industrial targets. In Southeast Asia, Singapore and Vietnam are currently ahead in embracing Industry 4.0.

This paper posits that several interlinked elements constitute technology diffusion (see Figure 1). Talent development entails building a local pool of individuals with technical and business competencies. Ecosystem development entails the government creating an enabling environment — such as by providing financial incentives and national strategies — for companies to explore technology locally and seek regional business opportunities. Research and development (R&D) must ensure the alignment of innovation with the needs of the industry and government; this alignment may include adopting commercial innovation for military or security applications. Commercialisation, which entails profit incentives and competition, drives innovation and adoption of advanced technology across sectors. Internationalisation, particularly by multinational companies and start-ups facilitate technology diffusion through knowledge transfer and foreign direct investments.

²⁵ Cervantes, Mario. "Diffusing Technology to Industry." *OECD Observer* 207 (1997): 20.
https://oecdobserver.org/news/fullstory.php/aid/2731/Diffusing_Technology_to_Industry.html

Figure 1: Diffusion of technology



Singapore has embarked on numerous programmes to accelerate its efforts in talent and ecosystem development, R&D, internationalisation and commercialisation of 4IR technologies both in the public and private sectors. The programmes seek to transform Singapore’s economy to be ready for challenges that stem from changes in global markets and technological disruptions.

Talent development and ecosystem development

On talent development, for example, Enterprise Singapore and the Economic Development Board (EDB) announced Tech@SG in July 2019. This pilot programme was to provide “access to business networks and talent” and “enable Singapore to upskill” its talent pool.²⁶ On ecosystem development, the Ministry of Trade and Industry (MTI) has implemented the Industry Transformation Maps (ITMs) for 23 industries, which include aerospace, security, transport, healthcare, information and communications technology (ICT), media, and food services. The ITMs constitute a strategy to create a comprehensive ecosystem that enables Singapore’s critical industries to remain competitive through

²⁶ Singapore Economic Development Board. “Pilot programme to facilitate access to talent and support growth of Singapore’s technology ecosystem.” September 02, 2019. www.edb.gov.sg/en/news-and-events/news/pilot-programme-to-facilitate-access-to-talent-and-support-growth-of-singapore-technology-ecosystem.html

technological adoption and innovation, and to gain better access to global markets through digital channels.²⁷

Research and development

On R&D, research institutes in Singapore have established collaborations with foreign counterparts and with companies from both Asia and the West. Collaborations with Chinese partners include researchers from the National University of Singapore (NUS) and Beijing-based AI company Pensees Technology jointly developing AI surveillance cameras.²⁸ The Nanyang Technological University (NTU) launched a joint talent programme in January 2019 with Chinese AI company SenseTime. It will allow PhD researchers to work on AI projects with practical applications. SenseTime has an industrial relationship with Huawei.²⁹ Collaborations with western partners include NTU working with Swedish vehicle maker Volvo to test autonomous buses.³⁰ European multinational company Airbus in February 2016 launched a project called Skyways with the Civil Aviation Authority of Singapore (CAAS), SingPost, and NUS to develop a drone parcel delivery system for urban environments.³¹

Internationalisation and commercialisation

On internationalisation, Singapore achieved significant milestones in October 2019 with the signing of several agreements and Memorandums of Understanding (MOUs) with China under the Belt and Road Initiative (BRI). One of the aims of BRI projects is to “speed up the transfer and commercialisation of advanced technologies.”³² For example, the China-Singapore (Chongqing) data channel will enhance the digital and physical connectivity between Singapore and western China.³³ The Singapore-China (Shenzhen) Smart City Initiative will enhance linkages between people and businesses, including those

²⁷ Ministry of Trade & Industry Singapore. “Industry Transformation Maps.” September 2016. www.mti.gov.sg/-/media/MTI/ITM/General/Industry-Transformation-Maps_v13.pdf

²⁸ Ting, Choo Yun. “Chinese firm Pensees to collaborate with NUS to develop AI-based camera system.” *The Straits Times*, July 31, 2019. www.straitstimes.com/business/chinese-firm-pensees-to-collaborate-with-nus-to-develop-ai-based-camera-system

²⁹ Majumder, Bhaswati Guha. “Singapore’s NTU ties up with AI company SenseTime to launch a new program for PhD researchers.” *International Business Times*, February 01, 2019. www3.ntu.edu.sg/CorpComms2/Documents/2019/02_Feb/IBT_190201_Singapore%27s%20NTU%20ties%20up%20with%20AI%20company%20SenseTime%20to%20launch%20new%20program%20for%20PhD%20researchers.pdf

³⁰ Wei, Toh Ting. “NTU and Volvo launch world’s first full-sized driverless electric bus for trial.” *The Straits Times*, March 05, 2019. www.straitstimes.com/singapore/transport/ntu-and-volvo-launch-worlds-first-full-sized-autonomous-electric-bus-for-trial

³¹ Wong, Derek. “Plan for drones to deliver parcels takes flight.” *The Straits Times*, February 09, 2018. www.straitstimes.com/singapore/transport/plan-for-drones-to-deliver-parcels-takes-flight

³² Belt and Road Alliance for Collaborative Innovation & Technology Transfer. “About Us.” October 15, 2018. www.jittc.org/beltandroaden/browse/AboutTheLeagueController/showAboutLianMen

³³ Infocomm Media Development Authority. “Launch of China-Singapore (Chongqing) International Data Channel.” *Media Release*, September 11, 2019. <https://www.imda.gov.sg/news-and-events/Media-Room/Media-Releases/2019/Launch-of-China-Singapore-Chongqing-International-Data-Channel>

between Southeast Asia and the Greater Bay Area.³⁴ Besides digitalisation, the human enhancement field also sees the potential for internationalisation and commercialisation. For example, firefighting and military agencies overseas have expressed interest in the Singapore-engineered exoskeleton - Auberon.³⁵

Challenges, however, may impede Singapore's efforts in embracing the emerging technologies landscape. Essentially, the US-China trade conflict is superficially about trade but strategically, it is more about establishing technological supremacy.³⁶ 4IR technologies contribute to shifts in the geopolitical power balance, much to the disadvantage of the established western-led international order.³⁷ Decisions over the acquisition of 4IR technologies will entail not only cost and technical considerations but also choosing between security and economic relations with the United States and China. Small states that depend heavily on global markets will face significant economic and national security risks resulting from big-power rivalry.

How Technology Intersects Geopolitics

The feared scenarios of "technological bifurcation" and "economic decoupling," in which different technologies and rules split the global economy, are becoming more likely. Geopolitical rivalry between the big powers show little prospects of reconciliation. Both the United States and China seem determined in pursuing a zero-sum game in 4IR technologies. There is increasing bipartisan consensus among US policymakers that China is pursuing technological dominance. It is using the latter as a means to grow military and economic power to threaten US interests.³⁸ China's policymakers perceive the United States as a threat actor with malicious intent and the desire to suppress the technological progress and economic growth of other states.³⁹ Strong nationalism in both China and the United States has also created considerable domestic pressure for both powers to not cooperate.⁴⁰

³⁴ Prime Minister's Office Singapore. "15th Joint Council for Bilateral Cooperation and Related Joint Steering Council Meetings." October 15, 2019. www.pmo.gov.sg/Newsroom/15th-Joint-Council-for-Bilateral-Cooperation-and-Related-Joint-Steering-Council-Meetings

³⁵ Cotta, Ian De. "Singapore's engineering prowess demonstrated in 4 state-of-the-art innovations." *The Peak Magazine*, August 04, 2018. <https://thepeakmagazine.com.sg/lifestyle/4-state-of-the-art-inventions-you-never-knew-were-from-singapore/>

³⁶ "High-tech supremacy at stake in US-China trade war." *The Business Times*, May 10, 2019.

www.businesstimes.com.sg/government-economy/high-tech-supremacy-at-stake-in-us-china-trade-war

³⁷ World Economic Forum. "The Future of International Security (2016-2018)." Accessed January 16, 2020, pp. 3–5. www3.weforum.org/docs/WEF_GFC_International_Security_Consolidated.pdf

³⁸ Swanson, Ana, and David McCabe. "Trump Effort to Keep U.S. Tech Out of China Alarms American Firms." *The New York Times*, February 16, 2020. www.nytimes.com/2020/02/16/business/economy/us-china-technology.html

³⁹ Ministry of Foreign Affairs of the People's Republic of China. "Transcript of State Councillor and Foreign Minister Wang Yi's Exclusive Interview with Reuters." February 15, 2020. www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1745264.shtml

⁴⁰ McFaul, Cole. "U.S.-China Decoupling: A Zero-Sum Game?" November 19, 2019. <https://uschinadialogue.georgetown.edu/responses/u-s-china-decoupling-a-zero-sum-game>

Furthermore, the narratives of technological rivalry have expanded beyond economic and national security concerns to include the clash of political and civilisational values. For example, the US State Department's director of policy planning, Kiron Skinner, remarked at New America's Future Security Forum in April 2019 that the US-China rivalry is "a fight with a really different civilisation and a different ideology".⁴¹ During the COVID-19 pandemic, US President Trump obliquely played up the civilisational clash on 17 March 2020 by terming the disease as a "Chinese virus" while other China hardliners in the United States repeated the call for "economic decoupling".⁴² The relationship between the United States and China will be tense in the long-term even if both states reach a truce on their economic war.⁴³

The big powers can use the interdependencies between foreign investments and global trade — including in 4IR technologies — as levers of foreign influence to convince or use sharp power to coerce small states to choose sides.⁴⁴ Sharp power entails the use of "subversion, bullying and pressure" to manipulate opinion and compel behaviour.⁴⁵ For example, the United States uses trade sanctions as a coercive instrument to contain the technological rise of its geopolitical rivals.⁴⁶ China aims to achieve "*yijing cuzheng*" — leveraging economics such as the BRI — in the technological market to promote politics.⁴⁷ To counter China's influence in telecom major Huawei, the United States in February 2020 also considered the influence-building step of acquiring controlling stakes in Finland's Nokia and Sweden's Ericsson.⁴⁸ The control of supply chains and talent in 4IR technologies have become important levers of pressure. Small states that rely heavily on 4IR technologies and global markets for economic security will have to navigate a more contested world.

Small states aiming to maintain their neutrality and strategic autonomy should plan for pressures that the big powers — both established and emerging ones — may exert to cement their

⁴¹ Musgrave, Paul. "The Slip That Revealed the Real Trump Doctrine." *Foreign Policy*, May 02, 2019. <https://foreignpolicy.com/2019/05/02/the-slip-that-revealed-the-real-trump-doctrine/>

⁴² Moak, Ken. "The case against a US-China 'divorce'." *Asia Times*, March 19, 2020. <https://asiatimes.com/2020/03/the-case-against-a-us-china-divorce/>

⁴³ The United States and China signed phase one of the trade deal in January 2020 but this development did not stop US officials from making fresh accusations on Huawei in February 2020 over intellectual theft, fraud and unlawful business dealings with North Korea. See "US and China sign phase one of trade deal." *The Straits Times*, January 16, 2020. www.straitstimes.com/world/united-states/us-and-china-sign-phase-one-of-trade-deal. Klein, Jodi Xu. "China clashes with US over new Huawei accusations of intellectual property theft and North Korea dealings." *South China Morning Post*, February 15, 2020. www.scmp.com/tech/enterprises/article/3050756/huawei-denounces-new-us-allegations-intellectual-property-theft

⁴⁴ Rahman, Muhammad Faizal Abdul. "Economic Warfare: Enduring Its Impact." *RSIS Commentary* 150 (2019). www.rsis.edu.sg/wp-content/uploads/2019/07/CO19150.pdf

⁴⁵ Nye, Joseph S. "China's Soft and Sharp Power." *Project Syndicate*, January 04, 2018. www.belfercenter.org/publication/chinas-soft-and-sharp-power

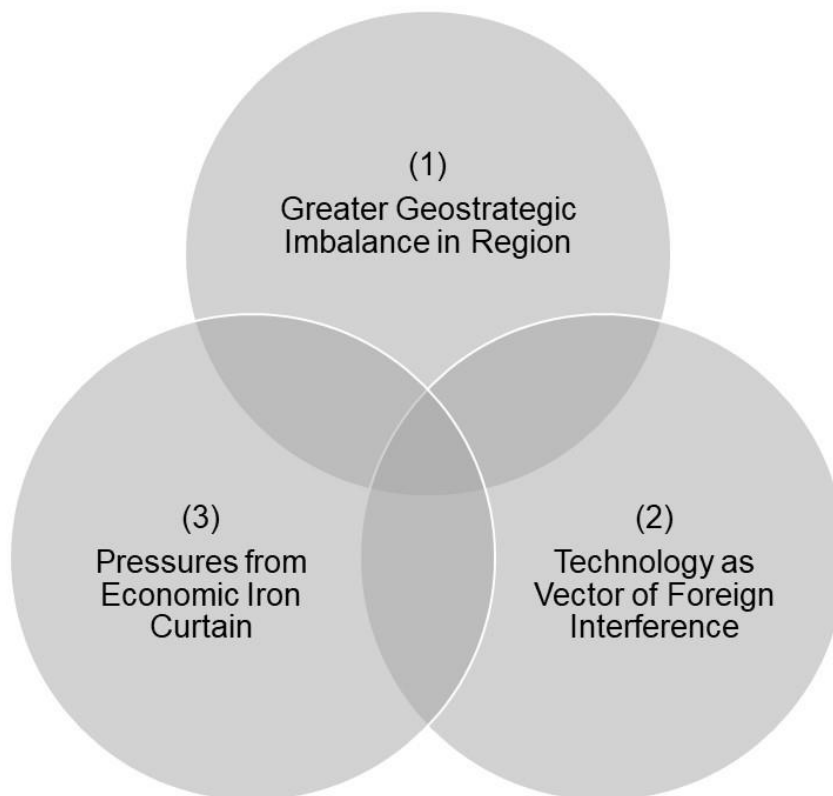
⁴⁶ "Trump wields a more powerful weapon than tariffs for trade war." *The Business Times*, May 24, 2019. www.businesstimes.com.sg/government-economy/trump-wields-a-more-powerful-weapon-than-tariffs-for-trade-war

⁴⁷ Zhang, Denghua. "The Concept of 'Community of Common Destiny' in China's Diplomacy: Meaning, Motives and Implications." *Asia & Pacific Policy Studies* 5 (2018): 203. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/app5.231>

⁴⁸ "A-G calls for US stake in Nokia, Ericsson to counter Huawei." *The Straits Times*, February 08, 2020. www.straitstimes.com/world/united-states/a-g-calls-for-us-stake-in-nokia-ericsson-to-counter-huawei

spheres of influence. Small states will need to project and plan for probable risk scenarios that may arise from the intersection of 4IR technologies and geopolitics. Fundamentally, these risk scenarios entail the big powers leveraging trade and 4IR technologies application to put pressure on small states. Additionally, small states that continue to engage China for practical reasons could find the United States isolating itself behind the “economic iron curtain” that it erected against China.⁴⁹ For Singapore, there could be at least three plausible and broad risk scenarios based on an analysis of current data (see Figure 2).

Figure 2: Three scenarios for intersection of technology and geopolitics



Greater geostrategic imbalance in the region

The first scenario is the possibility that China successfully narrows the technological gap between the US military and its own. A report by the Australian Strategic Policy Institute (ASPI) states that China is becoming a technological powerhouse because its military has sent numerous engineers and scientists abroad over the years to further their studies and build research collaborations.⁵⁰ China’s concept of “military-civil fusion” enables it to leverage advancements in 4IR technologies in the civilian sector to

⁴⁹ Singh, Daljit. “How will shifts in American foreign policy affect Southeast Asia?” *Trends in Southeast Asia* 15 (2019): 15. <https://bookshop.iseas.edu.sg/publication/2409>

⁵⁰ Joske, Alex. “Picking flowers, making honey.” *ASPI Policy Brief* 10 (2018): 3–9. www.aspi.org.au/report/picking-flowers-making-honey

modernise its military forces. The report also states that Singapore universities —NTU and NUS — are among the top 10 institutes outside China. Both aforementioned institutions have the highest level of research collaboration — both direct and indirect — with the Chinese military.⁵¹ For example, NTU's research progress in quantum technology could have military applications, and China can be a beneficiary.⁵² This report, therefore, implies that states forming technological collaborations with China are supporting its becoming a powerful geostrategic actor and challenging the US-led security partnerships that have been safeguarding the international order.⁵³

Similarly, a report by the International Institute for Strategic Studies and the Mercator Institute for China Studies states China is strengthening its defence state-owned enterprises (SOEs) and civilian sectors to adopt technological innovations for military applications. To that end, China ensures the Chinese Communist Party maintains its influence over Chinese technological companies as they acquire technologies overseas through investments and acquisitions. An important consideration is that 4IR technologies that are in early research stages could become enablers or have potential future military applications. For example, research collaborations in AI and autonomous systems can support China in (i) enhancing militarisation of disputed territories by deploying autonomous military systems; (ii) challenging US dominance militarily by complementing Chinese troops with robotic combat systems; and (iii) upsetting the regional military balance through its arms sales. This report highlights that China's pursuit of 4IR technologies could affect European states' national interests. However, the report also suggests that European states could continue to collaborate with China in research areas that address common problems and do not affect national security.⁵⁴

While the United States may continue to lead in military technology, China could compensate for the narrow gap in several ways. First, China is the second-largest military spender in the world and may attempt to balance its lack of technological superiority vis-à-vis the United States with superior numbers in military assets and manpower. Second, China could, at the strategic level, frame its conflict with the United States as a long struggle by the Chinese people and the Chinese nation to heighten the resilience of its military against the technologically-superior US. Third, China could continue to leverage its BRI, including the Digital Silk Road to grow its influence and diminish the strength of alliances and

⁵¹ The independence of ASPI, however has been under scrutiny. Although ASPI is an Australian think tank that has been conducting intensive research on China's rise in the Indo-Pacific, it has a significantly pro-US stance and reportedly receives funding from the US Department of State. See Robin, Myriam. "The think tank behind Australia's changing view of China." *Financial Review*, February 15, 2020. <https://www.afr.com/policy/foreign-affairs/the-think-tank-behind-australia-s-changing-view-of-china-2020131-p53wgp>. Carr, Bob. "Bob Carr: Australia needs a think tank that sees hope in partnership with China." *The Sydney Morning Herald*, September 11, 2016. www.smh.com.au/opinion/bob-carr-australia-needs-a-think-tank-that-sees-hope-in-partnership-with-china-20160911-grdmgb.html

⁵² Oakes, Troy. "Here's the Quantum Chip 1,000 Times Smaller Than Current Setups." *Vision Times*, November 18, 2019. www.visiontimes.com/2019/11/18/heres-the-quantum-chip-1000-times-smaller-than-current-setups.html

⁵³ Chandran, Nyshka. "Western universities may be inadvertently helping China's military: Report." *CNBC*, November 01, 2018. www.cnbc.com/2018/11/01/western-universities-may-inadvertently-help-chinas-military-report.html

⁵⁴ Nouwens, Meia, and Helena Legarda. "Emerging technology dominance: What China's pursuit of advanced dual-use technologies means for the future of Europe's economy and defence innovation." December 2018. www.merics.org/en/merics-trackers/emerging-technology-dominance

partnerships that the United States has with countries in the region. Fourth, China's growing economic clout and technological superiority vis-à-vis smaller states could act as levers that further challenge the cohesion of regional institutions — such as ASEAN — that have been supporting collective security in the region.

For Singapore, this scenario will entail its national security interests being caught in an increasingly complicated big power contest for influence in Southeast Asia. On one end, a more technologically capable and confident Chinese military could increase its overall presence and aggression in the region. On the other end, a distracted US will struggle to maintain its regional dominance while its attention and military resources are divided into other operational theatres across the globe. A more advanced Chinese military that successfully incorporates 4IR technologies into its operational doctrine can potentially challenge the technological edge that supports the strategic deterrence of the Singapore Armed Forces. China's regional arms sales could also alter the outlook of perceived threats from Singapore's immediate neighbours.⁵⁵ Singapore's longstanding foreign policy of cooperating with the United States, which it views as a "force for stability" that "facilitated regional economic growth," would come under more significant stress.⁵⁶ Singapore's efforts to balance relations with the United States and China can also come under stress as both big powers make more demands on East Asian states.⁵⁷ Furthermore, Singapore can find it increasingly challenging to lobby regional states for a common position against destabilising issues that stem from big power rivalry. For example, China expressed its displeasure in 2016 after Singaporean diplomats remarked that China's four-point consensus with Brunei, Laos, and Cambodia on the South China Sea was divisive for ASEAN.⁵⁸

Technology as a vector of foreign interference

The second scenario is the possibility of China capitalising its strengths in 4IR technologies and their internationalisation to grow its influence overseas and interfere in the domestic affairs of other states. The technological (and economic) interdependencies that states have with China can potentially create vulnerabilities that compromise their national security. For example, Australia fears that Huawei's involvement in its 5G networks can enable China to sabotage critical infrastructures in times of war or political crisis.⁵⁹ The United States fears that this scenario could undermine its global dominance by compelling states to acquiesce to China's demands and weaken the security partnerships it has with

⁵⁵ Zhen, Liu. "Chinese shipbuilder touts warships amid push to expand arms sales in Southeast Asia." *South China Morning Post*, July 26, 2019. www.scmp.com/news/china/military/article/3020299/chinese-shipbuilder-touts-warships-amid-push-expand-arms-sales

⁵⁶ Acharya, Amitav. *Singapore's Foreign Policy: The Search for Regional Order*. Singapore: World Scientific, 2008, p. 100.

⁵⁷ Basu, Medha. "How Singapore can thrive in the US-China trade war." *GovInsider*, July 31, 2019. <https://govinsider.asia/digital-gov/singapore-us-china-trade-war-bruno-macaes-foreign-policy/>

⁵⁸ Chow, Jermyn. "China responds to Singapore diplomats' remarks on South China Sea." *The Straits Times*, April 28, 2016. <https://www.straitstimes.com/asia/se-asia/china-responds-to-singapore-diplomats-remarks-on-south-china-sea>

⁵⁹ The International Institute for Strategic Studies. "Australia, Huawei and 5G." *IISS Strategic Comments* 25 (2019). www.iiss.org/publications/strategic-comments/2019/australia-huawei-and-5g

these states. To pre-empt this scenario, the United States, for example, has asked other states to ban Chinese companies such as Huawei from selling 5G technology solutions. The Committee on Foreign Investment in the United States (CFIUS) is seeking higher powers to scrutinise foreign investments in US companies that deal with technology.⁶⁰ Additionally, the US State Department has reached out to potential military spenders and warned that Chinese military technology is not safe for its users and opens the door for Chinese influence and intelligence operations.⁶¹ It also warned other states that China is using defence and security trade shows — such as the Singapore Airshow 2020 — as a platform for intelligence gathering and to expand its regional influence.⁶² Fundamentally, the United States seeks global support to limit the gains that China is pursuing in the quality of its technologies and market share in global high-tech markets. The United States, however, is seeing limited success partly due to its retreat from multilateralism which is chipping away at its moral leadership.

Similarly, Vietnam, as a smaller state, realises that embracing 4IR technologies is necessary to pursue economic growth through integration with global markets.⁶³ However, the country also seeks to minimise national security risks that interdependencies with China could create. Vietnam's vigilance towards China — its largest trading partner — is attributable to its history of territorial conflicts and current maritime disputes with its much larger neighbour in the South China Sea.⁶⁴ On digital technologies, Vietnam, unlike other Southeast Asian states, has chosen to collaborate with Nokia and Ericsson instead of Huawei to establish a domestic 5G network. This has, in effect, aligned it closely with the United States.⁶⁵ Vietnam's Viettel Group is also developing domestic 5G technology to lock out Huawei, although the profitability of its strategy is uncertain.⁶⁶ In both the territorial and technological domains, Vietnam has shown it is more prepared than some other ASEAN states to stand up to China. Among the key factors that enable Vietnam to pursue self-reliance in 4IR technologies are its vast talent pool, supportive government policies, home-grown private sector, and SOEs with a regional and global

⁶⁰ Sink, Justin and Mark Niquette. "U.S. Seeks Tighter Security Reviews of Foreign Tech Investments." *Bloomberg*, September 18, 2019. www.bloomberg.com/news/articles/2019-09-17/cfius-security-reviews-would-get-tougher-under-proposed-rules

⁶¹ Magnier, Mark. "Buyer beware – Chinese military weapons are low quality, says US State Department official." *South China Morning Post*, November 01, 2019. www.scmp.com/news/china/article/3035825/buyer-beware-chinese-military-weapons-are-low-quality-says-us-state?

⁶² "US warns China about using Singapore Airshow as platform for exploitation and theft." *Today Online*, February 12, 2020. www.todayonline.com/world/us-warns-china-about-using-singapore-airshow-platform-exploitation-and-theft

⁶³ "Digital transformation essential for business in 4IR era." *Vietnam Plus*, October 21, 2019. <https://en.vietnamplus.vn/digital-transformation-essential-for-business-in-4ir-era/162386.vnp>

⁶⁴ Raslan, Karim. "How Vietnam has kept China at bay over thousands of years." *South China Morning Post*, August 06, 2016. www.scmp.com/week-asia/geopolitics/article/1999202/how-vietnam-has-kept-china-bay-over-thousands-years

⁶⁵ "Vietnam shuns Huawei as it seeks to build Southeast Asia's first 5G network." *South China Morning Post*, August 27, 2019. www.scmp.com/news/asia/southeast-asia/article/3024479/vietnam-shuns-huawei-it-seeks-build-aseans-first-5g

⁶⁶ Onishi, Tomoya. "Vietnam carrier develops native 5G tech to lock out Huawei." *Nikkei Asian Review*, January 25, 2020. <https://asia.nikkei.com/Business/Telecommunication/Vietnam-carrier-develops-native-5G-tech-to-lock-out-Huawei>

presence.⁶⁷ Indeed, smaller states can observe how Vietnam navigates big-power rivalry as it seeks foreign investments to embrace 4IR technologies.

Concerns over the possible use of 4IR technologies by big powers for influence and intelligence operations are not unwarranted. Technology is essential in China's efforts to advance its economic interests under the BRI and its Digital Silk Road vision. China aims to attain "*yijing cuzheng*", which is leveraging economic projects to promote its political goals internationally.⁶⁸ These concerns have driven the United States to examine how China's smart city technologies, for example, could affect national security.⁶⁹ These concerns fundamentally mirror "the US Central Intelligence Agency's (CIA) purported use of backdoors in the encrypted communications products of Crypto AG to spy on other countries during the Cold War."⁷⁰ In this regard, Singapore's former foreign minister George Yeo once said the "Americans are so worried about Huawei not only because Huawei represents a possible vulnerability, but because using Huawei also makes it harder for American intelligence to gain access into other people's systems."⁷¹

A case of cyber-espionage in Africa demonstrated the possibility of China leveraging its overseas investments and digital technologies for purposes of maligning. In this case, China had reportedly used the ICT network it had built for the African Union headquarters to access and transfer confidential information. This was a form of foreign interference that could give China an upper hand on bilateral issues with African states.⁷² Similarly, past revelations of the US National Security Agency using American companies for electronic surveillance — such as the Planning Tool for Resource Integration, Synchronization, and Management (PRISM) programme — of overseas targets also demonstrates how any big power can use its economic and technological prowess on other states for foreign intelligence purposes.⁷³

⁶⁷ Mack, Vincent, Oon, Benny, and Cung Vu. "ASEAN's New Economic Player – Vietnam: ICT as Engine of Rapid Growth." *RSIS Commentary* 96 (2019). www.rsis.edu.sg/rsis-publication/rsis/aseans-new-economic-player-vietnam-ict-as-engine-of-rapid-growth/#.Xd14QvZuJ_w

⁶⁸ Rahman, Muhammad Faizal Abdul. "Economic Warfare: Enduring Its Impact." *RSIS Commentary* 150 (2019). <https://www.rsis.edu.sg/wp-content/uploads/2019/07/CO19150.pdf>

⁶⁹ Boyd, Aaron. "The U.S.-China Commission wants to look at how Chinese smart cities development plans could affect U.S. economic and national security." *Nextgov*, January 24, 2019. www.nextgov.com/emerging-tech/2019/01/commission-wants-know-if-chinas-smart-cities-are-smarter-ours/154397/

⁷⁰ Rahman, Muhammad Faizal Abdul, and Russell Huang. "The Asia-Pacific's Huawei Conundrum." *The Diplomat*, March 12, 2020. <https://thediplomat.com/2020/03/the-asia-pacifics-huawei-conundrum/>. Ikeda, Scott. "Crypto AG Shows That U.S. Concern Over Huawei Encryption Backdoors Comes from Long Experience Doing the Same Thing." *CPO Magazine*, February 25, 2020. www.cpomagazine.com/data-privacy/crypto-ag-shows-that-u-s-concern-over-huawei-encryption-backdoors-comes-from-long-experience-doing-the-same-thing/

⁷¹ Ma, Josephine. "Huawei ban won't stop spy threat when US and others are doing it too, says ex-Singapore minister George Yeo." *South China Morning Post*, March 30, 2019. www.scmp.com/news/china/diplomacy/article/3003856/huawei-ban-wont-stop-spy-threat-when-us-and-others-are-doing

⁷² Rahman, Muhammad Faizal Abdul. "Defending Singapore Against Foreign Interference." *RSIS Commentary* 171 (2019). www.rsis.edu.sg/rsis-publication/cens/defending-singapore-against-foreign-interference/#.XdJCuPZuJ_w

⁷³ Groll, Elias. "How American Companies Enable NSA Surveillance." *Foreign Policy*, October 04, 2016. <https://foreignpolicy.com/2016/10/04/how-american-companies-enable-nsa-surveillance/>. "In Asia, dissidents

For any small state that procures Chinese technology for use in public services, this scenario would raise concerns over whether China is using backdoors in its technological products and digital connectivity to gain access to the networks of electronic devices such as CCTV security cameras in public spaces. For example, Dubai has reportedly started using Chinese technology as part of its “Police without Policemen” programme, which seeks to leverage video surveillance and facial recognition technology for crime prevention.⁷⁴ Fundamentally, there are concerns that the use of Chinese components and infrastructure in smart cities can expand the digital space for China to conduct espionage for economic and political manipulation.⁷⁵ Concerning this scenario, a report by ASPI suggests that China could expand its informational power beyond its borders both for “cooperative and coercive” purposes.⁷⁶ Additionally, smart city technologies are increasingly crucial for the provision of essential public services. China's market leadership in smart city technologies and control of data flows could potentially endow it with possible levers to exert political and economic influence on other states' public agencies and industries that rely on its products.⁷⁷ Currently, China has shown it intends to use economic levers in influencing the decisions of other states to resist the United States' pressures and protect its national interests.⁷⁸ In this regard, the United States' alleged acts of cyber-espionage targeting China's companies and public agencies over the past decade could be part of clandestine efforts to gather intelligence on these possible levers and use countervailing measures.⁷⁹

Pressures from economic “iron curtain”

The third scenario is the possibility of the United States solidifying an “economic iron curtain” that imposes political and economic pressures on small states that depend heavily on global markets as well as the vast Chinese market for trade and technologies. A speech by Hank Paulson, former US Secretary of Treasury, highlighted several important points.⁸⁰ Although the United States and China always had a competitive relationship, the geopolitical situation has escalated to the point where the

worry that US may share Prism data.” *The Straits Times*, June 11, 2013. www.straitstimes.com/asia/in-asia-dissidents-worry-that-us-may-share-prism-data

⁷⁴ Polyakova, Alina, and Chris Meserole. “Exporting digital authoritarianism: The Russian and Chinese models.” *Brookings Policy Brief* (2019): 6. www.brookings.edu/wp-content/uploads/2019/08/FP_20190827_digital_authoritarianism_polyakova_meserole.pdf

⁷⁵ Shi-Kupfer, Kristin, and Mareike Ohlberg. “China's Digital Rise: Challenges for Europe.” *MERICs Papers on China* 7 (2019): 14 and 38. www.merics.org/en/papers-on-china/chinas-digital-rise

⁷⁶ Hoffman, Samantha. “Engineering global consent: The Chinese Communist Party's data-driven power expansion.” *ASPI Policy Brief* 21 (2019): 4 and 25. www.aspi.org.au/report/engineering-global-consent-chinese-communist-partys-data-driven-power-expansion

⁷⁷ El-Kadi, Tin Hinane. “The Promise and Peril of the Digital Silk Road.” *Chatham House*, June 06, 2019. www.chathamhouse.org/expert/comment/promise-and-peril-digital-silk-road

⁷⁸ “Chinese ambassador warns Dutch government against restricting ASML supplies.” *South China Morning Post*, January 16, 2020. www.scmp.com/tech/policy/article/3046302/chinese-ambassador-warns-dutch-government-against-restricting-asml

⁷⁹ Corera, Gordon. “China demands US response over CIA hacking claims.” *BBC News*, March 04, 2020. www.bbc.com/news/technology-51736410

⁸⁰ Paulson Institute. “Remarks by Henry M. Paulson, Jr., on the Risks of an ‘Economic Iron Curtain’.” February 27, 2019. www.paulsoninstitute.org/press_release/remarks-by-henry-m-paulson-jr-on-the-risks-of-an-economic-iron-curtain/

United States views China not only as a strategic competitor but a primary long-term adversary. China hardliners in the United States are advocating a technology denial regime that was in place during the US-Soviet Cold War. This denial regime entails de-integrating the globalised flows of technological products, investments, talent, and innovation ecosystems between the United States, China, and other states. Consequently, the denial regime could drive the United States to strain its relations with other states including its allies and partners. For example, a rift in relations between the United States, and its key ally, the United Kingdom happened following the latter's decision in January 2020 to allow Huawei a limited role in building the United Kingdom's 5G infrastructure.⁸¹ The possibility of the United States in the future imposing pressure on Singapore is real owing to two reasons. First, Singapore's close economic relations with China could be the cause for its inclusion on the United States' list of currency manipulators.⁸² Second, US lawmakers could openly chastise Singapore if they perceive Singapore-China relations as directly opposed to western values of liberal democracy.⁸³ These reasons demonstrate that Singapore could end up in the crosshairs of the United States for its close relations with China.

Asian and small states, particularly, could face US pressure to “divorce” China although they realistically cannot afford to do so. While some US public narratives are not asking other states to align with one particular side, choosing sides is intrinsic in the notion of “economic iron curtain”. As big power rivalry increasingly affects all aspects of economics, small states can find it increasingly difficult to trade globally and secure tech-related supplies. This problem could depress employment levels, industrial performance, and efficient provision of public services. Industry actors — such as businesses, business leaders, researchers, and innovators — dealing with 4IR technologies inevitably become geopolitical actors.⁸⁴ If China can successfully “design out” several US technologies and become one of the leading powers in specific (i.e., not all) 4IR technologies, industry actors would need to reconsider how they balance the benefits of acquiring Chinese products vis-à-vis paying the costs of US pressures. Additionally, industries too could be caught in between if both the United States and China become more willing to escalate offensive cyber operations as part of their technological Cold War.⁸⁵

In the history of technological Cold War, Finland is an example of a small neutral state that became embroiled in the US-USSR rivalry from the 1970s to 1980s. Studies have examined how the United States had used various pressures to incorporate Finland into its technological embargo against

⁸¹ Colson, Thomas, and Adam Blenkov. “Trump’s repeated threats have ‘irritated’ the UK and it plans to defy him and strike a deal with Huawei.” *Business Insider*, January 27, 2020. www.businessinsider.sg/donald-trump-huawei-boris-johnson-threats-security-5g-deal-2020-1?r=US&IR=T

⁸² Jaipragas, Bhavan. “US addition of Malaysia, Singapore to ‘monitoring list’ over currency practices met with ridicule.” *South China Morning Post*, May 29, 2019. www.scmp.com/week-asia/economics/article/3012317/us-addition-malaysia-singapore-monitoring-list-over-currency

⁸³ “Twitter post by US Senator Rick Scott.” November 15, 2019. <https://twitter.com/SenRickScott/status/1195147582609252353>

⁸⁴ Rahman, Muhammad Faizal Abdul. “Economic Warfare: Enduring Its Impact.” *RSIS Commentary* 150 (2019). www.rsis.edu.sg/wp-content/uploads/2019/07/CO19150.pdf

⁸⁵ Triolo, Paul. “Geopolitics and Technology – US-China Competition: The Coming Decoupling?” *RSIS Commentary* 214 (2019). www.rsis.edu.sg/wp-content/uploads/2019/10/CO19214.pdf

the USSR.⁸⁶ For example, it was the United States who first considered whether neutral states should only be allowed to procure technology that it was willing to sell to the USSR. The intent was to prevent dual-use technologies from flowing — by open trade or espionage — to the USSR through neutral states. Second, the United States had linked Finland's purchase of arms components to Finnish companies' technological exports to the USSR. Third, some Finnish companies had felt pressured to break contractual obligations with the USSR or be faced with the risk of bankruptcy. Finland feared that its economy would suffer significantly from a United States-led stoppage in the flow of western technology. Therefore, Finland had to face inevitable trade-offs as it trod carefully between the USSR and the United States. The USSR was its large but backward neighbour and significant export market. Meanwhile, the United States (and other western states) was the technological leader and politically similar, in that it was also a non-communist and capitalist state.⁸⁷

For Singapore, Finland's example demonstrates that it is difficult for small states to stay out of big power rivalry and remain totally neutral in the technological Cold War. A hawkish US could perceive neutral states with considerable economic and diplomatic influence as loopholes in its China containment strategy that must be plugged. Finland implemented policies and "other inconspicuous methods" to regulate trade with the USSR. It did so while concurrently conducting confidence-building measures with the United States (and other western states).⁸⁸ Small states also have to collaborate with industry actors to find ways to recalibrate their domestic and foreign policies in factoring in trade-offs and long-term economic security needs. The Finnish company Nokia demonstrated how industry actors have a role in playing the balancing act by engaging US and USSR officials.⁸⁹ The situation for small states, however, is more complicated today as compared to the US-USSR Cold War. Unlike the USSR, China is well integrated with the global market and is one of the leaders in 4IR technologies.

⁸⁶ Jensen-Eriksen, Niklas. "The Northern Front in the Technological Cold War: Finland and the East-West Trade in the 1970s and 1980s." *Journal of Cold War Studies* 21 (2019): 150-74. https://www.mitpressjournals.org/doi/abs/10.1162/jcws_a_00909

⁸⁷ Ibid

⁸⁸ Ibid, p. 174

⁸⁹ Ibid, pp. 164–66

Conclusion and Policy Recommendations

Emerging or 4IR technologies are critical to the long-term efforts of small states in ensuring efficient provision of public services, economic security and growth, and relevance to the global economy. This paper focuses on small states that belong to Robert Keohane's category of "middle powers", which are states that "cannot act alone effectively but may be able to have a systemic impact in a small group or through an international institution".⁹⁰ Singapore, Vietnam, Estonia, and most Nordic states such as Finland belong to this category. These states also have highly digitalised societies that embrace Industry 4.0, and are "the weaker part in an asymmetrical relationship" with a big power such as China, Russia, and the United States.⁹¹

4IR technologies are on the path of driving changes to society, security, economy, and politics. In this regard, Singapore, for example, has embarked on numerous programmes to accelerate its efforts in talent and ecosystem development, R&D, and internationalisation of 4IR technologies in both public and private sectors. The programmes seek to transform Singapore's economy in keeping up with challenges that stem from changes in global markets and technological disruptions.

4IR technologies, however, play an essential role in geopolitical contestations. It is increasingly crucial to factor in geopolitics for state and industry decision making bodies regarding investments and adoption of 4IR technologies. This is in addition to technical specifications and budgetary considerations. The potential outcomes and risks that 4IR technologies offer have driven big powers to emphasise it in the protection of national interests and in the pursuit of geopolitical influence. The adoption of 4IR technologies by countries for their public and private sectors enables big powers to compete in protecting and growing their spheres of influence. These big powers can use the interdependencies between foreign investments and global trade in 4IR technologies as levers of foreign influence. This, in turn, can be used to convince or use sharp power to coerce small states to choose sides. Small states that rely heavily on 4IR technologies and global markets for economic security have to navigate a more contested world. A state's decision to allow, ban, or restrict the involvement of China's technologies in its critical infrastructure projects fundamentally amounts to its confidence in managing security risks, the needs of its people and industries, and whether geopolitical alignment with the United States is an overriding factor.⁹²

Small states aiming to maintain their neutrality and strategic autonomy should plan for pressures that the big powers — both established and emerging — may exert to cement their spheres of influence. Certain trade-offs in relations between the big powers may be inevitable. Small states will

⁹⁰ Edstrom, Hakan, Gyllensporre, Dennis, and Jacob Westberg. *Military Strategy of Small States: Responding to External Shocks of the 21st Century*. New York: Routledge, 2019, p. 11.

⁹¹ Ibid, p. 12

⁹² Rahman, Muhammad Faizal Abdul, and Russell Huang. "The Asia-Pacific's Huawei Conundrum." *The Diplomat*, March 12, 2020. <https://thediplomat.com/2020/03/the-asia-pacifics-huawei-conundrum/>

need to project and plan for possible risk scenarios that could stem from the intersection of 4IR technologies and geopolitics. There could be at least three plausible risk scenarios. The scenarios are, (i) greater geostrategic imbalance in the region; (ii) technology as a vector of foreign interference; and (iii) pressures from the economic iron curtain. These scenarios could have an impact on Singapore's national security, its position of neutrality, and freedom to chart its own domestic and foreign policies. In pre-empting these scenarios, there are useful lessons based on how small European states navigated the technological Cold War in the 1970s to 1980s. The situation, however, is more complicated now especially as both the United States and China have their respective strengths in the field of technology and extensive economic links with each other.⁹³ It is difficult to emulate the balancing strategies of other small states given the varying levels of risk appetite and technological adoption, as well as their different geostrategic and geo-economic realities.

Nevertheless, there are strategic steps that small states such as Singapore can take to defend its national interests better while investing in and adopting 4IR technologies. First, the state must increase collaboration with the private sector to assess the 4IR economy for strategic vulnerabilities that big powers can exploit as levers to impose their demands. Strategic vulnerabilities may emanate from assets, systems, networks, and dependencies that big powers built for small states by using 4IR technologies. Second, the state should pay more attention to 4IR technologies that are both critical to its long-term economic security and strategic to the national interests of big powers and their SOEs. The Vietnam example shows how a state can manage dependence on external sources of 4IR technologies by building up its domestic talent pool, home-grown private sector, and global footprint of its SOEs. A small state's strengths, in specific 4IR technologies — as applications or enablers — could be its levers to strike a better bilateral position vis-à-vis the big powers. Third, the state should identify the trade-offs it would face in engaging the big powers. The Finland example shows that trade-offs happen even when a small state tries to balance relations between two opposing big powers through trade policies and confidence-building measures. Fourth, the state should expand the role of its counterintelligence apparatus to detect, analyse, and counter any technological or economic-enabled strategies and means that any big power may employ for subversive activities. Counter-intelligence is crucial for risk assessment and mitigation efforts, especially if a big power has a role in building the state's critical infrastructures that provide essential public services.⁹⁴ Additionally, engagements with big powers' SOEs could be a diplomatic back-channel for a small state to protect its interests and monitor the integration of commercial 4IR technologies with military and political objectives.

In sum, small states must prepare themselves for a more contested world that results from 4IR technologies hastening the redistribution of geopolitical power to the disadvantage of the established western-led international order. As China narrows the technological gap and grows its influence, the

⁹³ Kwang, Han Fook, and Hoo Tiang Boon. "RSIS Workshop on Geopolitics and Technology." *RSIS Event Report*, February 05, 2020, pp. 18–20. https://www.rsis.edu.sg/wp-content/uploads/2020/02/ER_Geopolitics-and-Technology-Workshop.pdf

⁹⁴ Rahman, Muhammad Faizal Abdul, and Russell Huang. "The Asia-Pacific's Huawei Conundrum." *The Diplomat*, March 12, 2020. <https://thediplomat.com/2020/03/the-asia-pacifics-huawei-conundrum/>

United States will continue to use various pressures on other states in its agenda to contain China. The United States will expectedly double down in its pressures even as its retreat from multilateralism erodes its moral leadership. This contestation will determine the course of international relations, investments in and the advancement of 4IR technologies in the future. Small states, in particular, will see the implications of this contestation on economic growth and security of the regions they are situated in. Small states — such as Singapore — must take strategic steps to defend their national interests while highlighting that the big powers must not push them around.

About the Author

Muhammad Faizal Bin Abdul Rahman is a Research Fellow with the Centre of Excellence for National Security (CENS) at the S. Rajaratnam School of International Studies (RSIS). He holds a Bachelor of Business Administration (with Merit) from the National University of Singapore. He completed his Master of Science in Strategic Studies at RSIS, specialising in terrorism studies. His dissertation examined the grand strategies of Al Qaeda and the Islamic State (Daesh), focussing on asymmetric warfare and cities as a jihadi battlespace. Prior to joining RSIS, Faizal served with the Singapore Ministry of Home Affairs where he was a Deputy Director and had facilitated international engagements with foreign security counterparts. He also had postings in the Singapore Police Force where he supervised and performed intelligence analysis, achieving several commendation awards including the Minister for Home Affairs National Day Award (2009) for operational and analysis efficiency; and in the National Security Research Centre (NSRC) at the National Security Coordination Secretariat (NSCS), where he led a team to research emergent trends in domestic security and monitor terrorism-related developments. Faizal also has certifications in Counter-Terrorism, Crime Prevention and Business Continuity Planning. Faizal is also a regular resource person for international media such as MediaCorp on issues of extremism, terrorism and homeland security; and given lectures at conferences such as the Stockholm Security Conference 2017 and Security Industry Conference (SIC) 2018.

About the S. Rajaratnam School of International Studies

The **S. Rajaratnam School of International Studies (RSIS)** is a think tank and professional graduate school of international affairs at the Nanyang Technological University, Singapore. An autonomous school, RSIS' mission is to be a leading research and graduate teaching institution in strategic and international affairs in the Asia Pacific. With the core functions of research, graduate education and networking, it produces cutting-edge research on Asia Pacific Security, Multilateralism and Regionalism, Conflict Studies, Non-traditional Security, Cybersecurity, Maritime Security and Terrorism Studies.

For more details, please visit www.rsis.edu.sg. Follow us at www.facebook.com/RSIS.NTU or connect with us at www.linkedin.com/school/rsis-ntu.

RSIS Working Paper Series
(from 2016 onwards)

- | | | |
|-----|--|--------|
| 327 | The Intersection of Emergent Technologies and Geopolitics: Implications for Singapore
<i>Muhammad Faizal Bin Abdul Rahman</i> | (2020) |
| 326 | The “Indo-Pacific” Concept: Geographical Adjustments and their Implications
<i>Wada Haruko</i> | (2020) |
| 325 | China’s Belt and Road Initiative – A Perception Survey of Asian Opinion Leaders
<i>Pradumna B. Rana, Chia Wai-Mun and Ji Xianbai</i> | (2019) |
| 324 | Capturing Anti-Jokowi Sentiment and Islamic Conservative Masses: PKS 2019 Strategy
<i>Adhi Priamarizki and Dedi Dinarto</i> | (2019) |
| 323 | Propositions on Sino-American Trade Dispute: Some Helpful Ideas from Social Science
<i>Steve Chan</i> | (2019) |
| 322 | Examining the Growth of Islamic Conservatism in Indonesia: The Case of West Java
<i>Irman G. Lanti, Akim Ebih, Windy Dermawan</i> | (2019) |
| 321 | Financial Development in Myanmar and the Role of Japan
<i>Tomoo Kikuchi, Takehiro Masutomo</i> | (2019) |
| 320 | China’s Belt and Road Initiative and its Energy-Security Dimensions
<i>Frank Umbach</i> | (2019) |
| 319 | The Hindu Rights Action Force and the Malaysian Indian Minority after the 2018 General Election in Malaysia
<i>Arunajeet Kaur</i> | (2018) |
| 318 | The Fourth Industrial Revolution’s Impact on Smaller Militaries: Boon or Bane?
<i>Nah Liang Tuang</i> | (2018) |
| 317 | Pakistan and its Militants: Who is Mainstreaming Whom?
<i>James M. Dorsey</i> | (2018) |
| 316 | Securing Energy Supply and Maritime Interests: Seeking Convergence
<i>Frank Umbach</i> | (2018) |
| 315 | Is Use of Cyber-based Technology in Humanitarian Operations Leading to the Reduction of Humanitarian Independence?
<i>Martin Stanley Searle</i> | (2018) |
| 314 | Game of Institutional Balancing: China, the AIIB, and the Future of Global Governance
<i>Kai He and Huiyun Feng</i> | (2018) |

- 313 Xi Jinping and PLA Transformation through Reforms (2018)
You Ji
- 312 Comparing the Governance of Islam in Turkey and Indonesia: Diyanet and the Ministry of Religious Affairs (2018)
Martin Van Bruinessen
- 311 Indonesian Muslims in a Globalising World: Westernisation, Arabisation and Indigenising Responses (2018)
Martin Van Bruinessen
- 310 Theocracy vs Constitutionalism in Japan: Constitutional Amendment and the Return of Pre-war Shinto Nationalism (2018)
Naoko Kumada
- 309 Cyber Deterrence in Singapore: Frameworks and Recommendations (2018)
Eugene EG Tan
- 308 Trade Policy Options for ASEAN Countries and Their Regional Dialogue Partners: “Preference Ordering” Using CGE Analysis (2018)
Xianbai Ji, Pradumna B. Rana, Wai-Mun Chia, and Chang Tai Li
- 307 The South China Sea: Beijing’s Challenge to ASEAN and UNCLOS and the Necessity of a New Multi-tiered Approach (2017)
Christopher Roberts
- 306 China’s Belt and Road Initiative: The Evolution of Chinese Private Security Companies (2017)
Alessandro Arduino
- 305 Engaging Religion with Pragmatism: The Singapore State’s Management of Social Issues and Religious Tensions in the 1980s (2017)
Mohammad Alami Musa
- 304 Incident Prevention and Mitigation in the Asia Pacific Littorals: Framing, Expanding, and Adding to CUES (2017)
Graham Ong-Webb, Collin Koh, Bernard Miranda
- 303 A Political Economy Analysis of the Southeast Asian Haze and Some Solutions (2017)
Prakash Chander
- 302 Waiting for Disruption?! Undersea Autonomy and the Challenging Nature of Naval Innovation (2017)
Heiko Borchert, Tim Kraemer and Daniel Mahon

Visit the RSIS website at www.rsis.edu.sg/?p=48639

to access the full list of past RSIS Working Papers.