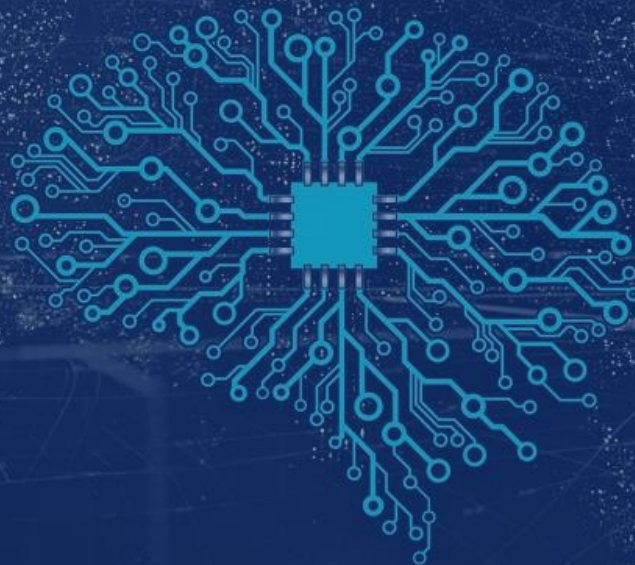


China's Standardisation System – trends, implications and case studies in emerging technologies



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Introduction

Standardisation, a subject that till recently held interest mainly for the specialists directly involved in it, has become a high-profile issue of international politics. The driving forces behind this are China's emergence as an influential player in many emerging technological fields, and its deteriorating political relations with various technologically leading economies, especially the United States. Perceptions of threats emanating from China, and of the risk that it might overtake advanced economies in strategic technologies, have focused attention on the process by which relevant standards - the accepted rulesets guiding technological development and application - are defined.¹

For example, in November 2021 the US National Institute of Standards and Technology issued a call for public comments on China's policies and influence in the development of international standards for emerging technologies.² The next month, the US House of Representatives passed a bill that would commission a task force to report on sixth-generation (6G) mobile wireless telecommunications, with the first subject on the list being 'the status of

¹ Voo, J. & Creemers, R. (2021). China's Role in Digital Standards for Emerging Technologies – Impacts on the Netherlands and Europe. LeidenAsiaCentre Report. Retrieved from: <https://leidenasiacentre.nl/report-chinas-role-in-digital-standards-for-emerging-technologies-impacts-on-the-netherlands-and-europe/>;

Neaher, G., Bray, D., Mueller-Kaler, J., & Schatz, B. (14 October, 2021). Standardizing the future: How can the United States navigate the geopolitics of international technology standards?. Atlantic Council. Retrieved from: <https://www.atlanticcouncil.org/in-depth-research-reports/report/standardizing-the-future-how-can-the-united-states-navigate-the-geopolitics-of-international-technology-standards/>;

Rühlig, T. (2021). China, Europe and the New Power Competition over Technical Standards. Utrikespolitiska institutet. Retrieved from: <https://www.ui.se/english/publications/ui-publications/2021/china-europe-and-the-new-power-competition-over-technical-standards/>;

Seaman, J. (2020). China and the New Geopolitics of Technical Standardization. Institut français des relations internationales. Retrieved from: <https://www.ifri.org/en/publications/notes-de-lifri/china-and-new-geopolitics-technical-standardization>.

² Huergo, J. (04 November, 2021). NIST Seeks Information on Chinese Participation in the International Standards Development Process. NIST. Retrieved from: <https://www.nist.gov/news-events/news/2021/11/nist-seeks-information-chinese-participation-international-standards>.

industry-led standards setting bodies in setting standards for such technology.³ In February 2022, the European Commission presented an EU standardisation strategy aimed at supporting the single market's resilience and enshrining democratic values in technological applications.⁴ The European Union's Internal Market Commissioner framed this strategy in terms of growing international competition in standards setting, particularly from China.⁵

Behind these concerns is the recognition that standards, by shaping the design and use of technology worldwide, shape the international distribution of economic and political power. An oft-cited example is mobile telecoms, in which the profits accruing to non-Chinese firms whose intellectual property shaped earlier generations of technical standards led the Chinese state to support a greater role for Chinese firms in global 5G standards.⁶ As the growing pervasiveness of digital technology amplifies the security challenges that go with international connections through digital networks, standards leadership in these technology ecosystems has emerged as a first-order national security issue, with China at the centre of US threat perceptions and increasingly those of other countries.⁷ In globally integrated technological ecosystems, relative influence in standards setting shapes the potential for rival states to 'weaponize' technological interdependence.

This report reviews China's evolving approach to standardisation, leading to a national standardisation strategy published in late 2021 that describes standards as 'the technical

³ The Hill. (12 January, 2021). House passes bipartisan bills to strengthen network security. TheHill. Retrieved from: <https://thehill.com/policy/cybersecurity/583905-house-passes-bipartisan-bills-to-strengthen-networks-security-cyber>

⁴ European Commission. (2 February, 2022). New approach to enable global leadership of EU standards promoting values and a resilient, green and digital Single Market. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_661

⁵ Breton, T. (13 January, 2022). Speech by Commissioner Breton at the conference "A stronger industry for a more autonomous Europe". European Commission Press Corner. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_354

⁶ Ma, J.D. (14 November, 2018). From Windfalls to Pitfalls: Qualcomm's China Conundrum. MacroPolo. Retrieved from: <https://macropolo.org/analysis/from-windfalls-to-pitfalls-qualcomms-china-conundrum/>;

Triolo, P. & Allison, K. The Geopolitics of 5G. Eurasiagroup. p.8. Retrieved from: <https://www.eurasiagroup.net/live-post/the-geopolitics-of-5g>

⁷ Lee, J. (8 December, 2021). The internet of things: China's rise and Australia's choices. Lowy Institute. Retrieved from: <https://www.lowyinstitute.org/publications/the-internet-of-things-chinas-rise-and-australias-choices>.

support for economic activities and social development, and an important aspect of the nation's basic (socioeconomic) system.' Brief examination is given to the particular approach taken by the Chinese government to standards in the context of the 'Belt and Road Initiative (BRI). The report then provides two case studies of particular technology fields - 6G mobile wireless telecoms and artificial intelligence - that illustrate the Chinese state's approach to standards governance and its differing orientation towards international and domestic activities, depending on the context, and the international implications. The report concludes by considering these issues from the viewpoint of European policymakers.

China's evolving approach to standardisation

China began to adopt international industrial standards after the Reform and Opening policy at the end of the 1970s: it restored its membership in the International Organisation for Standardisation (ISO) in 1978 and convened its first National Conference on Adoption of International Standards in 1984.⁸ However until recently, China was mostly a 'standard-taker' in international standardisation processes. Since the 18th National Congress of the Communist Party of China (CCP) in 2012, the Chinese government has started to focus at the highest levels on promoting China's increased role in international standard-making, from a strategic viewpoint. For example, in 2016, the Chinese President Xi Jinping stated that 'Whoever sets the standard has the right to speak; whoever owns the standard owns the dominant positions.'⁹

Following promulgation in 2015 of the 'Made in China 2025' technological upgrading strategy, the Standardisation Administration of China (SAC) commissioned the Chinese Academy of

⁸ Tian, S. (11 September, 2021). Opening remarks by Tian Shihong, deputy director of the State Administration for Market Regulation and director of the National Standardization Administration, at the press conference of the State Council Information Office [国家市场监督管理总局副局长、国家标准化管理委员会主任田世宏在国新办新闻发布会上的开场白]. Zhongguowang. Retrieved from: http://www.china.com.cn/zhibo/zhuanti/chinwen/2019-09/11/content_75196534.htm

⁹ Tian, S. (6 September, 2016). Create a new situation of standardization in our country – Study and implement Comrade Xi Jinping's important exposition on standardization work [开创我国标准化事业新局面 – 学习贯彻习近平同志关于标准化工作的重要论述]. CPC News. Retrieved from: <http://theory.people.com.cn/n1/2016/0906/c40531-28693273.html>

Engineering with a two-year research project ‘China Standards 2035’ (CS2035).¹⁰ While it remains unclear exactly how many of these project’s findings have been adopted, they are likely to have shaped the National Standardisation Development Outline [国家标准化发展纲要] promulgated in October 2021 by China’s State Council, the highest executive government agency (hereinafter the 2021 Standardisation Outline). This document, development of which was reportedly recommended by CS2035, elaborates strategic goals and action plans in standardisation out to 2035.¹¹

China’s approaches to standardisation should be understood as an element of its broader industrial and technology strategies that are aimed at multiple goals: increasing self-sufficiency and therefore independence from foreign-developed and owned technology, boosting Chinese industries’ competitiveness in global markets and returns from global usage of Chinese intellectual property, and creating path dependencies that bias future technological development in favour of Chinese actors. China’s experience with the dominance of foreign firms in earlier generations of mobile wireless technology led directly to efforts to promote a more significant role for Chinese firms in 5G standardisation.¹² Furthermore, as digital technologies underpin a growing scope of social and economic activity, the technical standards that shape them are becoming an increasingly important foundation of international political power and influence.¹³ This applies particularly to emerging technologies in which standards have yet to be fully defined, and where first-mover advantages may be significant.¹⁴

¹⁰ Hwang, J. (2021). Analysis of “China Standards 2035” Strategy[「中國標準 2035」戰略解析]. Chinese National Federation of Industries. Retrieved from: <http://www.cnfi.org.tw/front/bin/ptdetail.phtml?Part=magazine11006-615-7>

¹¹ Rühlig, T. (December 2021). The Shape of Things to Come: the Race to Control Technical Standardisation, pp. 36-37. Retrieved from: <https://www.europeanchamber.com.cn/en/publications-standardisation-report;http://www.cnfi.org.tw/front/bin/ptdetail.phtml?Part=magazine11006-615-7>

¹² Ma, J.D. (14 November, 2018). From Windfalls to Pitfalls: Qualcomm’s China Conundrum. MacroPolo. Retrieved from: <https://macropolo.org/analysis/from-windfalls-to-pitfalls-qualcomms-china-conundrum/>.

¹³ Lee, J. (24 June, 2021). The Connection of Everything: China and the Internet of Things. MERICS. p.5. Retrieved from: <https://merics.org/en/report/connection-everything-china-and-internet-things>

¹⁴ Seaman (2020).

Technical standards are a form of normative and infrastructural power. They help to embed particular normative choices in technological systems, and govern the compatibility and hence interoperability of such systems internationally.¹⁵ This affects not just global economic activity and the relative benefits derived from it, but also the international security balance, as the 6G case study below illustrates. As digital information and communications technology (ICT) becomes ever-more pervasive and complex, the Chinese government has focused more on shaping these systems at a holistic and fundamental level to China's advantage, with technical standardisation being a key means to this end.

In this context, standards development is viewed instrumentally by a Party-state that still seeks to play a direct role in China's economic and technological development. Many sectors are seeing expanding involvement by government authorities in the private economy that has developed over the past four decades. Under Xi Jinping's leadership, there has been growing emphasis across the board on centralised 'top-level design', reflecting the central leadership's confidence that they can devise policy and regulatory systems to guide evolution of an ever-more complex Chinese society.

A systematic state-supervised approach to standards development has assumed more importance in the face of technological 'decoupling' pressures from the US and its allies. Given China's continuing relative dependence on foreign technology, its experts and policymakers have become increasingly focused on harnessing resources across Chinese society to increase national self-reliance. Harking back to China's Mao-era tradition of resource mobilisation to drive progress in technologies deemed vital to national security,¹⁶ this approach is increasingly referred to as a 'Whole Nation System' [举国体制].¹⁷ The CCP's official journal, *Qiushi*, recently described this approach as 'aiming to enhance China's

¹⁵ Voo & Creemers. (2021). p.3;

Lee, J. Will China reinvent the Internet?. The China Story. Retrieved from: <https://www.thechinastory.org/will-china-reinvent-the-internet/>.

¹⁶ China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age | Evan A. Feigenbaum (sup.org)

¹⁷ Song, L. (2021). Thoughts on cyberpower under the new nationwide system [新型举国体制下建设网络强国的思考]. *Telecommunication Science*, 37(5). p.12.

comprehensive competitiveness and national security'. This political imperative is a powerful driver for innovation in a national standards-setting system that has always been state-centric.

Whereas (for example) the US national representative body at the ISO is not a government agency, the SAC is a sub-agency of the State Administration for Market Regulation (SAMR), which is under the leadership of the State Council.¹⁸ Other government agencies besides SAC play influential roles in standardisation of various technological and industrial systems. The Ministry of Industry and Information Technology (MIIT) for instance influences standardisation in a range of emerging technologies through its affiliated research institutes, for example the China Academy for ICT (CAICT). The Cyberspace Administration of China (CAC) is also beginning to assert a role in regulating the design of digital technologies.

Much standardisation work in China now occurs in technical committees that bring together government, state-linked research institutes and private industry, sometimes including (albeit with limited participation) foreign actors. For example, China's National Information Security Technical Committee (TC-260), headed by a senior official from CAC, includes in its working groups representatives from European firms such as Siemens, Nokia and Bosch, although Chinese ICT companies have dominated contributions to the standards that TC-260 has released to date.¹⁹ As in other countries, some such Chinese bodies are 'mirror committees' corresponding to technical committees in international SDOs.²⁰

Reflecting this increasingly complex picture, a liberalisation and devolution in China's standardisation approach is underway, aimed at giving more influence to market-driven factors and non-government actors. A 2018 amendment to China's Standardisation Law reduced the scope of government-developed and mandatory standards, while the 2021

¹⁸ Standardisation Administration of China. (n.d.). Responsibilities of the Institution [机构职责]. Retrieved from: <http://www.sac.gov.cn/zzjg/jgzj/#>

¹⁹ Voo and Creemers (2021), pp. 6-7;

Lee, J. (24 June, 2021). The Connection of Everything: China and the Internet of Things. MERICS. p.5. Retrieved from: <https://merics.org/en/report/connection-everything-china-and-internet-things>;

²⁰ Lee, J. (24 June, 2021). The Connection of Everything: China and the Internet of Things. MERICS. p.5. Retrieved from: <https://merics.org/en/report/connection-everything-china-and-internet-things>.

Standardisation Outline laid out a goal of transforming China's standardisation approach from a state-led one to one of 'equal emphasis on government and market' [政府与市场并重].²¹

The 2018 amendment of China's Standardisation Law originates from a 2015 State Council direction that identified the obsolescence and inefficiency of Chinese's then approach of standardisation.²² This document assessed that the effectiveness of China's standardisation system resulted from the 'fundamental problem of the roles of the government and market being misaligned'.²³ The main purpose of the 2018 reform was therefore to reduce the scope of government-made standards in order to promote market-driven standard-setting and boost Chinese standards' quality and competitiveness.

Previously, China's standardisation system consisted of (1) national standards made by the Standardisation Administration of China, (2) industry standards made by ministries, (3) local standards made by local authorities, and (4) enterprise standards made by individual companies. Each of those four categories have both mandatory and recommended standards. Apart from granting legal status to 'association standards' [团体标准] developed by industry associations, the 2018 reform abolished mandatory industry and local standards, leaving mandatory national standards under SAC's direct authority.

The 2018 reform also defined areas in which mandatory national standards should be made, these being (1) the safety of life, health and property, (2) national security, (3) environmental protection, and (4) basic needs of economic and social governance.²⁴ This shows that the Chinese government remains determined to maintain high-level state-control over standardisation in these broad fields. An example is coordination of the ongoing standard-

²¹ State Council of China. (2021). Outline of National Standardisation Development [国家标准化发展纲要].

²² State Council of China. (2015). Notice of the State Council on Printing and Distributing the Reform Plan for Deepening Standardization Work [国务院关于印发深化标准化工作改革方案的通知]. Retrieved from: http://www.gov.cn/zhengce/content/2015-03/26/content_9557.htm

²³ State Council of China. (2015). Notice of the State Council on Printing and Distributing the Reform Plan for Deepening Standardization Work [国务院关于印发深化标准化工作改革方案的通知]. Retrieved from: http://www.gov.cn/zhengce/content/2015-03/26/content_9557.htm

²⁴ Shenzhen Municipal Administration of Market Supervision. (22 May, 2018). [Policy Interpretation] Policy Interpretation of the New "Standardization Law" [【文字解读】新《标准化法》政策解读]. Retrieved from: http://amr.sz.gov.cn/xxgk/zcwj/zcid/content/post_1927962.html

setting process for AI ethics in China by the Ministry of Science and Technology (MoST), which is examined in case study two below.

Subsequent calibration of standards-setting work within China has made clear the desired trend towards greater alignment between Chinese and international standards, while promoting the role of Chinese actors in shaping these common standards. In 2020, directions from SAC and SAMR emphasised harmonisation of Chinese with international standards, while pushing for promotion of Chinese-developed standards at the international level.²⁵ The following year, Key Points of National Standardisation Work issued by SAC, described the new approach as a hybrid one: ‘government-guided, industry-centric, and interlocking industry, academia, and research’ [政府引导、企业主体、产学研联动].²⁶

These developments led to the State Council’s promulgation in October 2021 of the Outline of National Standardisation Development.²⁷ This document effectively provides a national strategy for standardisation.²⁸ It sets goals of transforming China’s standards system by 2025 into one in which the state and market play equally important roles, standards usage occurs throughout society rather than predominantly in the context of industry and trade, and domestic standardisation work is synergistic with that at the international level.²⁹ Towards the last goal, the 2021 Outline declares an ambition that 85% of Chinese-developed standards should become international standards by 2025.³⁰

²⁵ Lee, J. (24 June, 2021). THE CONNECTION OF EVERYTHING China and the Internet of Things. MERICS. p.9.

²⁶ Standardisation Committee of China. (2021). Key Points of National Standardisation Work 2021 [2021 年全国标准化工作要点].

²⁷ State Council of China. (2021). National Standardization Development Outline[国家标准化发展纲要]. Retrieved from: http://www.gov.cn/zhengce/2021-10/10/content_5641727.htm.

²⁸ Rühlig, T. (December 2021). The Shape of Things to Come: the Race to Control Technical Standardisation, p. 35. Retrieved from: <https://www.europeanchamber.com.cn/en/publications-standardisation-report>;

Hwang, J. (2021). Analysis of “China Standards 2035” Strategy[「中國標準 2035」戰略解析]. Chinese National Federation of Industries. Retrieved from: <http://www.cnfi.org.tw/front/bin/ptdetail.phtml?Part=magazine11006-615-7>

²⁹ State Council of China. (2021). National Standardization Development Outline[国家标准化发展纲要].

³⁰ State Council of China. (2021). Outline of National Standardisation Development [国家标准化发展纲要].

The official press conference accompanying release of the 2021 Outline made clear that it is intended to raise the international competitiveness of Chinese products and standards and aims to increase connectivity between China and the rest of the world, and promote Chinese industries' further incorporation into global markets.³¹ In line with China's wider policy settings, the evident goal is not to develop a self-contained body of Chinese standards and a foreign 'sphere of influence' within which they apply, cut off from standards spheres of influence dominated by states hostile to China. Rather, it is to improve China's position within and influence over the standards ecosystems of an integrated global economy.

The 2021 Outline reflects the arrival of standards at the centre of attention for China's political-administrative system. There are over two hundred references to standards in the 14th Five Year Plan for National Informatisation, issued in December 2021 by China's peak policy-setting body for all matters relating to digital ICT, the Central Commission for Cybersecurity and Informatisation. This document sets out comprehensive guidance - albeit much of it in the vague and aspirational language typical of high-level Chinese official policies - for development of China's digital economy and infrastructure out to 2025.³² Similarly, China's 2021 Data Security Law aims to 'standardise data handling activities', again by diffusing responsibilities throughout society rather than detailed prescription.³³

As indicated by the State Council's 2015 Direction, China's standardisation reforms of the last few years appear to reflect two general understandings. First, China's previous top-down hierarchical approach to international standard setting was inefficient, if not counter-productive. As one Chinese commentator observes, it would be more efficient for the Chinese government to give more agency to industry actors in promoting Chinese standards at international SDOs.³⁴ However, the growing role for industry players in China's standard-setting processes must be placed in the context of growing state influence over both state-owned and private companies, in particular those that are involved in emerging ICT technologies. In that context, this greater role for industry actors should be seen not as a shift

³¹ State Council of China. (2021). Outline of National Standardisation Development [国家标准化发展纲要].

³² Analyzing China's 2021–2025 Informatization Plan: A DigiChina Forum (stanford.edu)

³³ Translation: Data Security Law of the People's Republic of China (Effective Sept. 1, 2021) (stanford.edu)

³⁴ Jiang, S. (2020). The Transformation of Standardization Strategy in China: Comparing with EU Standardization Practice [论中国标准化战略的转型-基于欧盟标准化实践的考察]. *Social Science*: 2020(6), p.116;

away from state influence, but as directed at achieving international greater influence for Chinese-developed standards.³⁵

Second, a more inclusive, multi-stakeholder approach is more likely to promote acceptance of Chinese-developed standards in other countries or in international SDOs.³⁶ China's previous approach to standardisation allowed little space for inputs from domestic and international standard-takers.³⁷ According to the director of the Standards Innovation Department of SAMR, China's new standardisation strategy as described in the 2021 Outline reflects learning from other states' and international SDOs' best practices, and aims to enhance the alignment of Chinese and international standards as well as Chinese standards' international competitiveness.³⁸

Chinese authorities and experts may hope to achieve a Chinese version of the so-called 'Brussels effect', referring to the incentivisation of non-European private actors to comply with EU regulations in order to gain access to lucrative EU markets.³⁹ However, leveraging

³⁵ Sheehan, M., Blumenthal, M., & Nelson, M. R. (28 October, 2021). Three Takeaways From China's New Standards Strategy. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2021/10/28/three-takeaways-from-china-s-new-standards-strategy-pub-85678>

³⁶Jiang, S. (2020). The Transformation of Standardization Strategy in China: Comparing with EU Standardization Practice [论中国标准化战略的转型-基于欧盟标准化实践的考察]. *Social Science*: 2020(6), pp. 113-121;

Sun, C. (2020). "Standardized" Global Governance: "Belt and Road", Standard connectivity and China's Opening-up ["标准化" 全球治理:"一带一路"标准联通与中国的对外开放]. *Indian Ocean Economic and Political Review*: 2020(4), pp.136-160;

Hu, G., Wang, Y. (2020). The Trend of Standardization Promoting Innovation in the New Situation and my country's Countermeasures [新形势下标准化促进创新的趋势及我国应对]. *Innovation and Entrepreneurship*: 2020(3), pp. 52-55.

³⁷ Jiang, S. (2020).

³⁸ State Administration of Market Regulation. (20 Oct, 2021). Focus on the "National Standardization Development Program"! Take a look at the press conference of the State Council Information Office. [聚焦《国家标准化发展纲要》!看看这场国新办新闻发布会讲了啥?]. Retrieved from: http://www.samr.gov.cn/xw/zj/202110/t20211020_335842.html

³⁹ Kuo, M. A. (7 January, 2021). The Brussels Effect and China: Shaping Tech Standards. *The Diplomat*. Retrieved from: <https://thediplomat.com/2021/01/the-brussels-effect-and-china-shaping-tech-standards/>

market size alone may not be enough for China to create a 'Beijing Effect'.⁴⁰ Chinese standards are more likely to be adopted outside China if developed through a multi-stakeholder process that incorporates inputs from foreign actors. Further reform in China's standard-setting systems is required to accommodate this.⁴¹

In particular, a state-centric hierarchical approach to standard-setting is seen as unsuitable for promoting connectivity with other countries in the context of China's 'Belt and Road Initiative' (BRI): since the Chinese government cannot mandate which standards are adopted beyond China's borders, a more sophisticated approach is needed.⁴² Much commentary has been generated over the BRI's significance in Beijing's foreign policy and 'grand strategy', with the role of standardisation receiving increasing attention.⁴³ This merits a brief examination of how the Chinese state approaches standards governance in agreements with other countries under the BRI rubric.

Standardisation and the BRI - the multi-bilateralist approach

The State Council published two action plans, in 2015 and in 2018, on standardisation cooperation with BRI countries. MIIT laid out a detailed action plan in 2018 to promote bilateral standards recognition agreements in manufacturing industries such as steel, non ferrous metals, and petrochemicals, and to encourage Chinese telecommunications standards to be adopted in individual BRI partner countries [在沿线国家应用].⁴⁴ The 14th Five Year Plan

⁴⁰ Erie, M. S., Streinz, T. (2021). The Beijing Effect: China's 'Digital Silk Road' as Transnational Data Governance. New York University Journal of International Law and Politics (JILP). Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3810256.

⁴¹ Jiang, S. (2020).

⁴² Sun, C. (2020); Jiang, S. (2020).;

⁴³ See e.g. Aisyah, K. (8 January, 2022). China's Belt and Road Initiative to Set Future Global Tech Standards. OpenGov Asia. Retrieved from: <https://opengovasia.com/chinas-belt-and-road-initiative-to-set-future-global-tech-standards/>.

⁴⁴ MIIT. (5 November, 2018). Implementation Opinions of the Ministry of Industry and Information Technology on the Standardization of the Industrial Communication Industry Serving the "Belt and Road" Construction[工业

for National Informatisation includes an exhortation to ‘advance integrated cooperation on standards’ so as to promote joint infrastructure development in the BRI context.⁴⁵

China’s approach in promoting its standards in BRI countries runs parallel with China’s initiatives in international SDOs. The BRI is not a multilateral initiative where agreements concluded are effective for all BRI participating states; although a ‘BRI Regional Standards Forum’ was envisaged in the original tasking for CS2035, it was not mentioned in the 2021 Outline.⁴⁶ Rather, the BRI is a political label applied to various cooperation agreements between China and individual governments or regional organisations. China’s standardisation initiatives in the BRI context follow this multi-bilateralist approach: instead of seeking to have Chinese standards recognised at a pan-BRI level, the Chinese government has been concluding bilateral mutual standards recognition agreements [标准互认]. The Standardisation Connectivity BRI Action Plan (2018-2020) stipulates that China should promote interstate mutual standards recognition and exchanges in key areas of bilateral trade, technological progress, and industrial transformation and upgrade.⁴⁷

By the end of 2021, China had concluded mutual standard recognition with 43 states and regional organisations.⁴⁸ However most of these agreements do not provide for comprehensive mutual recognition of standards, but for mutual recognition on a sectoral basis: for example, China has concluded such agreements with Russia and Kyrgyzstan for civil aviation and oil pipelines respectively.⁴⁹ They will facilitate cross-border integration and exchanges within these sectors and may have multiplier effects in terms of flow-on economic

和信息化部关于工业通信业标准化工作服务于“一带一路”建设的实施意见]. Retrieved from: <http://www.miit.gov.cn/n1146295/n1652858/n1652930/n3757016/c6480388/content.html>.

⁴⁵ Translation: 14th Five-Year Plan for National Informatization – Dec. 2021 (stanford.edu)

⁴⁶ Ruhlig, T. (Dec 2021). The Shape of Things to Come: The Race to Control Technical Standardisation. European Union Chamber of Commerce in China Publication.

⁴⁷ State Council of China. (15 November, 2018). Connectivity in Standardisation, Action Plan for Jointly Building the "Belt and Road" (2018-2020) [标准联通共建“一带一路”行动计划(2018-2020年)]. Retrieved from: <http://www.scio.gov.cn/xwfbh/xwfbh/wqfbh/37601/39274/xgzc39280/Document/1641459/1641459.htm>

⁴⁸ Standardisation Administration of China. (4 August, 2021). Build the Bridge of Standards and Connect the ‘One Belt One Road’. Retrieved from: http://www.sac.gov.cn/zt/jdbn/bzgs/202108/t20210804_347434.html.

⁴⁹ Standardisation Administration of China. (4 August, 2021). Build the Bridge of Standards and Connect the ‘One Belt One Road’. Retrieved from: http://www.sac.gov.cn/zt/jdbn/bzgs/202108/t20210804_347434.html.

activity, and of promoting these standards' adoption by third countries. But they are far from providing foundations for a self-contained, China-centric ecosystem of standards covering a large cross-sectoral body of economic activity. This is unsurprising, since this is clearly not the objective of the Chinese policy settings described above.

To evaluate China's influence in standard-setting based on the number of states with which it has signed such agreements would therefore give an exaggerated picture of China's international standard setting influence. China also engages in standard-oriented dialogues with non-BRI countries such as France (e.g. smart cities and railways) and Germany (e.g. in electric vehicle standards) that are influential in international standards setting, likely with different strategic goals. Some Western commentators argue that Chinese industrial actors view standards cooperation as a means of technology transfer from advanced industrial countries.⁵⁰

Pursuing mutual standardisation recognition bilaterally or regionally while promoting Chinese standards in international SDOs likely reflects certain incentives on China's part. The 'multi-bilateral' format of mutual standards recognition dialogues allows China to leverage its relative technological prowess and market size in negotiations, maximising its bargaining power. In such settings, China is in a stronger position to act as a standard-setter and hence to promote the market dominance of Chinese firms than it typically would be in international SDOs. Mutual recognition of standards promotes path dependencies, with economies that adopt Chinese standards also acquiring an interest in these standards being adopted by international SDOs. From the viewpoint of BRI partner states, many developing countries probably lack the resources to develop their own standards in many fields.

Whether bilateral arrangements with China or international SDOs are likely to be more influential in shaping the standardisation landscape varies between technologies. In some cases, a history of international collaboration that provides the foundation for further development means that international SDOs and collaborative processes will probably continue to dominate, with China focusing on maximising its influence in these channels. In other cases, the technology's greenfield nature and the advance of real-world uses ahead of international discussions mean that Chinese unilateral domestic practice may be more

⁵⁰ Seaman (2020), p.25.

influential in shaping standards abroad. The following two case studies lean towards the first and second outcomes respectively.

Case study 1: 6G

So-called '6G' wireless specifications represent the next stage in telecommunications technology. Deployment of 5G wireless technologies is still unfolding worldwide, and has increasingly become a focus of political tensions between the US and 'like-minded' governments on the one hand, and China on the other.⁵¹ Researchers and technology companies are still at the stage of defining 6G telecoms performance requirements and use cases, which will shape future technical standards.

For example, the North American 'Next G Alliance' industry group launched its technical work program in May 2021, setting up working groups to tackle such basic questions as which technologies are relevant to 6G and which applications can make use of 6G infrastructure.⁵² Generally it is estimated that '6G' services will be commercialised at mass scale around 2030, with implementations likely to start in the late 2020s.⁵³

⁵¹ Lee, J. (31 July, 2020). The Global War for 5G Heats up. The Diplomat. Retrieved from: <https://thediplomat.com/2020/08/the-global-war-for-5g-heats-up/>

⁵² ATIS. (12 May, 2021). ATIS' Next G Alliance Launches Technical Work Program Setting 6G Roadmap into Action. Retrieved from: <https://www.atis.org/press-releases/atis-next-g-alliance-launches-technical-work-program-setting-6g-roadmap-into-action/>.

⁵³ Samsung News Room. (14 July, 2020). Samsung's 6G White Paper Lays Out the Company's Vision for the Next Generation of Communications Technology. Samsung Global Newsroom. Retrieved from: [https://news.samsung.com/global/samsungs-6g-white-paper-lays-out-the-companys-vision-for-the-next-generation-of-communications-technology](https://news.samsung.com/global/samsungs-6g-white-paper-lays-out-the-companys-vision-for-the-next-generation-of-communications-technology;);

5GIC Strategy Advisory Board. (2020). 6G Wireless: A New Strategic Vision. University of Surrey. Retrieved from: <https://www.surrey.ac.uk/sites/default/files/2020-11/6g-wireless-a-new-strategic-vision-paper.pdf>;

Nokia Bell Labs. (9 September, 2020). Communications in the 6G era: Communication needs and technologies in the timeframe of 6G. Retrieved from: <https://www.bell-labs.com/institute/white-papers/communications-6g-era-white-paper>;

Xu, Z. (2021). Looking forward to 6G and jointly defining 6G [憧憬 6G, 共同定义 6G]. Retrieved from: <https://www.huawei.com/cn/technology-insights/future-technologies/envisioning-and-defining-6g-together>

The likely defining characteristic of 6G networks, as described by the European Union's public-private partnership for developing 5G infrastructure, is that they will provide "near-instant and unrestricted complete wireless connectivity."⁵⁴ The vision articulated by Japanese telecoms operator Softbank in August 2021 provides another description of what could be enabled by 6G networks:

"6G will transform mobile networks into network infrastructure that will support the digitalization of all industries. With 6G, every business ... will be built on the foundation of mobile networks, just as the Internet became the sole common basic infrastructure for online communications around the world. ... digital and physical spaces will be connected in real time. What is predicted and judged in the virtual space using AI will be fed back to the physical space with ultra-low latency."⁵⁵

Chinese actors like Huawei and the CCID, a Chinese think tank affiliated to the MIIT, make similar public estimations. A 2021 White Paper by the CCID projects that the standard-setting process for 6G will begin in international SDOs such as the Third Generation Partnership Project (3GPP) in 2023, with the first 6G standard being published around 2026.⁵⁶ In line with this timeframe, the official guidance issued by the State Council in January 2022 for developing China's digital economy during the 14th Five-Year Plan Period (2021-2025) directs increased support for 6G technology R&D, and 'laying out of 6G resources in a forward-looking manner'[前瞻布局第六代移动通信(6G)网络技术储备].⁵⁷

⁵⁴ 5GPPP. (June 2021). European Vision for the 6G Network Ecosystem. Retrieved from: <https://5g-ppp.eu/european-vision-for-the-6g-network-ecosystem/>.

⁵⁵ Suas News. (2 August, 2021). SoftBank Corp. Unveils 6G Concept. Retrieved from: <https://www.suasnews.com/2021/08/softbank-corp-unveils-6g-concept/>.

⁵⁶ CCID. (2021). White paper on data security governance [数据安全治理白皮书]. CCID White paper. pp. 6-7.

⁵⁷ 前瞻布局第六代移动通信(6G)网络技术储备.

State Council of China. (12 December, 2021). "14th Five-Year" Digital Economy Development Plan["十四五"数字经济发展规划]. Retrieved from: http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm

The global politics of 6G will be shaped by the politics of 5G and how they continue to develop. Starting With the Trump administration, the US and some allied governments have been leading attempts to channel development along paths that minimise or exclude the role of Chinese actors. But these efforts have run up against the transnational nature of modern telecommunications technology, in which Chinese actors have been extensively involved for the last two decades, and the market power of Huawei as an individual company. The most effective tools so far to inhibit the global expansion of Chinese telecoms technology have proved to be US export controls that target Chinese firms' foreign dependencies in underlying technologies, specifically in semiconductors.⁵⁸

These dynamics are shaping the environment within which 6G will be defined and deployed worldwide over the coming decade. Whatever the particular form and applications of 6G, it currently appears likely to be an incremental development of current 5G wireless technology rather than a paradigm change.⁵⁹ Huawei's vice-chairman Eric Xu recently described the evolution of 5G technology over the next few years as progression to '5.5G', which in turn will lead over the longer run to 6G: "In the coming years, 5.5G definition and deployment as well as 6G research and definition will proceed simultaneously."⁶⁰

In this speech, Eric Xu also emphasised the dependence of 6G's evolution on the 'entire ICT industry', at a global scale. As Xu put it, "Whether industry can deliver a satisfactory answer in 2030 will depend to a large extent on whether the process by which we define 6G is sufficiently open (and) whether the participants in the definition are sufficiently diverse."⁶¹

⁵⁸ Lee, J., & Kleinhans, J. (June 2021). Mapping China's Semiconductor Ecosystem in Global Context. MERICS. Retrieved from: <https://merics.org/en/report/mapping-chinas-semiconductor-ecosystem-global-context-strategic-dimensions-and-conclusions>

⁵⁹ Fierce Wireless. (19 March, 2021). 6G doesn't mean ditching 5G but 'evolving' to next G. Retrieved from: <https://www.fiercewireless.com/tech/6g-doesn-t-mean-ditching-5g-but-evolving-to-next-g#:~:text=Kaniz%20Mahdi%2C%20VP%20of%20Advanced,to%2010%E2%80%9D%20once%20fully%20deployed.>

⁶⁰ Xu, Z. (2021). Looking forward to 6G and jointly defining 6G [憧憬 6G, 共同定义 6G]. Retrieved from: <https://www.huawei.com/cn/technology-insights/future-technologies/envisioning-and-defining-6g-together>

⁶¹ Xu, Z. (2021). Looking forward to 6G and jointly defining 6G [憧憬 6G, 共同定义 6G]. Retrieved from: <https://www.huawei.com/cn/technology-insights/future-technologies/envisioning-and-defining-6g-together>

Likewise, the head of China's official industry association for promoting 6G, IMT-2030, recently advocated a globally unified standard for 6G.⁶²

These views are reflected in official policy documents. The December 2021 National Informatisation plan and the January 2022 digital economy plan both emphasise participation in international standardisation work.⁶³ China's senior leaders apparently recognise that success in building and utilising frontier technologies like 6G is linked to China's ability to continue participating in the collaborative transnational processes that have defined ICT development for decades.⁶⁴

One example is the evolution of 'Open Radio Access Networks' (ORAN). This approach to mobile telecoms networks involves developing technical specifications that circumvent the proprietary control held by the dominant equipment vendors (Nokia, Ericsson and Huawei) over interfaces between different elements of the radio access network, thereby 'opening' the market to a larger vendor ecosystem. The immaturity of this ecosystem and the imperative to press ahead with 5G infrastructure roll-outs means that ORAN is unlikely to be adopted at scale in most markets, China included, as a technical solution for delivering 5G telecoms services. However, it might provide the foundation for the next generation of telecoms technology from the mid-2020s, as it appeals to telecoms equipment customers and national governments seeking an alternative to the current vendor oligopoly.⁶⁵

The US, Japanese and UK governments have been promoting ORAN as an alternative to equipment solutions provided by Huawei. Yet Chinese companies have been intimately involved with the development of ORAN from the beginning. The leading international

⁶² People's Daily. (26 September, 2021). China rolls out initial blueprint for 6G: industry insiders. People's Daily Online. Retrieved from: <http://en.people.cn/n3/2021/0926/c90000-9901058.html>.

⁶³ State Council of China. (12 December, 2021). "14th Five-Year" Digital Economy Development Plan[“十四五”数字经济发展规划]. Retrieved from: http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm

⁶⁴ Lee, J., & Drinhausen. K. (15 Jun, 2021). 'The CCP in 2021: smart governance, cyber sovereignty, and tech supremacy', in The CCP's next century: expanding economic control, digital governance and national security. MERICS. Retrieved from: <https://merics.org/en/report/ccps-next-century-expanding-economic-control-digital-governance-and-national-security>

⁶⁵ Morris, I. (22 July, 2021). Open RAN adds to 6G dilemma. Light Reading. Retrieved from: <https://www.lightreading.com/6g/open-ran-adds-to-6g-dilemma/d/d-id/771026>;

Kinney. S. (20 September, 2021). Will Open RAN be foundational to 6G?. RCRWireless. Retrieved from: <https://www.rcrwireless.com/20210920/5g/will-open-ran-be-foundational-to-6g>.

specifications body, the ORAN Alliance, was formed by merging a US-European industry group with a Chinese industry alliance (C-RAN) established by China Mobile, one of China's three state-owned telecoms operators.⁶⁶ China Mobile is one of the ORAN Alliance's five founding members (the others being US and European companies), which when acting collectively have an effective veto over the group's decisions.⁶⁷ China Mobile's chief scientist is co-chair of the ORAN Alliance's technical steering committee.⁶⁸

China's other two state-owned telecoms operators are also members of the ORAN Alliance, while CAICT - the Chinese lead for collaborations such as those with the European Commission and the German government on the internet of things and the industrial internet, which are key use cases for 5G and 6G⁶⁹ - is among the group's academic contributors.⁷⁰ The number of participating Chinese entities, which is second only to the number of US members, has led analysts to describe the ORAN Alliance as "just another way for the Chinese state to remain engaged and influential over global wireless communications networks."⁷¹

Huawei has been publicly sceptical about ORAN's relevance to current 5G implementations.⁷² However, just as Nokia and Ericsson joined the ORAN Alliance in response to momentum towards ORAN from telecoms operators and national governments, Huawei will likely need to respond to demand from other Chinese actors to exploit this new technical approach. The

⁶⁶ China Mobile. (n.d.). C-RAN International Workshop. Retrieved from: <http://labs.chinamobile.com/focus/C-RAN>

⁶⁷ Morris, I. (22 July, 2021). Open RAN adds to 6G dilemma. Light Reading. Retrieved from: <https://www.lightreading.com/6g/open-ran-adds-to-6g-dilemma/d-d-id/771026>

⁶⁸ Lin, C., & Katti, S. (23 June, 2021). O-RAN ALLIANCE Introduces 33 New Specifications Released Since March 2021. O-RAN. Retrieved from: <https://www.o-ran.org/blog/2021/6/23/o-ran-alliance-introduces-33-new-specifications-released-since-march-2021>

⁶⁹ Lee, J. (24 June, 2021). The Connection of Everything: China and the Internet of Things. MERICS. p.5. Retrieved from: <https://merics.org/en/report/connection-everything-china-and-internet-things>;

Federal Ministry of Economic Affairs and Climate Action, & Federal Ministry of Education and Research. (26 March, 2021). Stakeholder Landscape MIIT, CAICT, CCID. Industrie 4.0. Retrieved from: <https://www.plattform-i40.de/IP/Redaktion/EN/Downloads/Publikation/China/stakeholder-landscape.html>

⁷⁰ O-RAN.(n.d.). Membership. Retrieved from: <https://www.o-ran.org/membership>

⁷¹ RWR Advisory Group. (1 April, 2021). Chinese Companies Active in the Architecture of Open RAN. Retrieved from: https://www.rwradvisory.com/wp-content/uploads/2021/04/RWR_ORAN_Report_4-2021.pdf

⁷² Kinney, S. (15 September, 2021). Huawei gives another thumbs-down to open RAN - or so it says. Light Reading. Retrieved from: <https://www.rcrwireless.com/20210915/carriers/huawei-cto-on-open-ran-this-thing-is-going-to-take-years>;

situation around ORAN thus illustrates how collective behaviour by ‘team China’ is not autonomous, but is shaped by the technical and incentive structures of a technology stack that has developed for many years in an integrated global context.

Even from the Chinese state’s perspective, retaining influence over how alternative technical pathways towards 6G develop is preferable to betting the farm on Huawei, which may struggle even with China’s 5G roll-out due to the effects of US export controls. Other technical trends such as the emerging role of satellite constellations, in which the US retains significant advantages over China, incentivise Chinese actors to stay involved in 3GPP and international collaborations that are pushing ahead with standardisation work in these areas.⁷³

But despite this recognition of the need for continued collaborative approaches with foreign partners, there is broad consensus among Chinese sources reviewed for this report that the competition for leadership on technologies is a zero-sum game of strategic importance that China must win. This viewpoint reflects the perception that 6G will provide the infrastructure for application of other emerging technologies, which in aggregate will shape nation-states’ political and economic power in the coming decades.⁷⁴ Chinese experts and policymakers also expect that the US will continue efforts to constrain Chinese industry in R&D, foreign market access and participation in international standard-setting.⁷⁵

In this context, the ‘Whole Nation System’ [举国体制] approach referred to above is regarded by many Chinese commentators as critical to China’s ability to remain internationally competitive in developing and applying 6G technologies. Numerous Chinese sources, including policy-makers, MIIT-affiliated think tanks’ white papers, and scholars have linked

⁷³ Clark, R. (29 November, 2021). US years ahead in LEO broadband, but 6G battle looms. Light Reading. Retrieved from: <https://www.lightreading.com/satellite/us-years-ahead-in-leo-broadband-but-6g-battle-looms/d/id/773758>;

ATIS. (n.d.). Non-Terrestrial Networks 5G Integration. ATIS. Retrieved from: <https://www.atis.org/initiatives/non-terrestrial-networks-ntn-5g-integration/>

⁷⁴ Phoenix News. (12 September, 2021). Huawei’s rotating chairman Xu Zhijun: 6G will be launched into the market around 2030! [华为轮值董事长徐直军：6G 将在 2030 年左右投向市场!]. Phoenix News. Retrieved from: <https://finance.ifeng.com/c/89SyRSSz78t>.

⁷⁵ CCID. (2021). White paper on data security governance [数据安全治理白皮书]. CCID White paper. p.32

China's future success in 6G with a 'Whole Nation System' approach.⁷⁶ 6G is one of the key projects under China's 14th Five-year Plan, and so will receive priority in government support in R&D, commercialisation, and standardisation work.⁷⁷

Cross-industry, state-supported initiatives to promote R&D efforts in 6G for strategic national purposes are not uniquely Chinese. For example, the Alliance for Telecommunications Industry Solutions (ATIS) organised the Next G Alliance in order to 'advance North American wireless technology leadership over the next decade' during the full lifecycle of research and development, manufacturing, standardisation and market readiness.⁷⁸ In 2021 the EU launched its flagship 6G project Hexa-X, which involves dozens of industry and research actors from various member states.

However, an important distinction with China's IMT-2030 is that it is led by Chinese governmental bodies, providing a direct institutional channel for state influence in shaping technological specifications. IMT-2030 is the institutional successor of the IMT-2020, China's government-led initiative for 5G development which was established in 2013. As for standardisation specifically, the two IMT bodies include designated working groups that represent China in the International Telecommunications Union (ITU) and the 3GPP.⁷⁹ Yet IMT-2030's work also involves foreign actors: its 6G Vision and Candidate Whitepaper listed Ericsson, Nokia, and Samsung as major contributors. As Chinese commentators put it, while pursuing greater technological self-sufficiency in emerging technologies should be a national

⁷⁶ Zhou, Y.; Teng, X., Pan, W. (2021). Suggestions on the early research strategies of 6G in China [对我国 6G 早期研究布局的几点建议]. CCID policy brief. Retrieved from: <https://www.ccidgroup.com/info/1105/33193.htm>;

Song, L. (2021). Thoughts on cyberpower under the new nationwide system [新型举国体制下建设网络强国的思考]. Telecommunication Science, 37(5). p.12.

⁷⁷ State Council of China. (12 December, 2021). "14th Five-Year" Digital Economy Development Plan["十四五"数字经济发展规划]. Retrieved from: http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm

⁷⁸ Next-G Alliance. (n.d.). Home Page. Retrieved from: <https://nextgalliance.org/>.

⁷⁹ <http://www.imt2020.org.cn/zh/article/52/53>

goal, a unified international standard with an enhanced Chinese footprint is commercially and politically expedient.⁸⁰

Whether 6G will be standardised globally in the same collaborative manner as previous generations of wireless telecoms will depend on how different countries manage the security considerations that shaped global debate around Huawei's involvement in 5G networks, which will be still more salient for 6G. The general trend in response is towards security by design, with security integrated into the basic design of the infrastructure rather than added as an enhancement to it.^{81 82} In this context, Chinese researchers, think tanks, research institutions and industry actors increasingly discuss 'endogenous cybersecurity' [内生安全/原生安全⁸³] for 6G networks. The Chinese government's influence in Chinese efforts to implement and develop this concept is clear. 'Endogenous security' is designated as a candidate architectural technology in IMT-2030's 6G white paper, and the MoST commissioned a research project to the Purple Mountain Laboratories [紫金山实验室] on Endogenous Cybersecurity.⁸⁴

Chinese concerns about amplified security issues in the 6G era are universal and have technical aspects. Some cybersecurity challenges concern 'endogenous' to 6G networks: they are so far non-existent and will be created by the new features of 6G infrastructure. For example, it is expected that AI technologies will be widely applied in 6G networks, and that vulnerabilities in AI algorithms will therefore pose threats to the larger system. Furthermore 6G transforms mobile networks into enabling infrastructure for a growing range of

⁸⁰ Zhou, Y.; Teng, X., Pan, W. (2021). Suggestions on the early research strategies of 6G in China [对我国 6G 早期研究布局的几点建议]. CCID policy brief. Retrieved from: <https://www.ccidgroup.com/info/1105/33193.htm>

⁸¹ 6GWorld. (26 November, 2021). From Security-Enhanced 5G Systems to Security-By-Design 6G Systems – Rakuten Symphony. Retrieved from: <https://www.6gworld.com/latest-research/from-security-enhanced-5g-systems-to-security-by-design-6g-systems-rakuten-symphony/>.

⁸² Liu, Y., Peng, M. (2021). 6G endogenous security: architecture and key technologies [6G 内生安全:体系结构与关键技术]. Telecommunications Science: 2020(1), pp. 11-20.

⁸³ Huawei's preferred term.

⁸⁴ CCID. (2021). White paper on data security governance [数据安全治理白皮书]. CCID White paper. p.30.

applications and industries,⁸⁵ the amount and sensitivity of data carried by these networks will grow exponentially. And in the 6G era, more advanced technologies will become available to conduct cyber-attacks. For example, development of quantum computers is expected to eventually compromise current cryptographic algorithms.⁸⁶

But the security dilemmas that will accompany 6G also reflect competitive international politics and distrust. Security assurance for the ever-more complex networks that will be supported by 6G will be closely linked to political concerns about governments that regulate the actors involved in these networks.⁸⁷ In this context, political tensions between China, the US and other countries can only be partially mitigated through mutual standardisation approaches. The CCID published a Data Security Governance Whitepaper in June 2021 that illustrates the risks from China's viewpoint of international digital connections in a hostile political climate. It defined multiple challenges to China's data security, including the potential for cross-border data flows to expose sensitive information to exploitation by foreign governments, and the discrepancy between China's leadership in telecoms technologies and its lack of 'discourse power' [话语权] in international debates over data governance norms.⁸⁸

The potential for such concerns to be seen as outweighing imperatives for continued global integration in mobile wireless technologies will determine whether 6G is universally standardised, or whether China seeks to achieve the policy goals linked to its 6G transition by building a separate technology stack that it then exports to friendlier countries. For insights into what the latter outcome might look like in practice, we now examine the rapid technical and regulatory developments in China for another emerging technology.

⁸⁵ Zhang, C., Fu, Y., Li, H., & Cao, J. (2021). Research on security scenarios and security models for 6G networking [6G 网络安全场景分析及安全模型研究]. *Chinese Journal of Network and Information Security*, 7(1): p.6.

⁸⁶ Zhang, C., Fu, Y., Li, H., & Cao, J. (2021). Research on security scenarios and security models for 6G networking [6G 网络安全场景分析及安全模型研究]. *Chinese Journal of Network and Information Security*, 7(1): p.6.

⁸⁷ Lee, J. (8 December, 2021). The internet of things: China's rise and Australia's choices. Lowy Institute. Retrieved from: <https://www.lowyinstitute.org/publications/the-internet-of-things-chinas-rise-and-australias-choices>.

⁸⁸ CCID. (2021). White paper on data security governance [数据安全治理白皮书]. CCID White paper: pp. 12-14.

Case study 2: artificial intelligence (AI)

AI is one of eight ‘digital economy key industries’ [数字经济重点产业] identified in China’s 14th Five-year Plan.⁸⁹ China’s AI industry was estimated by CAICT to have grown 15.1 percent year-on-year in 2020. According to China’s Development Plan on the New Generation of Artificial Intelligence published in 2017 (hereinafter the 2017 AI Development Plan), AI drives upgrading in Chinese industry and its move towards the higher end of global value chains.⁹⁰ AI is also considered to be a technology which can boost China’s military sector and national defence capabilities.⁹¹ The 2017 AI Development Plan points to developing common standards for both civil and military applications, consistent with China’s civil-military fusion efforts.⁹² The digital economy development plan issued in January 2022 sets numerous goals for AI, including supporting key emerging fields such as autonomous driving, smart cities and intelligent manufacturing.⁹³

Applications of AI are giving rise to various governance dilemmas that will be challenging to regulate in terms of addressing competing ethical and legal requirements. Take for example self-driving cars: in an accident caused by an AI algorithm, which human person or legal entity should bear responsibility? These questions are still more challenging in the context of military AI systems and uses of armed force, addressed specifically below.

From the perspective of international competition, governments face another dilemma concerning AI governance. Over-regulation risks hampering the industry’s competitiveness,

⁸⁹ Government of China. (2021). PRC 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2035 [中华人民共和国国民经济和社会发展第十四个五年规划和 2035 年远景目标纲要], pp. 40-41.

⁹⁰ Cyber Administration of China. (3 December, 2018). Inspiring the "head goose effect" of AI [激发人工智能的“头雁效应”]. Retrieved from: http://www.cac.gov.cn/2018-12/03/c_1123797592.htm.

⁹¹ State Council of China. (8 July, 2017). New generation artificial intelligence development plan [新一代人工智能发展规划]. Retrieved from: http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm.

⁹² CAICT. (2021). AI Standardisation White Paper (Version 2021) [人工智能标准化白皮书 (2021 版)]. Retrieved from: <http://www.cesi.cn/images/editor/20210719/20210719180918587.pdf>.

⁹³ State Council of China. (12 December, 2021). "14th Five-Year" Digital Economy Development Plan[“十四五”数字经济发展规划]. Retrieved from: http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm.

and thus potentially disadvantaging the nation in competition with rivals which impose fewer constraints on AI development. This topic is extensively discussed by Chinese analysts in the context of AI governance.⁹⁴

Standards-setting for AI is already underway in international SDOs. By one 2020 assessment, 85% of international standards, including in the field of AI, have been adopted by the ISO.⁹⁵ The ISO is a multilateral organisation, the full voting members of which are national standardisation organisations most representative of standardisation work in their host country. As of 2020, China has presented 23 AI standards from a 2018 White Paper on AI standardisation issued by the China Electronics Standardisation Institute (CESI), arguing that these urgently need to be adopted for the further development of corresponding technologies. Of these, about 20 are being considered for adoption by ISO.⁹⁶

As development and commercialisation of AI technologies in China has progressed, the Chinese state government has also intensified coordination and policy-planning efforts towards regulating and standardising AI. In 2020, the SAC published the Guide for the Development of a New Generation AI Standards System [国家新一代人工智能标准体系建设指南] (hereinafter the 2020 Guide). This document sets out a timeline for national-level stand-setting during the period of the 14th Five-year Plan (2021-2025). The 2020 Guide aims to clarify top-level design of AI standardisation and research on fundamental AI standards by the end of 2021, and to build a preliminary AI standards system by 2023.

In the hierarchy of the future Chinese AI standards system defined by the 2020 Guide, standards concerning ethics, privacy, and security (category H) are stipulated to have regulatory effect, governing other AI standards. AI ethics standards appear to fall within the

⁹⁴ Wu, S.; Hu, R. (19 June, 2021). Research on the proposal of the European Commission's 2021 Artificial Intelligence Law [欧盟委员会 2021 年《人工智能法》提案研究]. Retrieved from: <https://www.secrss.com/articles/31997>.

⁹⁵ Kovachich, L. (7 July, 2020). Chinese Experience in the Development of the Artificial Intelligence Industry: A Strategic Approach [Китайский опыт развития отрасли искусственного интеллекта: стратегический подход]. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2020/07/07/ru-pub-82172>.

⁹⁶ Kovachich, L. (7 July, 2020). Chinese Experience in the Development of the Artificial Intelligence Industry: A Strategic Approach [Китайский опыт развития отрасли искусственного интеллекта: стратегический подход]. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2020/07/07/ru-pub-82172>.

scope of national mandatory standards as defined by China's 2018 Standardisation Laws. Accordingly, AI ethics standards in China will form the basis for nationwide legally binding regulation that governs other categories of AI standards as described in the 2020 Guide, for example 'industry application' [行业应用] standards, or function-specific standards such as for computer vision or machine-human interaction. According to the 2020 Guide, preliminary studies on Chinese AI ethics standards were to be completed by the end of 2021.

The emergence of a Chinese national standards system for AI is important to impose coherence on the recent flurry of activity by different state agencies to regulate and shape AI technologies. These initiatives seem to have been pushed forward largely independently, with only secondary indications to date of coordination between the state actors involved.⁹⁷ Interactions between these agencies will shape China's overall governance regime for AI, and the activities of private firms in developing and applying the technology. The direction in the 2021 Outline for standards work to support 'integrated application of new-generation information technology such as artificial intelligence, big data and block chain' highlights how the development of AI standards in China is likely to have flow-on effects to other emerging technological fields.⁹⁸

In September 2021, the Cyberspace Administration of China (CAC) published draft regulations for internet recommendation algorithms, with two aspects deserving particular attention. First, CAC's Guiding Opinions on Strengthening Overall Governance of Internet Information Service Algorithms stipulates that recommendation algorithms should 'disseminate positive energy' [正能量].⁹⁹ This terminology is used by Chinese authorities to describe official guidance of public opinion, a mission in which CAC plays a central role: CAC's director is also deputy director of the CCP's Central Propaganda Department.

⁹⁷ Sheehan, M. (4 January, 2022). China's New AI Governance Initiatives Shouldn't Be Ignored. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2022/01/04/china-s-new-ai-governance-initiatives-shouldn-t-be-ignored-pub-86127>.

⁹⁸ State Council of China. (10 October, 2021). National Standardization Development Outline [国家标准化发展纲要]. Retrieved from: http://www.gov.cn/zhengce/2021-10/10/content_5641727.htm.

⁹⁹ Cyber Administration of China. (2021). Guiding Opinions on Strengthening the Comprehensive Governance of Internet Information Service Algorithms [关于加强互联网信息服务算法综合治理的指导意见]. Retrieved from: http://www.cac.gov.cn/2021-09/29/c_1634507915623047.htm.

Conversely, other provisions break ground in international debates over governance,¹⁰⁰ notably the requirement for algorithm providers to ‘give an explanation and remedy situations in which algorithms have infringed on user rights and interests’.¹⁰¹

These draft CAC regulations were promulgated in official form at the end of 2021, and will come into effect in March 2022. Changes between the draft and final versions included removal of the express prohibition on ‘discriminatory or biased user tags’ in algorithmic recommendation systems.¹⁰² The CAC also published in September 2021 a three-year roadmap for comprehensive governance of all internet service algorithms - co-signed by nine other state agencies that will provide input to the roadmap’s implementation - with the goal of developing a ‘standardised algorithm ecology’.¹⁰³

Another state-linked actor shaping China’s AI standardisation work is CAICT which is cooperating with China’s AI Industry Alliance on testing and certification for AI systems. In July 2021, CAICT published China’s first white paper concerning ‘trustworthy AI’, which focuses on testing methods for robustness, bias, and explainability.¹⁰⁴ The core principles proposed in this document seem similar to those being proposed by Western actors, but

¹⁰⁰ Sheehan, M. (4 January, 2022). China’s New AI Governance Initiatives Shouldn’t Be Ignored. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2022/01/04/china-s-new-ai-governance-initiatives-shouldn-t-be-ignored-pub-86127>.

¹⁰¹ Art. 17. [算法推荐服务提供者应用算法对用户权益造成重大影响的，应当依法予以说明并承担相应责任] in

Cyber Administration of China. (31 December, 2021). Provisions on the Administration of Algorithm Recommendations for Internet Information Services[互联网信息服务算法推荐管理规定]. Retrieved from: http://www.gov.cn/zhengce/zhengceku/2022-01/04/content_5666429.htm.

¹⁰² Cyber Administration of China. (31 December, 2021). Provisions on the Administration of Algorithm Recommendations for Internet Information Services[互联网信息服务算法推荐管理规定]. Retrieved from: http://www.gov.cn/zhengce/zhengceku/2022-01/04/content_5666429.htm.

¹⁰³ Cyber Administration of China. (2021). Guiding Opinions on Strengthening the Comprehensive Governance of Internet Information Service Algorithms [关于加强互联网信息服务算法综合治理的指导意见]. Retrieved from: http://www.cac.gov.cn/2021-09/29/c_1634507915623047.htm.

¹⁰⁴ Sheehan, M. (4 January, 2022). China’s New AI Governance Initiatives Shouldn’t Be Ignored. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2022/01/04/china-s-new-ai-governance-initiatives-shouldn-t-be-ignored-pub-86127>.

CAICT is leading the way in translating these into implementations¹⁰⁵ By November 2021, CAICT was issuing ‘trustworthy AI’ certifications for facial recognition systems in use within China.¹⁰⁶ Among the firms that achieved an ‘excellent’ grade through this certification process was Cloudwalk, which is subject to US sanctions based on its provision of biometric surveillance technology in Xinjiang.¹⁰⁷

AI ethics in particular provide an example of how the current state-led direction in China, while apparently positive in many respects, may also have undesirable consequences from a European viewpoint. In July, 2021, the MoST published a consultation paper [征求意见稿] on Opinions for strengthening Governance of Technological Ethics [关于加强科技伦理治理的指导意见], and sought feedback from societal and industrial stakeholders till 26 August, 2021.¹⁰⁸ This document defined five principles for AI ethics governance: (1) AI should enhance the well-being of humankind. (2) AI should respect for the right to life, (3) AI should maintain [坚持] fairness and justice and prevent discrimination and prejudice, (4) AI should reasonably control risks, (5) AI should be open and transparent.

In September 2021, MoST published Ethical Norms of New Generation AI [新一代人工智能伦理规范] (hereinafter ‘the Ethical Norms paper’).¹⁰⁹ While most of the content concerning

¹⁰⁵ Sheehan, M. (4 January, 2022). China’s New AI Governance Initiatives Shouldn’t Be Ignored. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2022/01/04/china-s-new-ai-governance-initiatives-shouldn-t-be-ignored-pub-86127>.

¹⁰⁶ Sohu. (17 November, 2021). The first batch of "excellent class"! Yuncong Technology passed the "Trusted AI Face Recognition Evaluation" of the Ministry of Industry and Information Technology Institute [首批“优秀级”! 云从科技通过工信部信通院“可信 AI 人脸识别评估”]. Retrieved from: https://www.sohu.com/a/501708742_100207327.

¹⁰⁷ Slack, R., & Frederic, T. (24 December, 2021). U.S. Expands Sanctions Targeting Chinese Technology Companies. Kelly Drye. Retrieved from: <https://www.ustrademonitor.com/2021/12/u-s-expands-sanctions-targeting-chinese-technology-companies/>.

¹⁰⁸ Ministry of Science and Technology. (28 July, 2021). Guiding Opinions on Strengthening the Ethical Governance of Science and Technology (Consultation Paper) [关于加强科技伦理治理的指导意见 (征求意见稿)]. Retrieved from: http://www.most.gov.cn/tztg/202107/t20210728_176136.html.

¹⁰⁹ Ministry of Science and Technology. (26 September). Ethical Norms of New Generation AI [新一代人工智能伦理规范]. Retrieved from: <http://www.most.gov.cn/kjbgz/202109/177063.html>.

principles for AI ethics reflects MoST's July paper, it deleted the original wording of 'AI should prevent discrimination and prejudice'. Instead, the Ethical Norms paper proposes to 'offer alternative products and services based on the need of the underprivileged' [应充分尊重和帮助弱势群体、特殊群体，并根据需要提供相应替代方案].

This example shows that the wording in the Ethical Norms paper on prevention of discrimination is ambiguous, and raises concerns about whether future Chinese AI Ethics standards will facilitate the use of AI technologies to discriminate between ethnic and socio-economic groups. Furthermore, it is unclear whether these changes resulted from input by Chinese industry actors, or from reconsideration by MoST or other government actors.

These kinds of distinctions merit attention from European regulators, as they indicate the direction in which Chinese regulators are leaning and the form that finalised official standards may take. Propagation of a principle such as differential application between social groups at the discretion of state authorities is likely to shape the real-world use of AI within China in ways that conflict with the commitment to 'human-centric AI' by EU member-states such as Germany and by the European Commission.¹¹⁰

Take for example, the export of digital surveillance technologies to China by Dutch firm Noldus.¹¹¹ According to Amnesty International, these products are specifically designed to enable non-covert surveillance by digital systems to monitor, extract, collect and/or analyse data from individuals. Furthermore, at the time of the transactions covered in Amnesty's report, Noldus's technology also included facial, gender, age and ethnicity recognition - clear examples of biometric technologies.¹¹²

In response, Noldus' Director of Information Technologies argued that it is technically not possible to use the firm's products for the purpose of surveillance, since 'there are only four

¹¹⁰ Hartl, A., Peterka, J., Meiss, M., Schoenstein, M., & Dorfs., W. (18 May, 2021). Germany's human-centred approach to AI is inclusive, evidence-based and capacity-building. OECD.AI. Retrieved from: <https://oecd.ai/en/wonk/germany-takes-an-inclusive-and-evidence-based-approach-for-capacity-building-and-a-human-centred-use-of-ai>; <https://ec.europa.eu/futurium/en/ai-alliance-consultation.1.html>.

¹¹¹ Amnesty International. (21 September, 2020). Out of Control: Failing EU Laws for Digital Surveillance Export. Retrieved from: <https://www.amnesty.org/en/documents/eur01/2556/2020/en/>.

¹¹² Amnesty International. (21 September, 2020). Out of Control: Failing EU Laws for Digital Surveillance Export. p.31. Retrieved from: <https://www.amnesty.org/en/documents/eur01/2556/2020/en/>.

video files on the computer with human behaviours'.¹¹³ Noldus also mentioned that the usage of their products by universities that are connected with Chinese public security services, as reported by Amnesty International, always requires the consent of research participants.¹¹⁴

Nevertheless, recent policy developments in China warrant additional caution for European regulators: Given existing concerns about violations involving state and non-state actors in China of norms established in international human rights law (IHRL), the ambiguity in the anti-discrimination norm in MoST's AI Ethical Norms paper raises questions about exporting these kinds of technologies to China. For example, observable applications inside China of 'emotional recognition' AI are arguably inconsistent with the IHRL right to non-discrimination.¹¹⁵ In this context, the removal of an anti-discrimination requirement from the final version of CAC's internet recommendation algorithm regulations and from MoST's September paper on AI Ethics - and in the latter, substitution of an express endorsement of AI's differentiated application among social groups - can be expected to entrench real-world outcomes that in Western countries would be regarded as undermining global human rights standards.

By comparison with mobile wireless technology, AI is less likely to develop according to globally unified standards. The imperative for cross-border interoperability that drove global telecoms standardisation is less relevant for AI applications, which cover a range of disparate uses and so do not need to be developed as a coherent body in order to meet the functional requirement in question.¹¹⁶ Although basic ethical standards are established by IHRL, which almost all national governments (including China's) at least partially subscribe to, governments have distinct normative positions on how such concepts as privacy, freedom from racial discrimination and freedom of association are given effect in practice. Private firms

¹¹³ Sohu News. (22 September, 2020). Dutch firm refutes allegations of supplying surveillance technology to China[荷兰公司反驳向中国提供监控技术指控]. Retrieved from: https://www.sohu.com/a/419953726_291951

¹¹⁴ Ibid.

¹¹⁵ Article 19. (2021). Emotional Entanglement: China's emotion recognition market and its implications for human rights. Retrieved from: <https://www.article19.org/wp-content/uploads/2021/01/ER-Tech-China-Report.pdf>.

¹¹⁶ Lozada, P., Rühlig, T., & Toner, H. (6 December, 2021). Chinese Involvement in International Technical Standards: A DigiChina Forum. Retrieved from: <https://digichina.stanford.edu/work/chinese-involvement-in-international-technical-standards-a-digichina-forum/>.

providing AI technologies can be expected to configure their products to comply with differing regulatory regimes in different jurisdictions, which seems to be emerging as the typical approach of multinational companies to regulatory divergence between nations in digital technologies.¹¹⁷

If advanced industrialised states develop separate AI ethics standards systems, China may focus on concluding bilateral standards mutual-recognition agreements on AI ethics with developing countries that are more open to Chinese approaches. This could lead to a competitive race with the US and EU over which jurisdiction's standards apply in large parts of the world, with far-reaching economic and political implications. Such an outcome would be an example of the emergence of digital 'spheres of influence' led by rival technology great powers that commentators have warned about.¹¹⁸

There is one field of AI applications where there appears to be significant alignment in both technical practice and political incentives between China and Western countries: military uses of AI, and in particular lethal autonomous weapons systems (LAWS). Although China in 2018 called for a ban on the use of LAWS, this call did not extend to banning research and development, and was based on a narrow definition of LAWS that does not appear to describe weapons systems being developed by any nation-state.¹¹⁹ All military powers seeking to employ AI seem to be adhering to certain standards, most notably retention of 'meaningful human control' over LAWS, in view of the technology's current capabilities and of common incentives: for example, to maintain ultimate human control over machine decision-making

¹¹⁷ Thomas, C. A., & Wu, X. (25 February, 2021). How global tech executives view U.S.-China tech competition. Brookings Institution. Retrieved from: <https://www.brookings.edu/techstream/how-global-tech-executives-view-u-s-china-tech-competition/>.

¹¹⁸ See e.g. Kolodny, L. (20 September, 2018). Former Google CEO predicts the internet will split in two — and one part will be led by China. CNBC. Retrieved from: <https://www.cnbc.com/2018/09/20/eric-schmidt-ex-google-ceo-predicts-internet-split-china.html>;

Xinhua. (14 December, 2021). China submits position paper on regulating military applications of AI. Retrieved from: <http://en.people.cn/n3/2021/1214/c90000-9932301.html>;

Weber, V. (2020). Making Sense of Technological Spheres of Influence. LSE Ideas. Retrieved from: http://eprints.lse.ac.uk/107791/1/LSE_IDEAS_Technological_Spheres_of_Influence_April_2020.pdf.

¹¹⁹ Kania, E. B. (2020). "AI weapons" in China's military innovation. Brookings Institute. pp.5-7. Retrieved from: <https://www.brookings.edu/research/ai-weapons-in-chinas-military-innovation/>.

in applications of lethal force, and core principles of international humanitarian law such as distinguishing between combatants and non-combatants.

During the December 2021 session of the UN forum in which international regulation of LAWS is being discussed, China put forward its first proposal to regulate military applications of AI.¹²⁰ This statement echoes the ‘human-centric’[以人为本] language used in China’s 2020 Guide and Ethical Norms Paper, and advocates compliance with “international humanitarian law and other applicable international laws,” while simultaneously advocating that international regulation ‘observe national and regional ethical norms in... relevant weapons systems’.¹²¹ The issue is not China’s official support for these broad principles, but rather the way they are operationalised in technical design of these systems. Because LAWS’ technical parameters are still evolving, the development process can embed normative principles by designing in relevant safeguards, such as the capacity to attribute responsibility to human individuals for decisions by AI-enabled weapons systems to use lethal force.¹²²

Given that China has for years been the world’s leading exporter of armed drones, and that governments purchasing such systems are likely to stay with their initial supplier, the extent of safeguards and accountability measures built into Chinese-made LAWS may significantly impact how AI ethics are respected in armed conflicts worldwide.¹²³ A UN report’s finding that fully autonomous use of lethal force by an unmanned aerial system occurred recently in Libya’s civil war highlights how this issue is being driven by technology’s use on the

¹²⁰ Xinhua. (14 December, 2021). China submits position paper on regulating military applications of AI. Retrieved from: <http://en.people.cn/n3/2021/1214/c90000-9932301.html>.

¹²¹ Permanent Mission of the People’s Republic of China to the United Nations Office at Geneva and Other International Organizations in Switzerland. (13 December, 2021). Position Paper of the People’s Republic of China on Regulating Military Applications of Artificial Intelligence (AI). Retrieved from: http://www.china-un.ch/eng/dbdt/202112/t20211213_10467517.htm.

¹²² Anderson, K., Waxman, M. C. (2013). Law and Ethics for Autonomous Weapon Systems: Why a Ban Won't Work and How the Laws of War Can. Retrieved from: Columbia Law School Scholarship Archive. Retrieved from: https://scholarship.law.columbia.edu/faculty_scholarship/1803/.

¹²³ Chandra, A. (5 November, 2021). Why China's armed UAVs are a global export success, and its fighter jets, not so much. Defence Procurement International. Retrieved from: <https://www.defenceprocurementinternational.com/features/air/china-has-disrupted-the-military-drone-market>;

Weinberger, S. (10 May, 2018). China Has Already Won the Drone Wars. Foreign Policy. Retrieved from: <https://foreignpolicy.com/2018/05/10/china-trump-middle-east-drone-wars/>.

ground.¹²⁴ Rapid advancement of AI ethics practice in China may therefore be more influential in shaping global norms within this field than international discussions towards a common global framework.

Implications for European policymakers

European decision makers should grasp that China is no longer just a ‘technology taker’, but a ‘technology maker’ that is increasingly shaping the direction of international technological development, especially of applications. Technical standardisation is a key means through which the Chinese authorities exercise ‘grand steerage’ - their limited but pervasive interventions to guide the collective activity of Chinese actors throughout the economy in the desired direction.¹²⁵ There is still much uncertainty over whether the growing weight of state ‘steerage’ over China’s private sector will support or suffocate innovation and competitiveness. But it is clear that the pace of state-led standards development in China means that Chinese actors are already leading the world in grappling with certain normative and technical questions.

Notably, Chinese state agencies are breaking new ground in AI regulation. As described in the preceding case study, the CAC’s recently finalised regulations for internet services recommendation algorithms include globally unprecedented measures such as users’ right to an explanation of how algorithms affect them - an issue that has been extensively debated in the context of the EU’s GDPR, and relates to a key emerging technical field in AI development.¹²⁶ As Chinese authorities start to implement such regulatory measures into practice, other countries may start using these as reference points for their own’ development

¹²⁴ Kallenborn, Z. (5 October, 2021). Applying arms-control frameworks to autonomous weapons. Brookings Institute. Retrieved from: <https://www.brookings.edu/techstream/applying-arms-control-frameworks-to-autonomous-weapons/>.

¹²⁵ Blanchette, J. (n.d.). Grand Steerage Podcast. Center for Strategic and International Studies. Retrieved from: <https://www.csis.org/node/59842>.

¹²⁶ Sheehan, M. (4 January, 2022). China’s New AI Governance Initiatives Shouldn’t Be Ignored. Carnegie Endowment for International Peace. Retrieved from: <https://carnegieendowment.org/2022/01/04/china-s-new-ai-governance-initiatives-shouldn-t-be-ignored-pub-86127>.

of AI governance, or may simply adopt Chinese standards and Chinese AI solutions designed accordingly.

Even if a united front towards China does emerge among the advanced US-allied economies, this would not solve the geopolitical and economic challenges linked to China's technological rise. Increasingly, digital technology ecosystems - on both the production and consumption side - are being influenced by the developing world.¹²⁷ Global electronics supply chains and the fastest growing markets for digital technologies are currently concentrated in the region with the deepest ties to China's economy: East and Southeast Asia.¹²⁸ As foreshadowed by the debate over Huawei's involvement in 5G networks worldwide, the ability of Chinese firms to offer desirable technological products will facilitate market access abroad and the adoption, whether through formal agreement or by default, of associated technical standards.

In the context of strategic technological competition with China, European policymakers must also be vigilant about the full implications of alignment with US-led approaches, and growing pressure from Washington for cooperation on technical standardisation issues. While US partnerships will always be less politically problematic than Chinese ones in this context, this does not mean that European interests are best served by simply following a US lead on the technological development pathways set by standardisation choices. For example, in the case of wireless telecommunications and 6G, ORAN may turn out to be a pathway to market dominance by US firms over European competitors and customers.¹²⁹

The increasing contributions by Chinese actors at the developmental frontier of technologies such as 6G and AI may require re-evaluating the role of China-Europe collaborations. For example, Purple Mountain Laboratories - which as noted above is commissioned by MoST with developing the 'endogenous security' concept for 6G, and which recently claimed to have

¹²⁷ Lee, J. (24 June, 2021). The Connection of Everything: China and the Internet of Things. MERICS. p.5. Retrieved from: <https://merics.org/en/report/connection-everything-china-and-internet-things>

¹²⁸ Lee, J. (8 December, 2021). The internet of things: China's rise and Australia's choices. Lowy Institute. Retrieved from: <https://www.lowyinstitute.org/publications/the-internet-of-things-chinas-rise-and-australias-choices>.

¹²⁹ Morris, I. (6 October, 2021). Intel is building an open RAN fortress, but it's also under attack. Light Reading. Retrieved from: <https://www.lightreading.com/open-ran/intel-is-building-open-ran-fortress-but-its-also-under-attack/d/d-id/770094>;

European Commission. (2021). 5G SUPPLY MARKET TRENDS - Final Report. Retrieved from: <https://digital-strategy.ec.europa.eu/en/library/commission-publishes-study-future-5g-supply-ecosystem-europe>.

achieved a world record in data transmission using 6G-oriented technologies¹³⁰ - collaborates with several European universities.¹³¹ These types of partnerships will draw growing scrutiny from policymakers in both the EU and Washington DC, with concerns unlikely to be assuaged by China's increasingly intrusive data governance regime and assertions by Chinese authorities over activity by Chinese firms and research institutions.

Finally, continuing development of AI for military uses by the US, China and other states will require European policymakers to grapple with the implications, notwithstanding support by many EU member-states and the European Parliament for a ban on LAWS.¹³² As AI-enhanced military systems proliferate globally, this will not simply present ethical dilemmas, but may undermine international strategic stability. This problem will be more severe if such military systems are developed by nations independently without coordination on standards, or mutual arms control mechanisms of the kind that were agreed during the Cold War's later stages for nuclear weapons.¹³³

Based on the foregoing discussion, some general recommendations may be presented for European policymakers concerning response to China's national standards approach:

- Indiscriminate opposition to Chinese participation in international SDOs and standardisation work should be avoided. Such an approach would accelerate global technological bifurcation, undermining a range of interests for the EU as a whole and for individual member states, and would become increasingly difficult to reverse.

¹³⁰ Global Times. (5 January, 2022). Chinese lab achieves major achievement in wireless communication. Retrieved from: <https://www.globaltimes.cn/page/202201/1245197.shtml>.

¹³¹ Nature. (n.d.). Top 100 international collaborations. Nature Index. Retrieved from: <https://www.natureindex.com/supplements/nature-index-2017-china/tables/international>.

¹³² Kahn, J. (22 December, 2021). The world just blew a 'historic opportunity' to stop killer robots—and that might be a good thing. Fortune. Retrieved from: <https://fortune.com/2021/12/22/killer-robots-ban-fails-un-artificial-intelligence-laws/>.

European Parliament. (20 January, 2021). Guidelines for military and non-military use of Artificial Intelligence. Retrieved from: <https://www.europarl.europa.eu/news/en/press-room/20210114IPR95627/guidelines-for-military-and-non-military-use-of-artificial-intelligence>.

¹³³ Kahn, J. (22 December, 2021). The world just blew a 'historic opportunity' to stop killer robots—and that might be a good thing. Fortune. Retrieved from: <https://fortune.com/2021/12/22/killer-robots-ban-fails-un-artificial-intelligence-laws/>.

- Instead, attention should be paid to behaviour of Chinese participants in specific processes. Undesirable behaviour, such as apparent block voting by Chinese actors in past cases involving mobile wireless standards, should be addressed case by case.
- While international discussions about desirable standards frameworks are important, more focus should be placed on real-world implementation of standards. If the EU cannot present actionable alternatives to Chinese standards, the latter will gain ground in third countries that prioritise benefiting from use of the relevant technologies.

Conclusion

China's approach to technical standardisation has undergone significant evolution in recent years and bears close watching, as it increasingly shapes the real-world development of emerging digital technologies. As one recent assessment puts it, this is a 'state-centric variant' on standardisation practices that are not fundamentally different from those in Western countries.¹³⁴ The Chinese state is simply more involved than its Western counterparts in supporting and pushing Chinese firms in directions that serve the nation's industrial and hence strategic policy goals. This has led to quantifiable gains by Chinese actors in some sectors, although they remain far from displacing the influence of Western actors in any technical field or international SDO.¹³⁵

However, this picture may start to change significantly as Chinese actors become pioneers in certain emerging technologies, and as rising 'decoupling' pressure from the US and like-minded states steers Chinese actors towards 'multi-bilateralist' approaches with more receptive countries. The top levels of China's reformed standards governance system gives non-state actors a greater role, but this sits within a regulatory and policy framework that is

¹³⁴ Ruhlig, T. (Dec 2021). p.69.

¹³⁵ Creemers, R. & Voo, J.;

Ruhlig, T. (Dec 2021);

Neaher, G., Bray, D., Mueller-Kaler, J., & Schatz, B. (14 October, 2021). Standardizing the future: How can the United States navigate the geopolitics of international technology standards?. Atlantic Council. Retrieved from: <https://www.atlanticcouncil.org/in-depth-research-reports/report/standardizing-the-future-how-can-the-united-states-navigate-the-geopolitics-of-international-technology-standards/>.

steered by state authorities, and which conceives standards as a key element of national power and an instrument for prosecuting policy goals.

Nonetheless, the above case studies of 6G and AI show that the implications of Chinese domestic standardisation activity and participation in international SDOs should be considered on a case by case basis. From a foreign viewpoint, the important factors will often be the level of compliance of a particular process with local regulation and policy, rather than the fact of participants having Chinese nationality. The European Commission's 2021 report on 5G supply market trends, for example, recommends that O-RAN Alliance specifications be reviewed for compliance with the WTO Code of Good Practice and EU Regulation 1025/2012 before being translated into European (ETSI) standards.¹³⁶

The simultaneous rapid advance in China of standards governance and technical development in emerging fields will have major consequences for the evolution and employment of new technologies worldwide. Chinese authorities and stakeholders still see great utility in collaborative international approaches to technical standardisation. But in the face of worsening relations with advanced economies, and an intensifying international contest for technological leadership, China's standardisation regime is also focused on enabling technical advances within China and exporting these beyond the nation's borders. Monitoring the tension between these two orientations across a widening field of emerging technologies will be critical for European strategic and industrial policy going forwards.

¹³⁶ European Commission. (2021). 5G SUPPLY MARKET TRENDS - Final Report. p.92. Retrieved from: <https://digital-strategy.ec.europa.eu/en/library/commission-publishes-study-future-5g-supply-ecosystem-europe>.