

The geopolitics of technology standards: historical context for US, EU and Chinese approaches

NICHOLAS ZÚÑIGA, SAHELI DATTA BURTON,
FILIPPO BLANCATO AND MADELINE CARR*

In the context of a more competitive yet interdependent international system, geopolitical competition increasingly revolves around harnessing emerging technologies. Standard-setting can be seen as a central element of such competition, meaning that states seeking to shape the technology landscape are actively trying to increase their influence in international standard-setting bodies. Against this backdrop, this article is concerned with understanding the extent to which (and in what ways) the traditional rule-makers of international standardization, namely the United States and Europe, are responding to the rise of China in standard-setting bodies where the latter appears determined to participate fully in the processes and benefits of rule-making. To better appreciate the strategic dimension of standard-setting, it is useful to trace back its history and development.

Much of the literature on standard-setting and global affairs is policy-focused. Having contributed to this literature ourselves, we recognize that, while this is important and useful, what is missing is a historical account of current efforts to shape the ‘rules of the game’; the technical and political landscape within which states operate. In this article, we aim to bridge this gap by providing an analysis of broad historical trends that are shaping contemporary global technological competition. This contestation is a central pillar of international competitiveness and has long been regarded as fundamental to state power.¹ This historically informed view can help explain past developments and uncover future trends related to the geopolitical dimension of standard-setting.

Retracing the evolution of the approaches taken by the US, European Union and China to technology standardization, we show how the US became a dominant force in this field by establishing a technological order that best promoted its own interests. We argue that the EU has pushed back against this at times but has also found ways to align with the US approach. China’s growing proficiency in emerging digital technologies is accompanied by an intent to engage with the existing status quo system led by the US and EU, while at the same time developing political and economic space for a Chinese-led alternative. China is doing this partly by emulating the successful innovation policies of the US and EU, but

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¹ Madeline Carr, *US power and the internet in International Relations: the irony of the information age* (Basingstoke: Palgrave Macmillan, 2016).

also through a unique approach of integrating domestic and international standard-setting objectives. The central finding of the article is that all three polities are adapting to the shifting power dynamics in the international technology order. The US government is becoming more interventionist and proactive in standards. China has developed a long term, holistic strategy for using technical standards to bolster its domestic industrial development while also leveraging international and domestic standard-setting practices to exert its place as a global technology power. Finally, the EU is seeking a third way that strikes a balance between competition and cooperation to preserve values like interoperability, which have historically benefited both the single market and the global economy.

This article is organized as follows. We begin with a brief overview of the existing literature on the intersection of standard-setting, international relations and international political economy. We then move on to give separate historical accounts of the approaches taken by the US, Europe, and China to standard-setting, as well as their influence in technology standardization. To this end we rely on a comparative analysis of historical and existing documents. For Chinese documents, we use translations provided by the Center for Security and Emerging Technology at Georgetown University's Walsh School of Foreign Service. The conclusion offers some final remarks about what the three polities' standard-setting strategies mean for the future of geopolitics and technology standardization.

Technical standards and global affairs: a literature review

Despite its origins in the twentieth century within the technical domain of engineering communities, international technology standardization has long been regarded as a space of geopolitical competition between states.² As far back as the Second World War, the contestation over a globally accepted standard unit of measurement was a geopolitical one, fought between the 'inch' countries (the United States and the United Kingdom) and their European counterparts at the International Federation of the National Standardization Associations (currently organized as the International Organization for Standardization—ISO). Then, as now, technology standards represented a pathway to competitive advantage over technology development and its uptake.

Power over standards allowed states and private companies to reap political and economic benefits through compliance with standard essential patents (SEPs). These, in turn, generated lucrative, long-term revenue streams for patent holders via licensing fees. Profits from standards can be reinvested to finance further innovation, creating a virtuous cycle that ultimately results in competitive advantage for the benefiting companies and their states. Consequently, standards are regarded as a fundamental instrument for unlocking innovation and bolstering industrial development.

² John Boli and George M. Thomas, 'World culture in the world polity: a century of international non-governmental organization', *American Sociological Review* 62: 2, 1997, pp. 171–90, <https://doi.org/10.2307/2657298>; Craig N. Murphy and JoAnne Yates, *The International Organization for Standardization (ISO): global governance through voluntary consensus* (Abingdon: Routledge, 2009).

The International Relations (IR) literature has devoted a great deal of attention to the political dimension of standard-setting.³ IR scholars writing on standards have commonly taken an institutional perspective, focusing on the ways in which institutions and organizations influence the workings of international standardization organizations.⁴ For example, Walter Mattli and Tim Büthe argue that the institutional structure of national standards bodies shapes how effective countries are in promoting their own interests through international standardization processes.⁵ Some scholars have focused on other facets of institutional functioning, analysing legitimacy or whether standards are a dynamic or stabilizing phenomenon in international relations.⁶ Others have analysed the role of standards in relation to global value chains, comparing the trade effects of national, regional and international standardization.⁷ Critical scholars, fitting international standardization within the broader framework of neo-liberalism, have analysed standardization as a mechanism for exercising ‘governance at a distance’, or the shifting of governance from the public to the private sector.⁸ This body of work has focused on the changing role of the state in international standards governance, situating their contribution within debates over the role of the state in the era of neo-liberal globalization.⁹ Scholars of political economy, public policy and economics have focused on how states have used standardization as a way to ‘catch up’, particularly in the context of the economic rise of Japan, South Korea and then China.¹⁰ Their work is rooted in the tradition of developmentalism and

³ Maximilian Mayer, Mariana Carpes and Ruth Knoblich, ‘The global politics of science and technology: an introduction’, in Maximilian Mayer, Mariana Carpes and Ruth Knoblich, eds, *The global politics of science and technology—vol. 1* (Berlin: Springer, 2014), pp. 1–35. See also Jeffrey Hart, ‘Technology standards in international communication’, in *Oxford research encyclopedia of international studies*, 2017, <https://doi.org/10.1093/acrefore/9780190846626.013.111>. (Unless otherwise noted at point of citation, all URLs cited in this article were accessible on 1 April 2024.)

⁴ Walter Mattli, ‘The politics and economics of international institutional standards setting: an introduction’, *Journal of European Public Policy* 8: 3, 2001, pp. 328–44, <https://doi.org/10.1080/13501760110056004>; Walter Mattli and Tim Büthe, ‘Setting international standards: technological rationality or primacy of power?’, *World Politics* 56: 1, 2003, pp. 1–42, <https://doi.org/10.1353/wp.2004.0006>; Sebastian Botzem and Leonhard Dobusch, ‘Standardization cycles: a process perspective on the formation and diffusion of transnational standards’, *Organization Studies* 33: 5–6, 2012, pp. 737–62, <https://doi.org/10.1177/0170840612443626>; Nils Brunsson, Andreas Rasche and David Seidl, ‘The dynamics of standardization: three perspectives on standards in organization studies’, *Organization Studies* 33: 5–6, 2012, pp. 613–32, <https://doi.org/10.1177/0170840612450120>; Mayer, Carpes and Knoblich, ‘The global politics of science and technology’.

⁵ Mattli and Büthe, ‘Setting international standards’.

⁶ Botzem and Dobusch, ‘Standardization cycles’; Brunsson, Rasche and Seidl, ‘The dynamics of standardization’.

⁷ Knut Blind, Axel Mangelsdorf, Crispin Niebel and Florian Ramel, ‘Standards in the global value chains of the European Single Market’, *Review of International Political Economy* 25: 1, 2018, pp. 28–48, <https://doi.org/10.1080/09692290.2017.1402804>.

⁸ Winton Higgins and Kristina Tamm Hallström, ‘Standardization, globalization and rationalities of government’, *Organization* 14: 5, 2007, pp. 685–704, <https://doi.org/10.1177/1350508407080309>; Allison Loconto and Lawrence Busch, ‘Standards, techno-economic networks, and playing fields: performing the global market economy’, *Review of International Political Economy* 17: 3, 2010, pp. 507–36, <https://doi.org/10.1080/09692290903319870>; Alejandro M. Peña, ‘Governing differentiation: on standardisation as political steering’, *European Journal of International Relations* 21: 1, 2015, pp. 52–75, <https://doi.org/10.1177/1354066114523657>.

⁹ Linda Weiss, ‘The myth of the neoliberal state’, in Chang Kyung-Sup, Ben Fine and Linda Weiss, eds, *Developmental politics in transition: the neoliberal era and beyond* (London: Palgrave Macmillan, 2012), pp. 27–42.

¹⁰ Whasun Jho, ‘Global political economy of technology standardization: a case of the Korean mobile telecommunications market’, *Telecommunications Policy* 31: 2, 2007, pp. 124–38, <https://doi.org/10.1016/j.telpol.2006.12.004>; Heejin Lee and Sangjo Oh, ‘The political economy of standards setting by newcomers: China’s WAPI and South Korea’s WIPI’, *Telecommunications Policy* 32: 9–10, 2008, pp. 662–71, <https://doi.org/10.1016/j.telpol.2008.09.004>.

focuses on state–firm relations, emphasizing the role of industrial policy in developing competitive domestic firms.¹¹

With regard to technology, some contributions have analysed the progress of specific Wi-Fi and telecommunication standards, including South Korea's WIPI standard and China's WAPI and TD-SCDMA standards.¹² Such research analyses the international successes of these standards and shows how states adapted their strategies over time by balancing state and private-sector innovation.¹³ This scholarship highlights the obstacles that developing states encounter when attempting to influence established standard-setting processes. It also provides evidence of the impact of active state policy intervention in overcoming 'latecomer disadvantages' in global technology standardization.¹⁴ As such, it challenges the traditional logic of openness and private self-regulation as a critical factor for the multi-stakeholder model of technology standardization.¹⁵

More recently, contributions on the geopolitical dimension of standard-setting have focused on the speed of China's catch-up in this field, as exemplified by its growing lead in the race to deploy 5G technology. Contextually, the realization that the US private sector had lost ground to China in the telecommunications sector spurred more research efforts into the political competitiveness of technology standardization.¹⁶

Policy research in this field often compares the approaches of the US, EU and China.¹⁷ Much of this work stresses the need for the US and EU to consider

org/10.1016/j.telpol.2008.07.008; Xudong Gao and Jianxin Liu, 'Reprint of: Catching up through the development of technology standard: the case of TD-SCDMA in China', *Telecommunications Policy* 36: 10–11, 2012, pp. 817–31, <https://doi.org/10.1016/j.telpol.2012.10.001>; Xudong Gao, 'A latecomer's strategy to promote a technology standard: the case of Datang and TD-SCDMA', *Research Policy* 43: 3, 2014, pp. 597–607, <https://doi.org/10.1016/j.respol.2013.09.003>; Maximilian von Laer, Knut Blind and Florian Ramel, 'Standard essential patents and global ICT value chains with a focus on the catching-up of China', *Telecommunications Policy* 46: 2, 2022, 102110, <https://doi.org/10.1016/j.telpol.2021.102110>.

¹¹ Mi-jin Kim, Heejin Lee and Jooyoung Kwak, 'The changing patterns of China's international standardization in ICT under techno-nationalism: a reflection through 5G standardization', *International Journal of Information Management*, vol. 54, 2020, 102145, <https://doi.org/10.1016/j.ijinfomgt.2020.102145>.

¹² Lee and Oh, 'The political economy of standards setting by newcomers'.

¹³ Kim, Lee and Kwak, 'The changing patterns of China's international standardization in ICT under techno-nationalism'.

¹⁴ Jorge L. Contreras, 'Divergent patterns of engagement in internet standardization: Japan, Korea and China', *Telecommunications Policy* 38: 10, 2014, pp. 914–32, <https://doi.org/10.1016/j.telpol.2014.09.005>; von Laer, Blind and Ramel, 'Standard essential patents and global ICT value chains with a focus on the catching-up of China'.

¹⁵ Andrew L. Russell, *Open standards and the digital age: history, ideology, and networks* (Cambridge, UK: Cambridge University Press, 2014), p. 229; Henry Farrell and Abraham L. Newman, 'The Janus face of the liberal international information order: when global institutions are self-undermining', *International Organization* 75: 2, 2021, pp. 333–58, <https://doi.org/10.1017/S0020818320000302>.

¹⁶ Nigel Inkster, *The great decoupling: China, America and the struggle for technological supremacy* (London: Hurst, 2021).

¹⁷ John Chen et al., *China's Internet of Things* (Washington DC: U.S.–China Economic and Security Review Commission, 2018), [https://www.uscc.gov/sites/default/files/Research/SOSi_China%27s Internet of Things.pdf](https://www.uscc.gov/sites/default/files/Research/SOSi_China%27s%20Internet%20of%20Things.pdf); Alexandra Bruer and Doug Brake, *Mapping the international 5G standards landscape and how it impacts U.S. strategy and policy* (Washington DC: Information Technology & Innovation Foundation, 2021), <https://www2.itif.org/2021-5g-standards.pdf>; Giulia Neaher, David Bray, Julian Mueller-Kaler and Benjamin Schatz, *Standardizing the future: how can the United States navigate the geopolitics of international technology standards?* (Washington DC: Atlantic Council, 2021), <https://www.atlanticcouncil.org/wp-content/uploads/2021/10/Standardizing-the-future-How-can-the-United-States-navigate-the-geopolitics-of-international-technology-standards.pdf>; Tim Rühl, *China, Europe and the new power competition over technical standards* (Stockholm: Foreign Policy Institute, 2021), <https://www.ui.se/globalassets/ui.se-eng/publications/ui-publications/2021/ui-brief-no.-1-2021.pdf>.

a more proactive approach in standard-setting to counter the rise of China.¹⁸ For example, Tim Rühlig and Tobias ten Brink argue that China is increasingly mirroring the historical practices of the EU and US by externalizing its domestic model for technology standardization.¹⁹ Finally, Daniel Fuchs and Sarah Eaton have focused on Sino-German standardization partnerships through a developmentalist lens, and argue that China is leveraging such partnerships to increase its influence.²⁰

A review of the extant IR literature shows that, while IR scholars have studied the intersection between standard-setting and international affairs, more research is needed on the role that technology standards play in the current phase of heightened geopolitical competition between the US, China and the EU. Indeed, we argue that following the trajectory of digital standards can help better understand future power transitions in the international system. As a contribution to this existing gap in the literature, the next three sections present a historical overview of the US, EU and Chinese approaches to technology standard-setting.

US technology standardization: a century of global dominance

Strength in standards development has been instrumental to the United States' global technological leadership.

US Government national standards strategy for critical and emerging technology, May 2023.²¹

The United States' standards strategy strongly reflects American political culture. It is driven forward by a fundamental distrust in government authority and an age-old preference for private association in the face of coordination problems.²² Although the American National Standards Institute (ANSI) was first established as the American Engineering Standards Committee in 1918, the organization was never given an official government charter and did not have the power to coordinate the many different American standards developers. However, it was through

¹⁸ Chen et al., *China's Internet of Things*; Bruer and Brake, *Mapping the international 5G standards landscape*; Jeffrey Ding, 'China's growing influence over the rules of the digital road', *Asia Policy* 16: 2, 2021, pp. 33–42, <https://doi.org/10.1353/asp.2021.0015>; Tim Nicholas Rühlig and Tobias ten Brink, 'The externalization of China's technical standardization approach', *Development and Change* 52: 5, 2021, pp. 1196–221, <https://doi.org/10.1111/DECH.12685>. For a different perspective on the impact of China's rise in international standardization, see Naomi Wilson, 'A "China model?" Beijing's promotion of alternative global norms and standards', Testimony before the U.S.–China Economic and Security Review Commission, 13 March 2020, https://www.uscc.gov/sites/default/files/testimonies/March%2013%20Hearing_Panel%203_Naomi%20Wilson%20ITI.pdf; Neaheer et al., *Standardizing the future*.

¹⁹ Rühlig and ten Brink, 'The externalization of China's technical standardization approach'.

²⁰ Daniel Fuchs and Sarah Eaton, 'Diffusion of practice: the curious case of the Sino-German technical standardisation partnership', *New Political Economy* 27: 6, 2022, pp. 958–71, <https://doi.org/10.1080/13563467.2021.1961221>.

²¹ *US Government national standards strategy for critical and emerging technology*, The White House, May 2023, p. 3, <https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf>

²² D. Linda Garcia, 'Standard setting in the United States: public and private sector roles', *Journal of the American Society for Information Science* 43: 8, 1992, pp. 531–37, [https://doi.org/10.1002/\(SICI\)1097-4571\(199209\)43:8<531::AID-ASI3>3.0.CO;2-Q](https://doi.org/10.1002/(SICI)1097-4571(199209)43:8<531::AID-ASI3>3.0.CO;2-Q); US Congress Office of Technology Assessment, *Global standards: building blocks for the future* (Washington DC: US Government Printing Office, 1992), p. 14.

this vehicle that the private-led, multi-stakeholder, voluntary consensus standard-setting (VCSS) model began to take institutional shape.²³ The VCSS model was a middle ground between a purely market-based approach, which sometimes led to conflicting *de facto* standards, and the rigidity of *de jure* government-led standardization.²⁴ It was led by a plurality of (mostly US or Europe-based) stakeholders from private companies, technical experts and civil society organizations. This multi-stakeholder alliance reflected and drew upon American commitments to *laissez-faire* approaches,²⁵ rough consensus (at least within the technical community) and voluntary participation. As such, the VCSS model helped to legitimize and diffuse the norms, values and interests of the US through the standardization of technological innovations.

In the 1960s and 1970s, the US government began to take a greater role in standard-setting, motivated by concerns about consumer safety and anti-trust behaviour in the VCSS. It had become apparent that large companies were using VCSS processes to lock competitors out of the marketplace.²⁶ This perceived failure in private-sector standardization brought forth bills seeking to increase government oversight of the VCSS model in the late 1970s.²⁷ Federal agencies also began to issue more government standards, particularly in health, consumer safety and environmental protection.²⁸ The US Federal Trade Commission carried out a major investigation into the US standards system in 1978, controversially concluding that the government should step in and regulate the entire process.²⁹ Pressures to regulate the VCSS model, however, were strongly opposed by ANSI and other private-sector standards development organizations (SDOs). The clamour for official government policy came to a head with the release of the Office of Management and Budget (OMB) *Circular A-119*. Despite calls for regulation, the final version of the *Circular*, published in 1982 and updated in 1998, firmly placed the control of standard-setting in the hands of the privately-led VCSS model.³⁰

This move on the part of the OMB reflected the changing politico-economic landscape in the US.³¹ The election of Ronald Reagan to the country's presidency in 1980 brought a revival of classical liberal economic thinking, centred on profoundly reshaping market–state relations in ways that favoured reducing the role of the state, including in standard-setting.³² More than four decades later,

²³ JoAnne Yates and Craig N. Murphy, *Engineering rules: global standard setting since 1880* (Baltimore, MD: Johns Hopkins University Press, 2019), p. 23.

²⁴ Russell, *Open standards and the digital age*, p. 271.

²⁵ Garcia, 'Standard setting in the United States'; US Congress Office of Technology Assessment, *Global standards: building blocks for the future*, p. 14.

²⁶ US Congress Office of Technology Assessment, *Global standards: building blocks for the future*, p. 56.

²⁷ US Congress, 'Voluntary Standards and Accreditation Act', S.825, 1977, <https://www.congress.gov/bill/95th-congress/senate-bill/825?r=4&s=1>.

²⁸ US Congress Office of Technology Assessment, *Global standards: building blocks for the future*, p. 57.

²⁹ US Congress Office of Technology Assessment, *Global standards: building blocks for the future*, p. 19.

³⁰ The White House, 'Circular No. A-119—Federal Register (Federal participation in the development and use of voluntary consensus standards and in conformity assessment activities)', revised 1998, https://obamawhitehouse.archives.gov/omb/circulars_a119.

³¹ US Congress Office of Technology Assessment, *Global standards: building blocks for the future*, p. 19.

³² David C. Vladeck and Sidney M. Wolfe, 'The politics of OSHA's standard-setting', *American Journal of Industrial Medicine* 19: 6, 1991, pp. 801–4, <https://doi.org/10.1002/ajim.4700190611>.

the OMB *Circular*, which has undergone periodic revision, remains the defining policy of the US standards strategy and, by extension, the approach underpinning most international standardization institutions. The OMB directs US federal agencies to use private-sector standards instead of government ones, except in cases where doing so is impractical or inconsistent with existing laws.³³

In the 1980s, the emergence of digital technologies, coupled with the pressures of advancing globalization, encouraged the reorganization of technology standard-setting in the US.³⁴ This time, the ambition was to standardize to ensure interoperability³⁵ and expand the global influence of US emerging technology firms.³⁶ Moreover, the perceived slowness and formality of existing European-based international SDOs—such as the ISO and the International Electrotechnical Commission—encouraged US technology firms to start developing standards in consortia.³⁷

Standards consortia were founded on neo-liberal principles of openness, transparency and scepticism of government involvement. These loose and exclusive groups of companies came together with a shared interest in developing a standard to meet a specific technological and commercial need.³⁸ The resulting standards were thus highly responsive to short-term market needs. To this day, consortia continue to be among the most dominant international SDOs in internet and networking standardization.³⁹ They are an example of how domestic factors in US politics encouraged the internationalization of neo-liberal principles in technology standardization.

After the 1990s, the US government receded substantively from technology standard-setting to focus more on a market-supporting role. This was partly due to factors like the rise of technical standards consortia but also, following the fall of the Soviet Union, a relaxation of the US government's previous focus on technological competition. Nevertheless, the US government retained some control over the standard-setting process, such as managing the size of federal contracts for certain standards and investigating anti-competitive practices.⁴⁰

More recently, China's rise in international standardization has raised concerns over the efficacy of the US's *laissez-faire* approach. Specifically, the increased involvement of Chinese nationals in major technology-focused international SDOs such as the International Telecommunication Union and 3GPP⁴¹ has sparked

³³ James Olthoff, 'Testimony: setting the standards: strengthening U.S. leadership in technical standards', National Institute of Standards and Technology, 17 March 2022, <https://www.nist.gov/speech-testimony/setting-standards-strengthening-us-leadership-technical-standards>.

³⁴ Linda Weiss, 'Re-emergence of great power conflict and US economic statecraft', *World Trade Review* 20: 2, 2021, pp. 152–68, <https://doi.org/10.1017/S1474745620000567>.

³⁵ Hui Liu and Carl F. Cargill, *Setting standards for industry: comparing the emerging Chinese standardization system and the current US system* (Honolulu, HI: East-West Center, 2017), p. 25.

³⁶ Yates and Murphy, *Engineering rules*, p. 255.

³⁷ Russell, *Open standards and the digital age*, p. 274.

³⁸ Rogier Creemers, 'China's conception of cyber sovereignty: rhetoric and realization', in Dennis Broeders and Bibi van den Berg, eds, *Governing cyberspace: behavior, power and diplomacy* (Lanham, MD: Rowman & Littlefield, 2020), p. 112.

³⁹ Liu and Cargill, *Setting standards for industry*, p. 25.

⁴⁰ Russell, *Open standards and the digital age*, pp. 276–7.

⁴¹ 3GPP stands for '3rd Generation Partnership Project'. Bruer and Brake, *Mapping the international 5G standards landscape*, p. 3.

anxieties about the US's ability to retain its strategic advantage in standard-setting. Similarly, China's advances in developing standards for 5G networks have been interpreted as a sign of the country's growing technological prowess, especially as the new generation networks are poised to underpin technologies like the Internet of Things.⁴² To avoid losing its hegemonic position in international standardization, the US government has devised plans to work more cohesively with the private sector, leading to the publication of a new standardization strategy.

The 2023 US *National standards strategy for critical and emerging technology*⁴³ is structured around four objectives. First, seeking additional investment to support the development of key standards that fall beyond commercial interests. Second, promoting government participation in SDO activities. Third, addressing the skills shortage and training more people in technical standard-setting. Fourth, protecting the integrity and inclusivity of current standardization practices. In this sense, the *National standards strategy* refers to Chinese efforts to 'undermine the integrity of longstanding standards development processes, pushing top-down approaches to dominate future markets and reinforce coercive leverage'.⁴⁴

In sum, the US has historically pushed for a *laissez-faire* approach to standard-setting that gives preference to its private sector, promotes its values, and allows cooperation with like-minded partners. The rise of China is now prompting a shift in US strategy—one that increasingly involves a greater role for the government in technology standardization.

The EU: a third way to technology standardization

Europe's competitiveness, technological sovereignty, ability to reduce dependencies, and protection of EU values, including our social and environmental ambitions, will depend on how successful European actors are in standardisation at international level.

European Commission, *An EU strategy on standardisation*, 2022.⁴⁵

Europe has a long history of interstate standardization. In the nineteenth century, the first international standards began to emerge in the region, driven by early network technologies such as railroads, electricity and the telegraph.⁴⁶ Pressures for standardization ramped up around the turn of the century due to interstate

⁴² US Congress Office of Technology Assessment, *Global standards: building blocks for the future*; Chen et al., *China's Internet of Things*, pp. 59, 100; 2020 report to Congress of the U.S.–China Economic and Security Review Commission, 116th Congress (Washington DC: U.S.–China Economic and Security Review Commission, 2020), https://www.uscc.gov/sites/default/files/2020-12/2020_Annual_Report_to_Congress.pdf, p. 114. See also Niamh Healy, "My way or the Huawei": understanding the role of third-party states in weaponized interdependence via a study of the United Kingdom's response to the United States' treatment of Huawei', 26 May 2023, pp. 25–7, <https://doi.org/10.2139/ssrn.4540582>.

⁴³ The White House, *United States Government national standards strategy for critical and emerging technology* (Washington DC: The White House, 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf>.

⁴⁴ The White House, *United States Government national standards strategy for critical and emerging technology*, p. 12.

⁴⁵ European Commission, *An EU strategy on standardisation—setting global standards in support of a resilient, green and digital EU single market* (Brussels: European Commission, 2022), p. 1, <https://ec.europa.eu/docsroom/documents/48598>.

⁴⁶ Murphy and Yates, *The International Organization for Standardization (ISO)*, p. 11.

competition and the early free trade movement, which recognized the economic role that standards could play as both barriers to and enablers of trade.⁴⁷ The result was the development of the world's first national standards body (NSB), the British Standards Institute, in 1901.⁴⁸ At the onset of the First World War, other European states followed, leading to a proliferation of NSBs across the continent. These quasi-public organizations acted as the head of hierarchically ordered national standards networks, coordinating the development and publishing of national standards.

International standardization efforts were revived in the optimism of the post-Second World War period with the founding of the ISO in 1947. The ISO has gone on to become the largest international SDO, although in its initial years, between 1947 and 1964, it was a largely western European project.⁴⁹ This influence is reflected in the ISO's sovereignty-based system, which is coordinated through NSBs in a 'one country, one vote' arrangement.

The proliferation of international organizations in the postwar period was also encouraged by geopolitical pressures like the emerging competition between the US and the Soviet Union. During the Cold War, the US invested heavily in the economic recovery of western Europe.⁵⁰ This helped harmonize western European states' economic policies, boosting political cooperation and laying the foundation for the future development of the European Economic Community (EEC, later the EU).⁵¹

The EEC started as a trade liberalizing project with the ambition to eliminate barriers to trade among members, such as tariffs and quotas.⁵² Having removed most of these barriers during the 1960s, the members of the EEC realized that national standards and regulations, or technical barriers to trade, were the next significant obstacle to further economic integration and liberalization.⁵³ The patchwork of national standards slowed down the EEC's harmonization strategy, constituting a major barrier to further economic integration and innovation. Recent technological advancements in network technologies, including telecommunications,⁵⁴ further amplified the issue. The US was the first to liberalize its telecommunications sector, spurring European telecom providers' pressures to the EEC to reform its standardization system. Telecommunications manufacturers required a large, standardized market to compete with the US and Japan, while consumers demanded efficiency and lower costs.⁵⁵ The creation of a single European market in

⁴⁷ Yates and Murphy, *Engineering rules*, pp. 56, 92.

⁴⁸ Yates and Murphy, *Engineering rules*, p. 52.

⁴⁹ Yates and Murphy, *Engineering rules*, p. 196.

⁵⁰ Christoph Hermann, 'Neoliberalism in the European Union', *Studies in Political Economy* 79: 1, 2007, pp. 61–90 at p. 69, <https://doi.org/10.1080/19187033.2007.11675092>.

⁵¹ Craig Parsons, 'Showing ideas as causes: the origins of the European Union', *International Organization* 56: 1, 2002, pp. 47–84, <https://doi.org/10.1162/002081802753485133>.

⁵² Christian Frankel and Jean-Pierre Galland, 'Markets, standardization and innovation: reflections on the European Single Market', in Richard Hawkins, Knut Blind and Robert Page, eds, *Handbook of innovation and standards* (Cheltenham: Edward Elgar, 2017), pp. 287–301.

⁵³ Yates and Murphy, *Engineering rules*, p. 196.

⁵⁴ Jörg Huffschnid, ed., *Economic policy for a social Europe: a critique of neo-liberalism and proposals for alternatives* (London: Palgrave Macmillan, 2005), p. 59.

⁵⁵ Wayne Sandholtz, 'Institutions and collective action: the new telecommunications in western Europe', *World Politics* 45: 2, 1993, pp. 242–70 at p. 247, <https://doi.org/10.2307/2950659>.

the mid-1980s reinforced a push for further liberalization, particularly in network sectors. Restructuring the standardization system was central to achieving this, with the EEC announcing a 'new approach' to European standardization in 1985.⁵⁶

The New Approach to standardization fundamentally restructured the process by delegating the development of technical standards to three European standards organizations (ESOs); the European Committee for Standardization (CEN), the European Electrotechnical Committee for Standardization (CENELEC), and the European Telecommunications Standards Institute (ETSI).⁵⁷ Under the new approach, the EEC retained influence over the standards system through directives, which set out essential standards requirements for specific categories of products (health, safety, environment and consumer protection) or where the internal market was seen to be distorted.⁵⁸ The ESOs, in turn, were tasked with developing the technical details of the standards to meet the requirements set out in the directive, effectively linking EU regulation with technical standardization in a form of co-regulation between the EEC and the private sector.⁵⁹

The new approach was complemented from 1989 by the 'global approach'. This was a policy on testing, inspection and certification (TIC) that comprised the monitoring of standardization.⁶⁰ The global approach standardized the processes of product approval, allowing mutual recognition of different TIC practices across the EEC. The EEC's new approach and complementary policies have defined the EU approach to standardization, which is hierarchically ordered but co-regulated between the public and private sectors. The system was instrumental in the development of the European Single Market and, later, of Economic and Monetary Union.⁶¹

Despite these successes, however, the European approach to standards has faced several challenges. First, the *de facto* international power of consortia standards has challenged the formality of the *de jure* EU system.⁶² Moreover, the regional focus of ESOs has sometimes restricted their capacity to standardize globally. This is true especially for organizations like CEN and CENELEC, while ETSI has managed to attract a global membership base.⁶³ The EU standardization system has also indirectly generated asymmetries between consumers and small and medium

⁵⁶ European Council, 'Council Resolution of 7 May 1985 on a new approach to technical harmonization and standards', *Official Journal of the European Communities* No. C 136/1, 4 June 1985, [https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31985Y0604\(01\)](https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31985Y0604(01)).

⁵⁷ Michelle Egan, *Constructing a European market: standards, regulation, and governance* (Oxford: Oxford University Press, 2001).

⁵⁸ Michelle Egan, 'Regulatory strategies, delegation and European market integration', *Journal of European Public Policy* 5: 3, 1998, pp. 485–506 at p. 493, <http://dx.doi.org/10.1080/135017698343938>.

⁵⁹ Jacques Pelkmans, 'The new approach to technical harmonization and standardization', *Journal of Common Market Studies* 25: 3, 1987, pp. 249–69, <https://doi.org/10.1111/J.1468-5965.1987.TB00294.X>; Jane Winn and Nicolas Jondet, 'A "new approach" to standards and consumer protection', *Journal of Consumer Policy*, vol. 31, 2008, pp. 459–72, <https://doi.org/10.1007/S10603-008-9086-1>.

⁶⁰ European Commission, 'A global approach to certification and testing quality measures for industrial products', *Official Journal of the European Communities*, No. C 267/3, 19 Oct. 1989, <https://op.europa.eu/en/publication-detail/-/publication/e70b5934-a63e-4438-ab1e-407b009184ad/language-en>.

⁶¹ Egan, *Constructing a European market*.

⁶² Patrick Van Eecke and Maarten Truyens, 'Standardization in the European information and technology sector: official procedures on the verge of being overhauled', *Washington Journal of Law, Technology & Arts* 5: 3, 2009, <https://digitalcommons.law.uw.edu/wjlta/vol5/iss3/1>.

⁶³ Van Eecke and Truyens, 'Standardization in the European information and technology sector'.

enterprises—both of which groups have lacked a seat at the table—on the one hand, and large companies on the other.⁶⁴ These challenges, coupled with the rise of China in standard-setting, has prompted a rethinking on the role of standardization for the EU's competitiveness, which is outlined in the 2022 *EU strategy on standardisation* (hereafter 'the Strategy').⁶⁵

The *Strategy* organizes references to standard-setting that are scattered in other EU policy documents.⁶⁶ It highlights the strategic dimension of standardization as a means to gain competitive advantage and recognizes standards as the essential building blocks of a competitive European industrial policy.⁶⁷ The *Strategy* also refers to a 'global race for digital leadership' where 'many third countries are taking an assertive stance to standardisation, providing their industries with a competitive edge in terms of market access and technology roll-out'.⁶⁸ Moreover, the *Strategy* calls for efforts 'to ensure that [standardization] promotes EU interests and values',⁶⁹ stressing the role of standards in projecting norms and values abroad. In this sense, the plan to fund standardization projects in several African countries through the Global Gateway (a European version of China's Belt and Road Initiative—BRI), which will mobilize €300 billion in public and private funds by 2027⁷⁰—should be interpreted as an attempt by the EU to regain international influence and offset China's presence in the region.⁷¹

External geopolitical pressures are not the only challenge to the EU's competitiveness in standard-setting. The *Strategy* also mentions the influence of the (mostly non-European) corporate sector, particularly in emerging technologies. ETSI, for example, is singled out as allowing 'an uneven voting power to certain corporate interests'.⁷² To offset the double challenge of a dominant corporate sector and more assertive 'third countries', the *Strategy* calls for a greater role for the EU and national standardization bodies. This is, ultimately, the essence of a 'strategic' turn in European standardization in areas including semiconductors, data spaces and

⁶⁴ Egan, 'Regulatory strategies, delegation and European market integration'; Winn and Jondet, 'A "new approach" to standards and consumer protection'; Yates and Murphy, *Engineering rules*, p. 260.

⁶⁵ European Commission, *An EU strategy on standardisation*.

⁶⁶ See European Commission, *A new industrial strategy for Europe* (Brussels: European Commission, 2020), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0102&from=EN>; European Commission, *The EU's cybersecurity strategy for the digital decade* (Brussels: European Commission, 2020), <https://digital-strategy.ec.europa.eu/en/library/eus-cybersecurity-strategy-digital-decade-0>; European Commission, *A European strategy for data* (Brussels: European Commission, 2020), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066>; European Commission, *2021 strategic foresight report: the EU's capacity and freedom to act*, 2021, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2021:750:FIN>; European Commission, *An EU strategy on standardisation: setting global standards in support of a resilient, green and digital EU single market*, 2022, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022DC0031>.

⁶⁷ Michael E. Porter, *The competitive advantage: creating and sustaining superior performance* (New York: Free Press, 1985); Ganesh D. Bhatt and Varun Grover, 'Types of information technology capabilities and their role in competitive advantage: an empirical study', *Journal of Management Information Systems* 22: 2, 2005, pp. 253–77, <https://doi.org/10.1080/07421222.2005.11045844>; European Commission, *An EU strategy on standardisation*, p. 1.

⁶⁸ European Commission, *An EU strategy on standardisation*, p. 1.

⁶⁹ European Commission, *An EU strategy on standardisation*, p. 4.

⁷⁰ European Commission, *Joint Communication to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank: The Global Gateway*, JOIN(2021) 30 final, 2021, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021JC0030>.

⁷¹ European Commission, *An EU strategy on standardisation*, p. 7.

⁷² European Commission, *An EU strategy on standardisation*, p. 4.

more.⁷³ To restore the influence of European stakeholders in ESOs, the *Strategy* proposes an amendment to the existing Regulation on standardization.⁷⁴ As a result, standardization requests from the Commission to ESOs will be handled exclusively by member states' delegates from the NSBs, effectively excluding non-European players from ruling on matters of strategic interest.⁷⁵ Further, an EU 'excellence hub', led by a chief standardization officer, will ensure better coordination of standardization activities within the EU, while a High-Level Forum bringing together representatives of member states, ESOs, NSBs, industry, civil society and academia will advise on standardization priorities.⁷⁶

The EU standards *Strategy* can be seen as a strategic adjustment in the face of a more contested international system. However, while the *Strategy* is in tune with the EU's technological ambitions, it also presents it with a balancing act. In fact, political competition over digital standards can potentially come at the expense of interoperability—the ability of computer software or systems to work together—which the EU continues to champion, and which has benefited the single market and the global economy at large. Ultimately, a strategic approach to standardization that preserves such objectives will entail, first and foremost, a careful equilibrium between competition on the one hand, and continued cooperation with rival states on the other.

Chinese standards strategy: a holistic approach to China's future

In order to spur high-quality development and comprehensively build China into a modernized socialist country in an all-round way, there is an urgent need to further strengthen standardization.

*National standardization development outline, 2021*⁷⁷

In contrast to the bottom-up approaches of the US and EU, China's system of standardization has historically developed from the top down. This dynamic is a common feature of developing countries, where governments drive standardization as a means to promote economic development.⁷⁸ This flipped logic to standardization, centred around industrial policy, is the foundation of contemporary Chinese strategy.

Prior to 1978, Chinese standardization was entirely coordinated by the government in the planned economy.⁷⁹ With the rise of Deng Xiaoping and China's

⁷³ European Commission, *The 2022 annual EU work programme for European standardisation* (Brussels: European Commission, 2022), <https://ec.europa.eu/docsroom/documents/48601>.

⁷⁴ European Commission, 'Regulation No 1025/2012 of the European Parliament and of the Council on European standardisation, L316/12', *Official Journal of the European Union*, No. L 316/12, 14 Nov. 2012, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R1025&from=EN>.

⁷⁵ European Commission, *An EU strategy on standardisation*, p. 2.

⁷⁶ European Commission, *An EU strategy on standardisation*.

⁷⁷ People's Republic of China, *National standardization development outline*, transl. by Center for Security and Emerging Technology, 2021, https://cset.georgetown.edu/wp-content/uploads/to406_standardization_outline_EN.pdf.

⁷⁸ Wang Ping, *A brief history of standards and standardization organizations: a Chinese perspective* (Honolulu, HI: East-West Center, 2011), <https://www.eastwestcenter.org/publications/brief-history-standards-and-standardization-organizations-chinese-perspective>, p. 13.

⁷⁹ Wang, *A brief history of standards and standardization organizations*.

subsequent economic reopening, the country started to engage with international standardization in the ISO.⁸⁰ The Standardization Law of 1988 structured the Chinese standardization system into four distinct levels: national, industry, local and enterprise. All levels, except enterprise standards, were developed entirely by the government in technical committees.⁸¹ Influenced by the standardization systems of developed economies, China introduced the concept of voluntary standards in its 1988 Law.⁸²

Throughout the 1980s and 1990s, China was primarily a standards taker, following a ‘copycat’ policy of adopting international standards rather than developing its own.⁸³ This initial period of reform was capped off by China’s accession to the World Trade Organization (WTO) in 2001. China was motivated to join the WTO to improve market access for Chinese products. Yet the country found itself facing a new set of barriers and costs in the form of technical regulations, standards and intellectual property (IP) licensing fees.⁸⁴ This experience profoundly reshaped China’s approach to industrial policy, with the country adopting a catch-up standards strategy bent on fostering indigenous innovation.⁸⁵ The imperative of indigenous innovation emphasized the need to develop Chinese standards, based on Chinese technologies, with Chinese-owned IP rights.⁸⁶ This policy shift started a long-term cyclical process of review and development in Chinese standards strategy managed by the Ministry of Science and Technology, the Standardization Administration of China (SAC), and sector-specific government ministries.⁸⁷ The SAC’s 2006 *Outline of the eleventh five-year development plan for standardization (11FYDPS)* constituted the first major policy update of China’s standards strategy since 1988. The 11FYDPS specifically identified standardization as a basis for developing indigenous innovation in key sectors.⁸⁸ It incentivized sector-specific standardization strategies and the formation of foreign industrial alliances to foster ‘learning by doing’.⁸⁹ The policy also called for greater involvement of the private sector in standardization and encouraged active engagement with international SDOs.⁹⁰ But despite the tilt towards market standardiza-

⁸⁰ Yates and Murphy, *Engineering rules*.

⁸¹ Wang, *A brief history of standards and standardization organizations*, p. 21.

⁸² Ping Wang, *Global ICT standards wars in China, and China’s standard strategy*, paper given at workshop on ‘Asia’s rise in global standardization’, Yonsei University, Seoul, 2013, pp. 1–20.

⁸³ Wang, *Global ICT standards wars in China, and China’s standard strategy*, p. 3.

⁸⁴ Dieter Ernst, *Indigenous innovation and globalization: the challenge for China’s standardization strategy* (La Jolla, CA and Honolulu, HI: Centre for International Governance Innovation and East-West Center, 2011), <https://www.eastwestcenter.org/sites/default/files/private/ernstindigenouinnovation.pdf>, p. 19.

⁸⁵ Wang, *Global ICT standards wars in China, and China’s standard strategy*, p. 13.

⁸⁶ Piergiuseppe Pusccheddu, ‘*Hic sunt dracones?* Mapping the legal framework of China’s innovation policy: standardization and IPRs’, *International Review of Intellectual Property and Competition Law*, vol. 51: 5, 2020, pp. 559–93, <https://doi.org/10.1007/s40319-020-00945-8>; Filippo Gualtierio Blancato, *Regulate to dominate: the geopolitics of standard-setting in digital technologies and its strategic implications for the EU* (Bruges: United Nations University Institute on Comparative Regional Integration, 2019), <https://cris.unu.edu/regulate-dominate-geopolitics-standard-setting-digital-technologies-and-its-strategic-implications>.

⁸⁷ Ping Wang, Yiyi Wang and John Hill, *Standardization strategy of China—achievements and challenges* (Honolulu, HI: East-West Center, 2010), <https://www.eastwestcenter.org/publications/standardization-strategy-china-achievements-and-challenges>.

⁸⁸ Ernst, *Indigenous innovation and globalization*, p. 19.

⁸⁹ Wang, *Global ICT standards wars in China, and China’s standard strategy*, p. 13.

⁹⁰ Ernst, *Indigenous innovation and globalization*.

tion, Chinese enterprises continued to respond to the priorities set out by the Communist Party of China.⁹¹ During the 2000s, China tried to internationalize its own national standards in technology areas, most notably with the WAPI Wi-Fi standard and the TD-SCDMA 3G telecoms standard.⁹² While these efforts have largely been deemed unsuccessful and costly, they provided valuable lessons about operating in the SDOs which have shaped China's contemporary approach to standard-setting.⁹³

China is now transitioning from an entirely top-down approach to standardization to a hybrid one defined by pragmatism. The deterministic struggle for global recognition as a nation with technological capabilities (at the very least) equal to the West remains the (unwritten) subtext of each successive industrial strategy; this becomes explicit in the industrial strategy update that was the most recent at the time of writing, the *14th five-year plan for promoting the high-quality development of the national standards system* (hereafter *14FYP*), which was released in December 2021.⁹⁴

Drawing from the China Standards 2035 strategy,⁹⁵ the *14FYP* aims to improve China's indigenous innovation and fast-track the promotion of Chinese standards internationally via a two-track approach. The first track entails increasing Chinese engagement and integration with the existing international standards system. The second track consists of creating an alternative to the existing system by spreading Chinese standards internationally.⁹⁶

Under the first track, Chinese firms are encouraged to engage with international SDOs.⁹⁷ This fulfils China's indigenous innovation objectives as, in order to play an active role in international technology standardization, Chinese firms must be at the forefront of innovation. In this sense, standards also represent a way for China to promote its domestic innovation, as shown by Huawei's globally leading role in international 5G standardization.⁹⁸

Under the *14FYP*, China commits to an 85 per cent rate of harmonization between domestic and international standards, although China's rate of adoption of international standards has actually decreased since a high point in 2008, being surpassed by the adoption of national standards.⁹⁹ Interestingly, the *14FYP* also

⁹¹ Ernst, *Indigenous innovation and globalization*, p. 27.

⁹² Kim, Lee and Kwak, 'The changing patterns of China's international standardization in ICT under techno-nationalism'; Pusceddu, 'Hic sunt dracones?'. See also Carl Shapiro and Hal R. Varian, 'The art of standards wars', *California Management Review* 41: 2, 1999, pp. 8–32, <https://doi.org/10.2307/41165984>.

⁹³ Ernst, *Indigenous innovation and globalization*; Kim, Lee and Kwak, 'The changing patterns of China's international standardization in ICT'; Wilson, 'A "China model?"'.

⁹⁴ People's Republic of China, *14th five-year plan for promoting the high-quality development of the national standards system* [2021], transl. by Center for Security and Emerging Technology, 2022, <https://cset.georgetown.edu/publication/14th-five-year-plan-for-promoting-the-high-quality-development-of-the-national-standards-system>.

⁹⁵ People's Republic of China, *National standardization development outline*.

⁹⁶ Mikko Huotari et al., *Decoupling: severed ties and patchwork globalisation* (European Chamber of Commerce in China, 2021), <https://meric.org/en/report/decoupling-severed-ties-and-patchwork-globalisation>, p. 51.

⁹⁷ People's Republic of China, *14th five-year plan*, p. 16.

⁹⁸ Ernst, *Indigenous innovation and globalization*; Kim, Lee and Kwak, 'The changing patterns of China's international standardization in ICT under techno-nationalism'.

⁹⁹ Business Europe, *The EU and China: addressing the systemic challenge* (Brussels: Business Europe, 2020), <https://www.besnesseurope.eu/publications/eu-and-china-addressing-systemic-challenge>, p. 85.

commits to the provision of translations into other languages of domestic standards in areas that are not harmonized with international ones.¹⁰⁰ Strategically, while this fulfils China's indigenous innovation objectives, it also makes Chinese domestic standards accessible for foreign partners in an increasingly complex supply chain. It consequently increases China's influence over the international standards system through the de facto spread of Chinese standards, and reduces the dependence of Chinese firms on foreign technology.¹⁰¹

Alongside the first track of the *14FYP* (Chinese firms being supported and encouraged to engage with international SDOs), China pursues a second track to create an international standardization system based on Chinese values.¹⁰² This second track stresses the need to expand 'win-win' cooperation and international standardization linkages based on China's national standards.¹⁰³ The BRI is the state's flagship initiative for achieving this.¹⁰⁴ The *14FYP* places emphasis on fostering cooperation with countries that are part of the BRI's sphere of influence, with an emphasis on economic groupings like the BRICS.¹⁰⁵ The focus is on those economies at the margins of the existing technology standardization system or that are excluded from it due to a lack of resources, indigenous industry partners or technical expertise.¹⁰⁶ This track demonstrates China's intent to leverage its growing geopolitical influence to establish a separate system of international standardization based on Chinese values.¹⁰⁷ In other words, China's two-track approach involves engaging with the existing system led by the US and EU while developing a political and economic space for a Chinese alternative.

The *14FYP* also outlines China's plans to expand the role of the private sector in standard-setting.¹⁰⁸ This is representative of China's increasingly hybrid approach to standardization, which attempts 'to combine bottom-up and top-down approaches'.¹⁰⁹ In doing so, it seeks to harness the efficiencies of bottom-up approaches while maintaining the control of the top-down model.¹¹⁰ The bottom-up element of this hybrid approach is evident in the role granted by the strategy document to 'social organizations'—that is, groups of private companies that loosely resemble the US consortia model for standards development.¹¹¹

¹⁰⁰ People's Republic of China, *National standardization development outline*, p. 4.

¹⁰¹ Ernst, *Indigenous innovation and globalization*, p. 5.

¹⁰² Huotari et al., *Decoupling*, p. 51.

¹⁰³ People's Republic of China, *14th five-year plan*.

¹⁰⁴ Barry Naughton, 'Chinese industrial policy and the digital Silk Road: the case of Alibaba in Malaysia', *Asia Policy* 15: 1, 2020, pp. 23–39, <https://doi.org/10.1353/ASP.2020.0006>.

¹⁰⁵ People's Republic of China, *14th five-year plan*, p. 17. BRICS stands for Brazil, Russia, India, China and South Africa.

¹⁰⁶ Sinan Ülgen et al., *Rewiring globalization* (Washington DC: Carnegie Endowment for International Peace 2022), <https://carnegieeurope.eu/research/2022/02/rewiring-globalization>, p. 116.

¹⁰⁷ Rebecca Arcesati, 'Competing with China in the digital age', in Mikko Huotari, Jan Weidenfeld and Claudia Wessling, eds, *Towards a 'principles first approach' in Europe's China policy: drawing lessons from the COVID-19 crisis* (Berlin: Mercator Institute for China Studies, 2020), <https://mercis.org/en/report/towards-principled-competition-europes-china-policy/3-competing-china-digital-age>.

¹⁰⁸ People's Republic of China, *14th five-year plan*, p. 3.

¹⁰⁹ People's Republic of China, *14th five-year plan*, p. 14.

¹¹⁰ Wilson, 'A "China model?"'.

¹¹¹ People's Republic of China, *Standardization Law of the People's Republic of China*, 2018, http://ncse.sac.gov.cn/sacen/law/201801/t20180102_340493.htm; Wilson, 'A "China model?"'.

It is also worth noting that China assigns to standards a number of functions, including ‘industrial promotion, industry administration, market access, and quality supervision’.¹¹² This expansive definition is an insight into how the Chinese state sees standards as tools for controlling and coordinating the country’s private and public sectors to achieve national strategic objectives. These functions also indicate that, despite signalling a greater role for the private sector, China’s standards strategy remains fundamentally led by the Chinese government.

The *14FYP* aims to enhance domestic standardization with a focus on three areas: innovation, cyber security and standardization quality. There are consistent references to the importance of fostering innovation in science and technology and translating new innovations into standards.¹¹³ To achieve this, the strategy plans to build government laboratories for testing, inspection and certification, as well as developing market-oriented professional standardization services similar to their European counterparts. Through the rapid conversion of innovative technologies into national standards that can support real-world applications, China is aiming to support a cyclical process of industrial and technological upgrading.¹¹⁴ High on the agenda is also a transition from quantity to quality. Some Chinese firms are known for submitting a high volume of low-quality standards for review in international SDOs.¹¹⁵ The *14FYP* puts in place a form of quality control specifically aimed at reducing development times for national technology standards, while also seeking to tighten the systems and services that manage and monitor standard quality.¹¹⁶

China has also moved from opposing IP rights and licensing fees connected to technology standards to actively supporting them. This transition is representative of China’s move from a ‘catch-up’ strategy to a ‘first mover’ one, akin to the approach of established technological powers like the US.¹¹⁷ However, while China has increased its support for IP licensing fees, it also seeks to lower the value of such fees to suit Chinese firms’ profit strategies, which tend to focus on volume of sales rather than high returns on IP. This revisionist approach is viewed by the US as a threat to the profit model of US technology firms, hence it is expected to become a point of contention between the two polities.¹¹⁸

The overarching takeaway from the *14FYP* is that China intends to continue pursuing a sovereignty-based approach to new and emerging digital technologies. This could affect the openness of the Chinese market to foreign firms providing products and services in these areas.¹¹⁹ Ultimately, China’s strategy is pragmatic. It serves key domestic industrial capacity development aims while, at the same time,

¹¹² People’s Republic of China, *14th five-year plan*, p. 4.

¹¹³ People’s Republic of China, *14th five-year plan*.

¹¹⁴ People’s Republic of China, *14th five-year plan*.

¹¹⁵ U.S.–China Economic and Security Review Commission, *2020 report to Congress*; Wilson, ‘A “China model?”’; Ding, ‘China’s growing influence over the rules of the digital road’, p. 39; Neaher et al., *Standardizing the future*.

¹¹⁶ People’s Republic of China, *14th five-year plan*, p. 4.

¹¹⁷ Kim, Lee and Kwak, ‘The changing patterns of China’s international standardization in ICT under technological nationalism’, pp. 102–45.

¹¹⁸ U.S.–China Economic and Security Review Commission, *2020 report to Congress*, p. 107.

¹¹⁹ Jost Wübbeke et al., *Made in China 2025: the making of a high-tech superpower and consequences for industrial countries* (Berlin: Mercator Institute for China Studies, 2016), p. 56, <https://merc.org/en/report/made-china-2025>; Wilson, ‘A “China model?”’.

it uses domestic standards as a means of exerting ‘a basis for macro-control [via] industrial promotion [over] industry administration, market access, and quality supervision’.¹²⁰ In doing so, it limits private-sector autonomy and innovative capacity, leveraging both international and domestic standard-setting practices to cement China’s place as a global technology power. Viewed this way, executing China’s ambitious five-year plan will require a fine balancing act between supporting indigenous innovative potential on the one hand and retaining its digital sovereignty on the other. Regarding the latter, China will take care that any protectionist tendencies do not discourage the engagement of international actors and markets, thereby reinforcing its increasing market power in the international digital economy that is rapidly emerging as one of its key bargaining chips.

Conclusion

This article has shown that the standardization strategies of the US, the EU and China reflect the unique historical contexts in which they were developed. Each strategy expresses a particular vision of innovation and competitiveness defined by different strategic priorities. The US has historically relied on a bottom-up, *laissez-faire* corporate-led strategy, which has successfully driven their ‘first-mover’ advantage. Market-driven solutions with minimal government intervention, as well as well-funded initiatives and a focus on the promotion of the US technology sector in growing markets, have been effective to ensure US technological dominance in the past decades. However, the US is now pivoting away from its traditional approach towards a more hybrid one to counter the rise of China. This is driven by a recognition that an open economic approach, coupled with an over-reliance on the private sector in emerging technology (artificial intelligence, Internet of Things, autonomous vehicles and quantum computing) has been exploited by China to catch up in these areas.

Conversely, China has historically relied on a top-down approach to standardization but is now shifting to one that combines greater private-sector participation with strong government coordination. China’s attempt to align its tech entrepreneurs to state ambitions is part of the country’s objective to become an influential rule-maker in emerging technologies. To this end, China is both attempting to increase its influence in existing standard-setting organizations and seeking to establish an alternative sphere of influence based on Chinese standards and values. Its dual approach of developing both domestic and international standards is based on a downstream view of how the size of the Chinese market will lead to the international adoption of Chinese standards. The expectation is that those that are investing in the Chinese market will find it in their own interests to align with Chinese-developed tech standards. In this sense, the Chinese approach to standards is part of a wider geopolitical competition with the US and the EU and it will be one of the defining fields of contention in the race to set the rules of emerging technologies.

¹²⁰ People’s Republic of China, *14th five-year plan*, p. 4.

Finally, the EU is seeking a third way to pursue a competitive standard-setting strategy without sacrificing international cooperation. Presumably, the EU will align its interests with the US while leaving space for its own indigenous technology sectors to grow. In other words, the EU will seek to square its technological ambitions with its ethos of transcending technical barriers and promoting interoperability.

Our historical overview has shown that, while these three polities have different priorities and face distinct challenges, they all seem to converge towards a greater role for governments in standard-setting. This does not mean that the private sector will not be influential. Indeed, as shown by recent advancements in emerging technologies, the private sector has unrivalled resources and expertise to invest and drive forward innovation. But as technology becomes the terrain of heightened geopolitical competition, we can expect states to carve more space for them to identify and set standardization priorities, facilitate coordination and direct investments. In other words, we can expect standard-setting to become more political.

From an academic and policy perspective, understanding the politics of technology standards requires deepening interdisciplinary skills and softening disciplinary silos that prioritize specialization over synthesis. The historical analysis in this article, as well as the analysis of contemporary power dynamics, has put current events into perspective and outlined possible future trajectories. Ultimately, this approach allows us to recast claims of technological progress being 'good' or 'neutral', and promotes the view that technology is indeed political.