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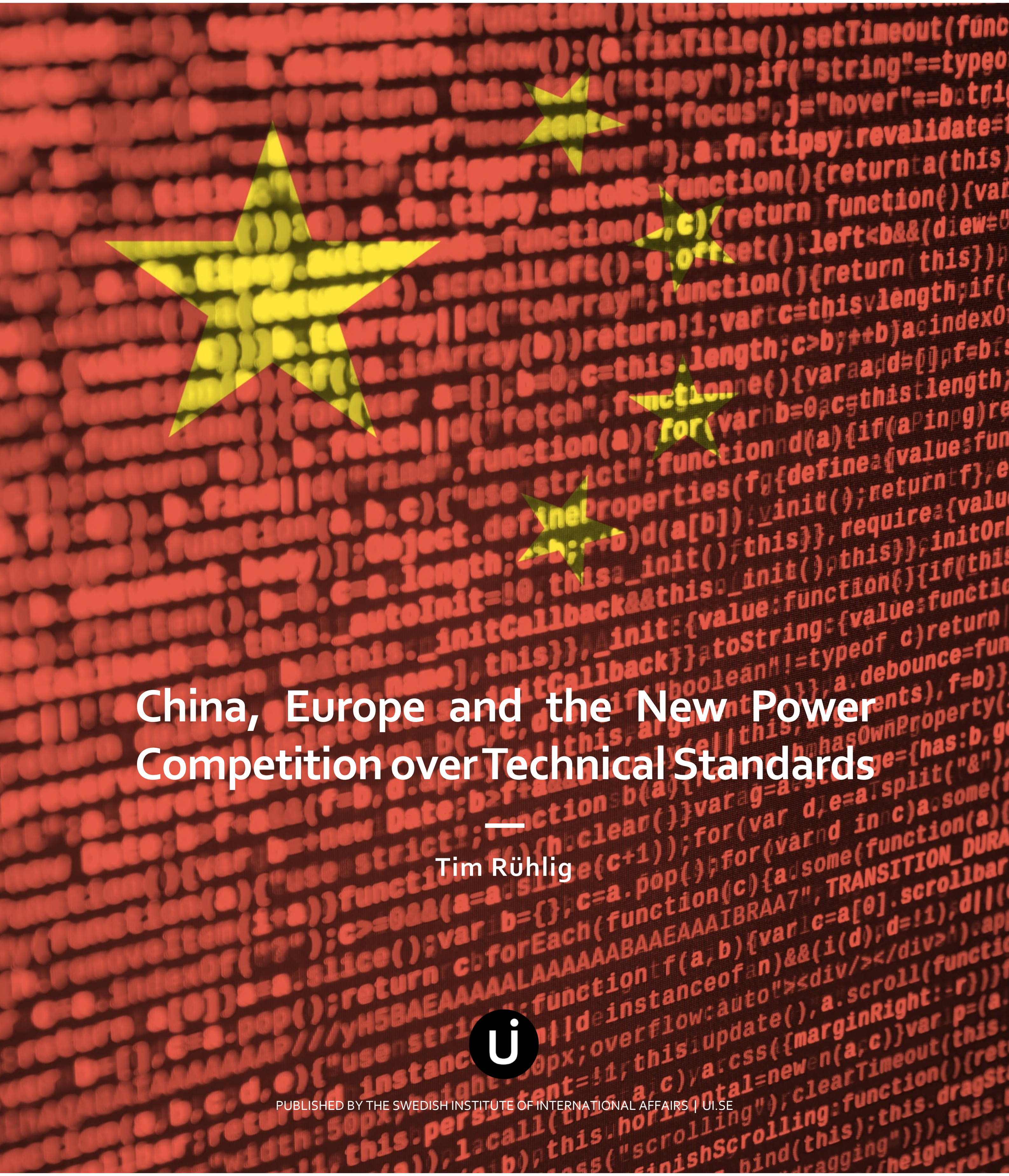

China, Europe and the New Power Competition over Technical Standards

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Abstract

Technical standards, which have long been treated as non-political product specifications, are be-coming the subject of power rivalry. This is the result of: (a) broader competition between China and the United States over key enabling technologies; (b) a more state-directed approach to technical standards in China; and (c) the often-overlooked power potential inherent in technical standards. Technical standardization's transformation into an arena for power competition has challenged the European Union (EU), which has traditionally punched above its economic weight and held and still holds enormous influence over international technical standards. This paper unpacks the growing power rivalry over technical standards, develops a concept of "technical standardization power" and explains how China has successfully utilized its party-state-permeated economy to increase its technical standardization power. Finally, it summarizes the implications for the EU, outlines a number of scenarios and makes recommendations for Europe.

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Introduction

Standards support acceleration of our domestic economic reform and our international status. […] Technical standardization will help spread Chinese wisdom to the world and contribute to the construction of a multipolar world.
- Senior Chinese national ministry official, Qingdao, October 2019

Geo-economic rivalry is back on the international agenda, including competition for the lead in high technology and innovation. Within this field, albeit largely overlooked, technical standards risk becoming a major battlefield with far-reaching consequences. Only a few years ago, technical standards were seen purely as non-political enablers of globalization. While companies competed over technical standards, with some minor exceptions, they did not appear to be an area of concern to states.

This is hardly surprising since technical standards are voluntary product specifications developed by industry. For example, USB is a standard for cables, connectors and protocols that enables charging and the exchange of data on a wide range of devices. Similarly, Wi-Fi is a family of radio technologies built on technical standards that allow for wireless local area networking of a wide range of technological equipment. Technical standards allow products of all kinds to be applicable in a wide range of contexts across countries and manufacturers. They create interoperability and guarantee basic safety. Hence, technical standards facilitate globalization and international trade.

The inherent commercial force of technical standards has always been beyond doubt. Products that do not comply with technical standards cannot be sold on world markets because they only work in isolation and not in concert with other products. In most cases, states had no interest in these commercial implications. In recent years, however, states have rediscovered the power potential of technical standards, which had once been utilized by nation states in the late 19th and early 20th century. The recent trend is the result of three factors.

First, we are witnessing a broader trend of emerging competition over key enabling technologies between the United States (US) and the People's Republic of China (PRC). Second, the PRC has adopted a very different approach to technical standardization. In the West, technical standards are developed by private sector standards developing organization (SDOs) in what is at its core *private self-regulation*. In Information and Communication Technologies (ICT) standardization consortia, for example, commercial entities make up more than 90% of the membership. In Europe, the role of public agencies (state organs and the European Commission) is limited to licensing a small number of SDOs. In Sweden and at the European level, only three organizations are allowed to develop national and European standards, respectively. In the US, the role of government is even more limited. The Chinese standardization system, by contrast, is a state-steered one. For many years, it was entirely controlled by the Chinese party-state. A new standardization law of 2018 has supplemented the state tier of standardization with a "market" tier. However, even this market tier is subject to considerable party-state influence. This makes technical standardization part of the Chinese party-state's strategic industrial policymaking and turns it into a *political* tool. China's growing footprint in international technical standardization has sparked international interest in and concern over the Chinese approach. Third, and as a result of the first two trends, the power potential of technical standards has come to the notice of Chinese and US leaders.

As long as technical standards appeared non-political, European actors have been able to punch above the continent's economic weight. Recent developments endanger the European Union's (EU) stronghold in technical standardization and will require the EU to readjust its standardization policy.

This UI Brief explores how technical standardization is a source of economic, legal, political and discursive power in international relations, and summarizes China's increasing standardization power. It explains the fundamental differences between China's state-steered and the European private sector-led standardization systems and describes how the PRC is utilizing the characteristics of its party-state-permeated economy to gain technical standardization power. The paper closes with a discussion of the implications for the EU, outlines various scenarios and makes policy recommendations for Europe.

Technical standards: a potential source of power?

At first glance, technical standards might appear non-political. They are developed from discussions among leading engineers in their field in a search for efficient solutions to common challenges to generating interoperability and basic safety. A closer look, however, reveals that they can be far more than technical specifications. Below, I develop the concept of *technical standardization power* in order to outline how technical standards confer power in at least four dimensions: the economic, legal, political and discursive.

Economic dimension: A large proportion of technical standards is made up of patented technology. Around 55% of all ICT standards are patented technology in widely applied in fields such as telecommunications, e-commerce, electronics, the life sciences, the health sector, manufacturing and the automotive sector. One-third of the entire new generation wireless technology, better known as 5G, is believed to consist of standardized patented technology. At first glance, this might be surprising since technical standards and patents exist for contrasting purposes. Patents protect inventions and prevent competitors from utilizing new inventions. Technical standards, by contrast, spread technological solutions across manufactures in order to establish interoperability and guarantee basic safety. This contradiction is resolved through licensing schemes. Holders of patents that are essential for compliance with a technical standard, referred to as standard-essential patents (SEPs), commit to license their patented technology on fair, reasonable and non-discriminatory (FRAND) terms. While this framework guarantees that SEPs are available to all suppliers and not just to the patent holder, enormous amounts of royalty fees must be paid to the inventors of the innovative technologies underlying the respective SEPs. The Swedish technology giant, Ericsson, for example, earned €5.2 billion by licensing technology in 2017, accounting for more than 20% of the company's revenues.

The distributary effects of technical standards are not limited to the payment of royalties for SEPs. Companies that fail to establish their technological solutions as technical standards must redesign their products to comply with standards that generate interoperability. This results in switching or adaptation costs. Hence, those who successfully set international technical standards can expect royalties from SEPs and avoid adaption costs. Given the considerable size of both, the distributary effects resulting from technical standards affect competitiveness. Back in the late 19th century, Werner von Siemens already understood this when he stated that: "he who owns the standards, owns the market".

Legal dimension: International technical standards are voluntary technical specifications. Through the backdoor, however, these standards become part of international trade law. If domestic technical standards deviate from international standards, the judiciary of the World Trade Organizations (WTO) can find a state to be noncompliant with international trade law by violating the Technical Barriers to Trade (TBT) Agreement. Only if the respondent can provide a reasonable explanation for such deviations, such as specific requirements for the protection of human health and safety or environmental protection, are deviant standards deemed legal. This is more crucial than one might think given that around 80% of trade is affected by technical standards and associated technical regulations.

Domestically, technical standards can be referenced in legally binding documents, most often in regulations. For example, when regulations prescribe certain legally binding thresholds, technical standards can serve as a method for upholding the limits set in that regulation. In such a case, technical standards remain voluntary on paper but prescribe the easiest way for companies to ensure compliance with the legally binding regulation. Both internationally and domestically, voluntary standards can turn out to be effectively binding under the TBT Agreement or by being referenced in regulations.

Political dimension: Standards generate interoperability only in the area where they are applied. Hence, technical standards can create geographically bifurcated or fragmented technological areas. Competing contradictory standards result in a lack of global interoperability, creating lock-in effects.

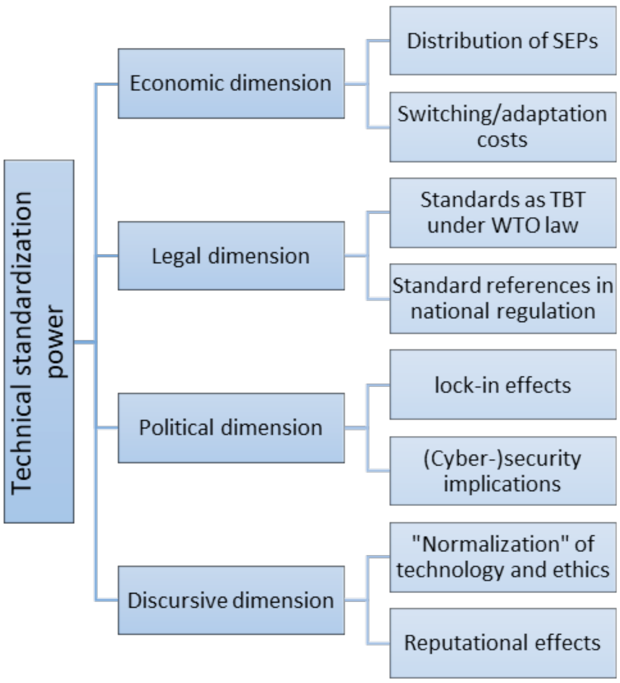

Figure 1: Dimensions of technical standardization power. Own graphic.

To date, for example, technical standards in the railway sector remain largely national or regional. If country A were to adopt the national railway standards of country B, however, ranging from track gauges to traction technical parameters and voltage, the maintenance and further buildout of the railway cannot be carried out by suppliers other than those based in country B. Other manufacturers will be producing using deviant technical standards; their products would simply not be compatible. Country A is therefore locked into country B's technology and fully reliant on suppliers based in country B.

Railways are a critical infrastructure, enabling the flow of goods and people as well as generating welfare and mobility. A lock-in effect in such a critical sector would have political implications. As the only host to suppliers that are compliant with their respective technical standards, Country B could ask country A for political concessions in return for the maintenance and buildout of its critical infrastructure. Even if country B does not explicitly ask for such concessions, country A would think twice before adopting a confrontational stance on issues of core interest to country B in fear of the consequences for the functioning of its critical infrastructure.

Apart from such lock-in effects, some experts controversially suggest that technical standards have the potential to impinge on what is often regarded as the crown jewels of state power: security. Some observers argue that those who develop a technology are likely to have a deeper knowledge of how it works, including its vulnerabilities. Once internationally standardized, this technology spreads globally. When this concerns critical digital infrastructure, the developer of the technology in question possesses prime knowledge of its flaws that can be used to undermine an adversary's security. Other observers counter that standardization is a process of maximum transparency in which it is hardly possible to hide security-relevant flaws from the eyes of the engineers of potential adversaries. From this perspective, a high degree of standardization even increases the (cyber-)security of the relevant products by providing international transparency. Whichever perspective is the most accurate, technical standardization influences the degree of (cyber-)security in critical digital technologies.

In sum, technical standards have political implications that stem from lock-in effects while also affecting the (cyber-)security of states.

Discursive dimension: How technology is designed is highly political as it inscribes ethical values to it. Technology does not exist in a vacuum, divorced from the political. Technical standards are of importance in this regard since they formulate a "basic recipe" by setting the general rules by which different manufacturers develop specific products. Hence, technical standards shape what is perceived as "normal" technology.

Today, for instance, we are used to Wi-Fi as the dominant standard for wireless local area networks (WLAN). This, however, was by no means a given. A few years after Wi-Fi was adopted as the international standard, the rival WAPI technology was proposed as a new standard. It promised better performance but provided worse privacy compared to Wi-Fi. WAPI met considerable resistance and finally failed to become an international standard, largely due to procedural issues. Whether intentionally or not, by rejecting WAPI, international standards bodies prioritized privacy over performance, shaping what consumers and manufacturers around the globe can expect from WLAN technology. This is not an isolated example. At a time when emerging technologies are increasingly penetrating all spheres of public and private life, ethical, political and security questions are playing a growing role in technical standardization.

Algorithmic bias, transparency in algorithmic decision making and data privacy are just three examples of ethical underpinnings in technical standardization. The discursive power implications of technical standardization are not limited to its underlying ethical values. If a country can shape international technical standardization it is likely to gain a reputation as a credible and important power in world affairs. It is a sign of technological supremacy since technical solutions are accepted as international standards, in a sign of societal progress beyond economic and military prowess.

In addition to the economic, distributary, legal and political implications, the ability to shape international technical standardization provides a source of power since it helps to "normalize" future technology, inscribes political values and boosts a state's image as a technological leader. Technical standardization can be a source of power for states. It is therefore no wonder that it has become one of the most crucial arenas of the emerging power rivalry over technology.

China: a technical standardization power?

Over the past decade, China has acquired considerable technical standardization power. At the governance level, China is taking on more and more leadership positions in international technical standardization organizations (see box 1). While still considerably behind Germany, the US, France, the United Kingdom and Japan, China is gaining more and more of the influential secretariat positions on Technical Committees, Subcommittees and Working Groups in the International Standardization Organization (ISO) and the International Electrotechnical Committee (IEC). In the International Telecommunications Union (ITU), the PRC has gained leadership positions in the Telecommunication Advisory Group, study groups and focus groups. In the General Assembly of the Third Generation Partnership Project (3GPP), another international technical standardization organization focused on telecommunications standards, Chinese companies hold around 25% of the votes. Companies from all the European states combined have around one-third of the votes.

BOX 1: CHINESE LEADERSHIP IN SDOS

ISO

2008: China becomes a permanent member of the ISO Council.

2013: China becomes a member of the ISO Technical management Board.

2015–18: Zhao Xiaogang is the first Chinese citizen to serve as ISO president

IEC

Since 2020: Zhu Yinbiao is the first Chinese citizen to serve as IEC President. He was previously Vice President.

ITU

2015–2023: Zhao Houlin is the first Chinese citizen to serve as ITU Secretary General. He was previously Deputy Secretary General.

China's successful efforts to influence international technical standardization organizations have not been matched by a growing willingness to adopt international standards in China. At the end of the 1990s, up to 70% of new standards in the PRC were adopted from international standardization organizations. In 2005, the share of international standards stood at 54%. The proportion had declined still further to no more than 21% by 2017. This indicates that the PRC's engagement is not the result of an appreciation or acceptance of established institutional frameworks. Instead, existing international standardization organizations appear to be a platform that China can use to project its power. It is not international standards that are the core motivation for China's standardization engagement, but its craving for power.

This is even more visible in China's international technical standardization activities outside the established institutional framework. Most crucially, China's major infrastructure policy, known as the Belt and Road Initiative (BRI), comes with a standardization component. In 2015, China's main macroeconomic agency, the National development and Reform Commission (NDRC), issued its first "Action Plan for the Harmonization of Standards along the Belt and Road". At the end of 2017, the NDRC published another action plan setting further benchmarks to be fulfilled by the end of 2020. As part of the plan, China began to translate its domestic technical standards into foreign languages to facilitate their adoption in third countries. By September 2019, China had signed 90 bilateral agreements on technical standardization cooperation with 52 countries and regions.

Despite these impressive numbers, Chinese experts acknowledge that these broad agreements are vague and mostly no more than paper tigers. A major state-sponsored research project, "China Standards 2035", suggests transforming these agreements into a regional technical standardization organization, the BRI Standards Forum, that could develop BRI Regional Standards. If this plan were implemented, the new institution would be a potential rival that undermines existing international standardization organizations such as the ISO and the IEC. Another interpretation of the Chinese initiative is that the PRC is aiming to improve coordination with other BRI states in the BRI Standards Forum to make it more effective at influencing the ISO and the IEC. In addition to these institutional developments, many BRI projects rely on Chinese technical standards. It is through these projects that the PRC disseminates its domestic technical standards to third countries without submitting them to the established international SDOs.

China's growing footprint in international technical standardization organizations and the spread of its domestic standards within the BRI have boosted China's technical standardization power. *Economically*, China's share of SEPs declarations and of expected revenues has increased dramatically. For example, the share of Chinese SEPs declarations in connection with 5G is around one-third, compared to only around 7% in the previous generation of mobile technology, 4G/LTE.

The increase in China's share of SEPs has been accompanied by a larger impact on the technical standards that underpin future technologies linked to 5G. *Legally* speaking, noncompliance with these technical standards would be a violation of the TBT Agreement.

Politically, China's growing impact on 5G standards has raised concerns in the US about the potential cybersecurity implications. For example, the US Department of Defense is concerned that China's strong presence could focus 5G technology on low-frequencies while US manufacturers have prioritized high-frequencies (mmWave). There is a debate among US experts about whether high frequencies provide a greater degree of security for wireless communications, and there are concerns that US troops might need to rely on Chinese technology for their communications in overseas operations. Beyond 5G, China's BRI raises concerns about the political lock-in effects described above. In this context, several BRI railway projects financed by China's state-controlled financial institutions have raised concerns, such as the Jakarta-Bandung high-speed railway, the Abuja-Kaduna railway, the Ethiopia-Djibouti railway and the China-Laos railway. All these projects are based on domestic Chinese technical railway standards, which means that the respective countries must rely exclusively on Chinese suppliers to maintain and further build out their railway networks.

Discursively, China's expressed intention to invest in facial recognition standards and its proposal for a reformed standard internet protocol, referred to as New IP, have alarmed experts in Europe and the US. The fear is that Chinese standards proposals in both areas could restrict privacy to a greater extent than technically necessary. In developing countries, however, China's reputation as a digital innovation leader is improving.

China's standardization power: a result of state-steering?

China's growing technical standardization power is not just the result of its increased efforts to shape international technical standardization. Its state-steered standardization system has also played a role. China's recent domestic standardization law introduced a market-tier alongside the previously existing state-controlled standardization system, but even this market-tier is steered by the Chinese party-state. State-owned enterprises (SOEs) and privately owned national champions with close ties to the party-state, and defunct ministries serving as industry associations played a crucial role in the development of some of the most important technical standards developed in the "market tier". The state-permeated character of the Chinese economy more generally does not allow for a truly private sector-driven standardization tier.

Internationally, the PRC has made best use of the core characteristics of the specific structures of its party-state permeated economy to boost its technical, material and reputational capabilities that – in combination – have helped the country to shape international technical standardization.

Technical factors: Technical standardization processes are discussions by the engineers debating innovative technical solutions to the common problems that affect safety and interoperability. Technical expertise is a vital and necessary but – as discussed below – not a sufficient prerequisite for shaping international technical standardization. The PRC was less innovative than the industrialized countries for many years but this is changing rapidly. According to the EU Chamber of Commerce in China Business Confidence Survey, the proportion of European companies that perceive Chinese R&D competitiveness to be more favorable than the world average rose from 15% in 2016 to 38% in 2019. China's "digital competitiveness" has already overtaken that of the EU according to BuinessEurope calculations based on the IMD World Digital Competitiveness Ranking. This is largely the result of the party-state's prioritization of R&D and innovation, particularly in key enabling technologies such as electrical equipment, energy saving, digital connectivity and railways, which have received preferential treatment under the macro-industrial "Made in China 2025" framework.

Apart from prioritizing R&D, China's innovation and its impact on international technical standardization have profited from efforts to become an early if not the first mover, coupled with early commercialization. Of particular importance in this respect is to bridge the "valley of death" between fundamental research and obtaining commercial profits from new products and technologies based on that fundamental research. China has tackled this "valley of death" in key enabling technologies by easing regulation to allow quick rollout and by providing more long-term funding that allows innovative companies to put less pressure on a technology to become profitable. This has allowed Chinese technology companies to take greater risks when investing in innovation, and helped them to set international standards because they were able to illustrate the effectiveness of their technical standards proposals.

A third and final technical factor that was found to be decisive for an actor's ability to shape international technical standardization was the capacity to make regular contributions, resulting in active participation, and the ability to achieve leadership positions. The Chinese party-state has incentivized active participation by setting quantitative targets for SOEs and encouraging privately owned companies to do the same. At times, this has resulted in a lower quality of Chinese standardization proposals. Overall, however, the high proportion of Chinese standardization proposals has helped the country gain influence in international technical standardization.

Material factors: China's increased technical capabilities are largely the result of material factors, primarily massive investment. In contrast to the private sector-led SDOs in Europe and private sector companies, their Chinese counterparts benefit from state backing that comprises subsidies, soft loans, state-directed investment through Special Purpose Vehicles, preferential public and SOE procurement as well as systematic export credits that have similar effects to subsidies. Crucial to these mechanisms of preferential funding is the fact that China's financial sector is almost entirely controlled by the Chinese party-state. While the state-permeated character of the Chinese economy is not news, the role of the party-state has grown still further since Xi Jinping took office. Beyond the massive financial support for R&D and participation in standardization work, preferential access to data and a conducive regulatory ecosystem further contribute to the unlevel playing field between European and Chinese companies in the field of technical standardization.

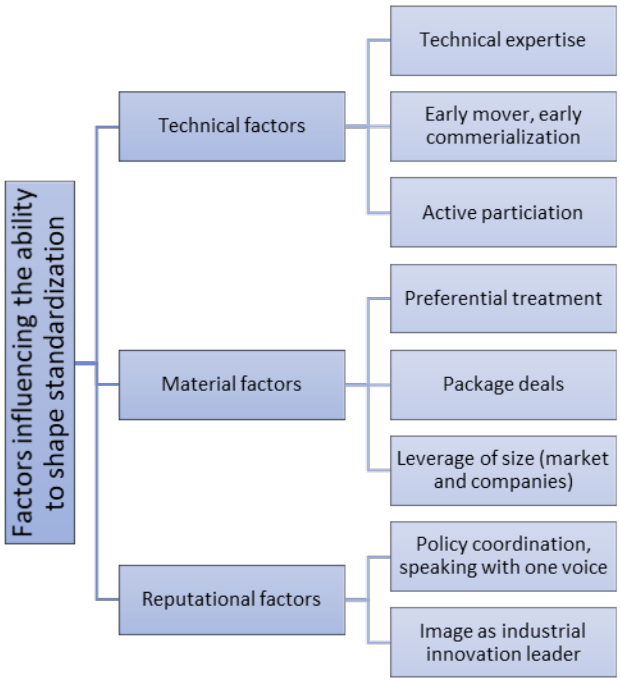

Figure 2: Factors influencing the ability to shape standardization. Own graphic.

Preferential financial support for Chinese standardization efforts from the party-state go beyond funding for R&D to include the conditioning of loans as part of the BRI. The PRC has adopted a practice of offering "package deals" that bind the granting of loans for major infrastructure projects to the adoption of Chinese technical standards. This incentivizes developing countries in particular, as they have a strong demand for Chinese funding. Chinese technical standards result in the lock-in effects described above as a political dimension of technical standardization power.

A third and final material factor stems from the empirical fact that larger economies and big companies have a higher impact on international technical standards than smaller markets and small and medium-sized enterprises (SMEs). Early commercialization in a large market such as the Chinese market sets examples for others to follow. SMEs may have a higher adoption ratio of their technical standards proposals but they usually lack the ability and resources to contribute to technical standardization to the same extent as large companies. SDOs are inclusive and easily accessible, but technical standards-setting is costly. It requires not only investment in R&D, but also lobbying work and regular participation in technical meetings. SDOs are fragmented and decentralized, involving many highly specific bodies that meet to negotiate all around the world. SMEs find it difficult to participate in a high number of such meetings and lack both the personnel and the resources to finance the travel involved. China has strengthened its national champions under President Xi Jinping. Over the past decade, the average size of Chinese industrial SOEs has increased from 923 million RMB in 2008 to 2.3 billion RMB in 2017. This works to the advantage of Chinese influence in international technical standardization, at least for as long as such national champions remain innovative.

Reputational factors: Research on technical standardization has revealed that a coordinated approach in international forums correlates with greater influence. While conflicts of interest among several actors within a state are the rule rather than the exception, the hierarchical structure of the Chinese party-state and the high degree of state permeation of the economy facilitate a strategic Chinese approach that allows Chinese actors to speak with one voice in international standardization bodies. While the unity of the PRC party-state and its political economy is often overestimated, by international standards, particularly in a field of national priority such as 5G, there is a fairly high degree of national coordination and cohesion. One example of such coordination is the IMT 2020 (5G) Promotion Group, which brings together Chinese public agencies, research institutes and Chinese tech companies. This helps boost the reputation of standardization proposals as collective ones, rather than just the particular interests and solutions of an isolated individual company.

More generally, China profits from its improving image as an industrial innovation leader. This is not just the result of the higher quality of the products and technologies "made in China". It has been further boosted by the strategic media outreach of Chinese state-owned media working in foreign languages. Highly symbolic technical standardization successes, such as the adoption of polar coding for the control panels of non-standalone 5G, further improve China's image and credibility.

Implications for Europe

The times of an unquestioned European stronghold for international technical standardization, which was treated as a non-political enabler of globalization and international trade are now over. Not only has the technological rivalry between the US and China turned technical standardization into an arena of competition, but China's state-steered approach is questioning technical standardization as an area of private sector self-regulation. The four-dimensional power potential of technical standardization has been exposed. For the international technical standardization system in general and the EU in particular, this has two major implications.

First, the politicization of technical standards runs the risk of turning standardization from a cooperative into a confrontational subject. This would alter the character of standardization. The more participants perceive standards to be political, the less developments will use technical criteria to identify the best technological solutions for resolving issues of interoperability. This will come with efficiency costs and hamper standardization as a driver of international trade and investment, and would be yet another blow to globalization. European companies and SDOs that have proved highly effective at playing the "cooperative standardization" model run the risk of diminished influence.

Second, the politicization of standardization divides actors into two camps. Established standardization powers such as Germany, France or the United Kingdom will aim to preserve the existing system. China appears to be in opposition to this group, in that it is a latecomer to the system and has not had the chance to shape its institutional framework. This increases the risk of a bifurcated international standardization order. Europe's approach, which rests more than in any other political entity on the idea of a unitary system of technical standardization, will not be able to continue unchallenged.

These two potential implications raise two related questions. First, will international technical standardization remain largely cooperative or will it become more competitive? Second, will the international technical standards order preserve a largely unitary institutional framework or become a bifurcated one? From these two questions, it is possible theoretically to devise four scenarios.

	Bifurcated institutional framework	**Preservation of existing, largely unitary institutional framework**
Mode of interaction: competition	(1) rivaling institutions	(2) dysfunctional institutions
Mode of interaction: cooperation	(4) harmonious coexistence	(3) institutional adaptation

Figure 3: Scenarios of future international technical standardization system. Source: own graphic.

The first scenario comes true if a bifurcated institutional system is combined with a competitive mode of action that prioritizes relative over absolute gains. The result would be rival institutions.

The second scenario becomes a reality if China and Europe perceive technical standardization mostly as a field of competition, and aim for relative gains over absolute gains but remain within an existing international institutional framework. This scenario would essentially lead to dysfunctional standardization institutions. Since it is unlikely that a dysfunctional institutional framework would last long, this scenario is unlikely remain stable.

In the third scenario, the existing institutional framework is not only preserved, but continues to run in a cooperative mode that prioritizes absolute over relative gains. In this scenario, institutional adaptations can be expected, given that China's influence will continue to increase, and the PRC has a state-steered approach to standardization in contrast to the currently dominant private sector-led self-regulation. Hence, the existing system would undergo gradual rather than radical change.

The fourth scenario emerges if a bifurcated institutional framework continues to adopt a cooperative mode of action. This scenario is fairly unlikely. The normative force of technical standardization lies in its promise to create global interoperability. It is hard to imagine that two technical standardization bodies would exist in a single field without striving to establish the global validity of their standards, placing the two institutions in a relationship of rivalry and competition. It is not unlikely that we will see diverging developments in different economic sectors. While scenarios two and four are theoretically possible, but unlikely to be sustainable in the long-run, Europe should strive for scenario three but be prepared for a worst-case scenario resulting in scenario one.

In order to preserve the existing non-political mode of action, which rests largely on cooperation, Europe should advocate a non-political approach to technical standardization. This would require an emphasis on the value of the existing system of private sector self-regulation. Cooperation with like-minded states while also reaching out to states that seem likely to risk adopting a politicized approach could also further EU interests.

With the aim of preserving the existing institutional framework, Europe should continue to work on socializing China into the established institutions and allowing the PRC to gain influence. This would not mean accepting whatever China proposes. Instead, Europe needs to insist on the preservation of the existing rules and better implementation of reciprocity.

In order to prepare for the worst, the EU needs to improve its ecosystem for innovation, which is the basis for technical standardization. This will mean increasing the budget for R&D, the adoption of unitary investment rules, deregulation wherever possible to tackle the "valley of death" between technological innovation and commercialization, and the synchronization of national regulation, among other policies. Finally, the EU should build up further its capacities for monitoring international developments in order to be able to react swiftly and effectively.

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