Shaping Global Technology Governance: Why the U.S. Must Adopt a Proactive Approach to Technical Standards for Long Term Security

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Technical standards are levers to set quality standards in markets, protect domestic markets, spur innovation, and proliferate goods and services internationally. Technical standards also form a key part of nascent technology governance structures. Increasingly, however, questions of technical governance have become intertwined with nations' espoused values, whether those nations have more democratic or more authoritarian proclivities.

Historically, the U.S. has had a hands-off approach to influencing international technical standards. This is a product of its market-led philosophy and its technological leadership, which heretofore have provided the U.S. with de facto influence over standards. However, as China's technological influence has grown, so has China's influence in standards development organizations (SDOs). This paper provides a snap shot of just how much China's influence has grown in three key standards development organizations through: the number of participants at the International Organization for Standardization/International Electronical Technical Commission Joint Technical Committees; the number of contributions at the International Telecommunications Union over 10 years; and the increasing number of leadership roles held by Chinese industry representatives in the 3G Partnership Project. China's influence in international standards setting has grown because they have developed a strategy based on a sophisticated understanding of how the existing technological governance framework and standards-setting system works.

We face a critical moment in the evolution of technology, where new foundational technologies adopted in the coming few years will transform the way we live, and, for providers, create strategically and economically lucrative path dependencies. This paper makes the case that the U.S. should revisit its hands-off approach, in order to address its declining technological influence, the global challenges all governments face as a result of internet-related technologies, and a need for a streamlined and improved global governance regime.

A strategy should be developed recognizing that China's intention to become a global technology leader will not diminish and that China's effectiveness in influencing international technical standards will only grow. Furthermore, and as U.S. industry knows, technical standards-setting is not a winner-take-all-game. Chinese-proposed standards are not inherently bad, and collaboration with China in standards development will move global innovation forward as well as help to develop and implement higher quality technology.

The paper provides seven policy recommendations to help U.S. policymakers, working together with other U.S. and U.S.-aligned stakeholders, develop a new approach for influencing technical standards, pave the way for better global technology governance through streamlining the current global technical standards development process for technology, and make the multi-stakeholder model truly multi-stakeholder.

"The standardization world has changed. We can't assume that U.S. technology and practices will automatically be adopted everywhere [anymore]."[1]

– American National Standards Institute, 20 years ago

Primacy in technological innovation has been a chief propellant of U.S. dominance over the past century. Maintaining that technological advantage is now the lodestone of U.S.-China great power competition. Both sides seek to gain first-mover advantage in emerging technologies for prestige and economic advantage and to aid the design and proliferation of their governance philosophies.

The past decade has shown increasing tensions between the governance of technology and the state. There are four visions of the internet that are most prominent: Silicon Valley's Open Internet; DC's Commercial Internet; Brussel's Bourgeois Internet; and Beijing's Authoritarian Internet.[2] The model of the internet that those in America and elsewhere enjoy stems from Silicon Valley's Libertarian ideals of an open internet based upon free speech, free association, aversion to overt regulation, and other aspects of individual liberty.

The internet has been a key facilitator of globalization, spreading prosperity as well as unintended negative consequences to billions. The internet and related technologies have presented new challenges to many governments ranging from facilitating terrorist attacks to

[1] Quoted from ANSI's U.S. National Standards Strategy 2000 in Tim Büthe and Walter Mattli, *The New Global Rulers: The Privatization of Regulation in the World Economy* (Princeton: University Press, 2011), 126.
[2] These four possible internets are outlined in Kieron O'Hara and Wendy Hall, "Four Internets: The Geopolitics of Digital Governance," *Center for International Governance Innovation Papers*, no. 206 (December 2018), https://www.cigionline.org/publications/four-internets-geopolitics-digital-governance.

disrupting democratic processes. Governments around the world have sought to limit its malicious applications or increase their power.[3]

The transnational nature of global digital infrastructure and supply chains is increasingly coming into conflict with national governments and values. The current SDO ecosystem has failed to address these geographical differences and the digital threats they can lead to. In response to these increased societal and national security challenges, some governments are taking a more assertive role in internet governance. The internet presents governance challenges to authoritarian countries like China and to democracies. Authorities in Germany, the UK, and China have also intervened in internet protocols to determine what content is being sent and to suppress certain types of content they deem unsafe.[4]

At the same time, we are at a critical juncture of technological evolution where new foundational technologies will transform the way users live and create strategically and economically lucrative path dependencies for providers. Although there has been significant pushback against Chinese manufactured technology, mainly in developed markets, over the past two decades China has consolidated itself as the key digital provider for developing markets, where the majority of the remaining 48% of the world[5] who are not yet online reside.

Technical standards are key to U.S.-China technology competition. Most people do not recognize that it is because of technical standards that they can send a WhatsApp message from an iPhone to an Android device. The invention of Universal Serial Bus, or USB[6], has assisted in

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[3] Adrian Shahbaz, "The Rise of Digital Authoritarianism," Freedom House, 2018, https://freedomhouse.org/report/freedom-net/2018/rise-digital-authoritarianism.
[4] J. Hall et al., "A Survey of Worldwide Censorship Techniques," Internet-Draft, Network Working Group (Internet Engineering Task Force, 25 May 2018), https://tools.ietf.org/id/draft-hall-censorship-tech-05.html.
[5] "Internet Usage and Population Statistics 2020: Q2 Estimates," Internet World Stats: Usage and Population Statistics, 3 March 2020, https://www.internetworldstats.com/stats.htm.
[6] Eugene Kim, "The Guy Who Invented USB Didn't Make a Dime off of It — but Here's Why He's OK with That," *Business Insider*, November 15, 2015, https://www.businessinsider.com/ajay-bhatt-usb-creator-interview-2015-11.

the proliferation of countless gadgets, from e-Readers and battery packs to smartphones and toothbrushes, regardless of where they are made or by whom. Technical standards enable readers of this paper to access it from a desktop, laptop, iPad, or mobile. Technical standards are developed at both the domestic and international level, and the approach governments take towards influencing technical standards varies from country to country.

The U.S. government has a hands-off approach to standards setting, preferring standards to be set by industry in multi-stakeholder fora, and has traditionally dominated international technical standards. In contrast, the Chinese government has not dominated international standards setting to date and their hands-on approach involves not only actively developing domestic standards-setting expertise but also growing influence in both multi-stakeholder and multilateral fora.

The U.S.' influence over international technology standards is a byproduct of the technological leadership the U.S. enjoys. Alongside the U.S., Europe, Japan, and South Korea have decided the global rules for technology and established the organizations that effectively enforce these norms and procedures.[7] However, as the technology gap between developing countries and China has shrunk,[8] China's influence in standards development organizations has grown as technological improvements from other markets does not guarantee U.S. leadership in standards setting.

This paper shows how the U.S.' hands-off, even complacent approach to standardization is no longer appropriate given current levels of technological competition. Through explaining

[7] Marianne Schneider-Petsinger et al., "US–China Strategic Competition: The Quest for Global Technological Leadership" (Chatham House, November 2019), https://reader.chathamhouse.org/. Page 29.
[8] Judged by, for example, the number of patents as a proxy or research funding where the US accounted for 25% and China 23% of the US$2.2 trillion spent on R&D worldwide in 2017. Giuliana Viglione, "China Is Closing Gap with United States on Research Spending," *Nature*, January 15, 2020, https://doi.org/10.1038/d41586-020-00084-7.

the importance of technical standards, using data to illustrate how China's influence in key SDOs has grown, as well as the systemic challenges facing the international standards development system this paper seeks to make the case for a stronger U.S. presence in international standards-setting, coordinated by government, and that collaboration with China is both possible and desirable.

What Are Technical Standards?

"If you control an industry's standards, you control that industry lock, stock, and ledger"

– William Deming, MIT Management Professor & one of the architects of Japan's post-war economic boom[9]

Technical standards writ large facilitate globalization, extending access, convenience, and vulnerabilities in equal measure. Formulating and promoting official standards is widely recognized as an important tool for improving product quality, safety, coordination, and interoperability.[10] Complying to a different technical standard can raise production costs for industry, but in turn it might provide access to a larger group of consumers. Not complying with a technical standard would limit a given player's access to that market. The participants in standards development processes include government bodies, regulators, industry, and civil society.

[9] William Deming, *Out of the Crisis,* (Cambridge, MA: Massachusetts Institute of Technology Press, 1986).

[10] Technical standards and their development in SDOs are a relatively underexplored field in political science. It is thoroughly interdisciplinary with more studies found in sociology, economics, management, and law. The governance of technical standards currently sits outside traditional government-controlled structures, but these new governance structures will continue to shape the structure of the global information society. See Laura DeNardis, *Protocol Politics: The Globalization of Internet Governance,* (Cambridge, MA: MIT Press, 2009) for an in-depth analysis of IPv6 protocol politics.

Technical standards can also be set on the ground, outside of SDOs. The international proliferation of technology is driven through two main routes: (1) from below, through product adoption at such a high volume that a de facto standard is set, (2) from above, through proposing and securing agreement for technical standards in SDOs thereby setting a de jure standard.[11] The Chinese Communist Party (CCP) has provided consistent support for both routes 1 and 2 for priority information technologies.[12] In recent years, the U.S. government (USG) has not.

The process of technical standardization is sometimes described as "an apolitical, scientific process of developing or identifying the technically optimal solution to a regulatory or technical challenge."[13] However, this perspective has been broadly disputed. Standards do not embody an objective truth or undisputed wisdom of experts, and global standardization is instead often a battle of one process or solution over another; technical standardization "is an intensely political process, even if the politics may be hidden beneath a veneer of technical rhetoric."[14]

The increasing politicization and reach of technology and types of digital architecture make this already political process even more contentious. The participants of standards development processes—states, regulators, industry, and others—seek to reach a negotiated outcome that reflects multiple issues including economic interests, as well as broader concerns such as protecting consumer interests and the safe and ethical development of technology.[15] Table 1 outlines the differences between certain types of standards.

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[11] Julia Voo, "State Influence and Technical Standards," *Harvard Kennedy School Review*, December 2019, https://ksr.hkspublications.org/2019/12/31/state-influence-and-technical-standards/.
[12] Jonathan E Hillman, "China's Belt and Road Initiative: Five Years Later," U.S.-China Economic and Security Review Commission, January 25, 2018, https://www.csis.org/analysis/chinas-belt-and-road-initiative-five-years-later-0.
[13] Thomas A. Loya and John Boli, "Standardization in the World Polity: Technical Rationality over Power," 1999, https://search.proquest.com/docview/60065177?pq-origsite=summon. Page 188.
[14] Büthe and Mattli, *The New Global Rulers*. Page 11-12.
[15] Jeff Ding, "Balancing Standards: U.S. and Chinese Strategies for Developing Technical Standards in AI," *National Bureau of Asian Research* (blog), July 1, 2020, https://www.nbr.org/publication/balancing-standards-u-s-and-chinese-strategies-for-developing-technical-standards-in-ai/.

Table 1: Types of Standards[16]

Type of Standard	What does it mean?	Impact
Specification	Highly prescriptive standard setting out absolute requirements.	Often used for product safety purposes or for other applications where a high degree of certainty and assurance is required by the user community.
Codes of Practice	Recommended sound good practice.	Drafted to incorporate a degree of flexibility in application whilst offering reliable indicative benchmarks. Often used in construction and civil engineering industries.
Methods	Highly prescriptive - setting out an agreed way of measuring, testing, or specifying what is reliably repeatable in different circumstances and places.	For example, a certain vocabulary list may provide a set of terms and definitions that help harmonize the use of language in a particular subject or discipline.
Guides	Give less prescriptive advice which reflects current thinking and practice amongst experts in a particular subject.	A specific course of action is not provided.
Standard Essential Patent (SEP)	This standard is impossible to implement without using patented technology.	Standards often incorporate patented technology, creating a lucrative stream of royalty fees for the entity that owns the patent.

[16] Table adapted from "Different Types of Standards," British Standards Institute, accessed September 13, 2020, https://www.bsigroup.com/en-GB/standards/Information-about-standards/different-types-of-standards/.

Enforceability

Technical standards have varying levels of enforceability ranging from best practice to a formal agreement. They can be given teeth through government incorporation into regulations thereby making them mandatory.[17]

Technical standards produced by three organizations in particular carry an implicit legitimacy due to the adoption of the Agreement on Technical Barriers to Trade (TBT Agreement). These organizations include: the International Organizations for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunications Union (ITU). The TBT Agreement is an integral part of the Agreement establishing the World Trade Organization (WTO) and is therefore binding for all 164 WTO Member States. The specific article stipulates that "where technical regulations are required and relevant international standards exist or their completion is imminent, Members shall use them… as the basis for their technical regulations."[18]

Crucially, although the TBT Agreement does not define international standards exclusively as the products of the ISO, IEC, and ITU only these SDOs are considered by some as having been implicitly delegated regulatory authority.[19] In addition, trade agreements may cross reference certain technical standards developed by SDOs or include statements that reiterate their

[17] Büthe and Mattli, *The New Global Rulers,* 137.
[18] 'Uruguay Round Agreement: Agreement on Technical Barriers to Trade', World Trade Organization, 1 January 1995, https://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm.
[19] Gabrielle Marceau and Joel Trachtman, 'A Map of the World Trade Organization Law of Domestic Regulation of Goods: The Technical Barriers to Trade Agreement, the Sanitary and Phytosanitary Measures Agreement, and the General Agreement on Tariffs and Trade', *Journal of World Trade* 48, no. 2 (April 2014): 391-392, https://doi.org/10.1023/A:1021226926215.

value as facilitators of global trade. This provides an additional incentive for some actors to ensure that they shape or take technical standards developed in the above SDOs in particular.[20]

Even in areas where technical standards are not enforced by law, they can be unavoidable due to market forces making it most profitable to adopt the technology that is most widely used. A standard can also incorporate patents that require royalties to be paid to the creator. In these cases, successfully securing your standard as the international standard can be a huge income generator. For example, in 2017, Nokia generated USD 1.86 billion, roughly 7% of its revenue, from SEPs.[21]

Technical standards for certain technologies are particularly advantageous. For example, the suite of 3G standards enabled early web-enabled smartphones, and the 4G suite of standards enabled faster browsing, particularly for videos. Both new generations of technology created entire new ecosystems of applications and hardware, which in turn created significant first-mover advantages for the owners of the SEPs. For example, the U.S. company Qualcomm developed the CDMA technology on which most 3G networks are based, and analysts estimate that Qualcomm receives 5% of the profits from every 3G handset.[22] Generational technology in particular creates a path dependency resulting in huge economic and strategic benefits for the corresponding companies and, potentially, governments.

[20] There are other key SDOs such as IETF, W3C, and 3GPP who actors also seek to influence and align with. This is not an exhaustive list, merely a way to zero in on some SDOs from over 200 that work on technical standards for information technologies.
[21] Dan Strumpf, "Where China Dominates In 5G Technology," *Wall Street Journal*, February 27, 2019, http://search.proquest.com/docview/2191237633?accountid=11311&rfr_id=info%3Axri%2Fsid%3Aprimo.
[22] Bill Ray, "Who Owns 4G Mobile Technology?," *The Register,* September 23, 2011, https://www.theregister.com/2011/09/23/lte_patent_pie/.

Which Technical Standards Matter the Most?

New technologies, such as 5G or a mobile phone, tend to have groups of standards associated with them. There are more than two hundred SDOs developing technical standards for information and communication technologies (ICT).[23] Components in a mobile phone can touch on up to 300 standards. Conversations around 5G standards are not referring to just one standard but rather a suite of standards under consideration.

Often, many different companies contribute to the development of a certain technology. Indicators suggest that the eventual suite of 5G standards will be composed of standards from a group of international contributors. It is hard to view standards negotiations as one that occurs between countries because in many cases standards are developed by transnational private sector companies, and in other cases, civil society stakeholder communities transcend geographic boundaries. However, company headquarters are a good indicator of where at a minimum economic benefit from favorable standards adoption will likely flow. A quick overview of the top 30 companies which submitted technical contributions for 5G standards showed submissions from 11 countries, namely China, the U.S., Sweden, Finland, Japan, South Korea, Taiwan, France, Germany, Italy, and the UK.[24]

International collaboration has allowed industry to focus on specific components of technologies resulting in new innovations. It is neither feasible nor desirable for the USG to attempt to influence all the technical standards for ICT under development.

The type of technology—and subsequently the relevant technical standards—that matters most to USG should flow from an expert assessment of what is key to U.S. future security.

[23] Ron Schneiderman, "International Standards Development Organizations Defined," in *Modern Standardization* (John Wiley & Sons, Ltd, 2015), 253, https://doi.org/10.1002/9781119043492.oth.
[24] "Who Is Leading the 5G Patent Race?" (iPlytics, November 2019): 9, https://www.iplytics.com/wp-content/uploads/2019/01/Who-Leads-the-5G-Patent-Race_2019.pdf.

Whether or not the U.S. has the industrial capability will shape the type of influencing strategy the U.S. adopts. The overarching priority should be to ensure that the global evolution of emerging technologies is robust, secure, and reliable.

There are certain technical standards such as 5G, digital object architecture, and New IP that are currently being developed and discussed in SDOs and are particularly contentious for a variety of reasons. The following section outlines the very different ways in which these technical standards should matter to U.S. policymakers.

5G at 3GPP

The 5G suite of technical standards represents a new generation of wireless technology that will connect a massive number of devices, enable high data rates, and provide fast and reliable communications with minimal lag time. 5G will be unveiled in two phases: the first phase is 'non-standalone 5G' which leverages existing pieces of 4G mobile infrastructure; and the second phase is 'stand-alone 5G' which requires substantial investments in new infrastructure such as antennas and base stations.[25]

i. Why does 5G matter to policymakers?

- *To access the latest 5G technology, the U.S. will be beholden to an international supplier. This poses a security risk. The competition is between China's Huawei, Sweden's Ericsson, and Finland's Nokia.[26] Although the U.S. does have a stake in the 5G stack via Qualcomm it does not have similar hardware vendors. The vast ecosystems and information that 5G will facilitate mean that increasingly countries will depend on these 5G enabled services. The potential is that Huawei, and by extension the CCP, could dominate the 5G market in a way that they become the*

[25] For a more in-depth explanation of 5G and its geopolitical relevance see: Paul Triolo and Kevin Allison, "The Geopolitics of 5G," Eurasia Group, November 15, 2018, 7 https://www.eurasiagroup.net/live-post/the-geopolitics-of-5g.

[26] For more on why there is no equivalent American 5G competitor to Huawei read: Elsa B. Kania, "Opinion | Why Doesn't the U.S. Have Its Own Huawei?," *POLITICO*, accessed September 22, 2020, https://www.politico.com/news/agenda/2020/02/25/five-g-failures-future-american-innovation-strategy-106378.

favored provider. This could give the CCP significant leverage in markets that are dependent on its services including potentially access to and control over the services that flow through 5G networks.

- *Like other generational technologies, 5G will confer huge economic value to whomever makes the technology defined by the 5G suite of technical standards. 5G, as opposed to 3G and 4G, has a large proportion of its standards driven by non-US industry. Huawei is responsible for most 5G contributions, followed by Sweden's Ericsson, Finland's Nokia, the U.S.' Qualcomm, and China's ZTE.*[27] *The implication is that Huawei will gain huge royalties, just as Qualcomm did for previous generations of mobile technologies. Economic benefit will not only flow through the new infrastructure that is required but also via the new applications that 5G will enable, such as autonomous vehicles. Analysts estimate that this new generation technology could contribute trillions to the global economy.*[28]

Digital Object Architecture (DOA) at the ITU-T

DOA is primarily a document repository mechanism used by the Library of Congress, the British Library, and publishers. DOA identifiers are assigned to books, papers, etc., and stored in a database; the coded books and papers are then searchable in that database.[29] DOA is a technical framework that some believe could be applied to assign unique identifiers to arbitrary devices thereby allowing their identification, use and control: IoT devices, consumer goods, smart phones, and so on. The ITU has signed a memorandum of understanding with the DONA Foundation which is charged with rolling out DOA. The MoU says that ITU-T will oversee transition arrangements for DOA intellectual property in the event of the death of the DOA inventor Bob Kahn.

[27] "Who Is Leading the 5G Patent Race?" 8.
[28] Karen Campbell et al., 'The 5G Economy: How 5G Technology Will Contribute to the Global Economy', *IHS Economics and IHS Technology*, January 2017, 16.
[29] Dominique Lazanski, "Governance in International Technical Standards-Making: A Tripartite Model," *Journal of Cyber Policy* 4, no. 3 (September 2, 2019): 372, https://doi.org/10.1080/23738871.2019.1696851.

i. Why does DOA matter to policymakers?

- *The risk is that this valuable information can be applied to facilitate real-time surveillance and tracking of devices and individuals connected to the internet. Some Members at the ITU such as Russia and Saudi Arabia are seeking to ensure that DOA is adopted as a global standard.*[30] *This centralization has been presented as particularly risky for human rights defenders and certain minority groups.*[31] *It is worth noting however that it could also be equally useful to those governments who are seeking to defend networks from botnet attacks.*

New Internet Protocol ("New IP") at the ITU-T

In September 2019, Huawei Technologies proposed a new research project to develop a "top-down design for the future network" named "New IP"[32] at the International Telecommunications Union. The "original IP" Transmission Control Protocol/ Internet Protocol (TCP/IP),[33] is the foundation of the decentralized internet which was developed at the Internet Engineering Task Force.

i. Why does New IP matter to policymakers?

- *A key design criticism of New IP is that it is not addressing a need for new technology, but about trying to alter the governance structure of the internet.*[34] *This new protocol would centralize control over the network into the hands of telecoms operators who in some cases, like in China, are either state-run or state-controlled.*[35] *A broader*

[30] "ITU IoT Standards: Gateway to Government Control?," Wiley Connect, September 20, 2016, https://www.wileyconnect.com/home/2016/9/20/itu-iot-standards-gateway-to-government-control.
[31] Madhumita Murgia, Yuan Yang, and Anna Gross, "Chinese Tech Groups Shaping UN Facial Recognition Standards," December 1, 2019, http://www.ft.com/content/c3555a3c-0d3e-11ea-b2d6-9bf4d1957a67.
[32] Huawei Technologies et al., 'ITU-T Technical Standard Advisory Group, Contribution 83 "New IP, Shaping Future Network"', International Telecommunications Union, 10 September 2019, https://www.itu.int/md/T17-TSAG-C-0083. *The Financial Times* made this document public here: http://prod-upp-image-read.ft.com/ec34d7aa-70e6-11ea-95fe-fcd274e920ca as well as the accompanying presentation: http://prod-upp-image-read.ft.com/eff4a82a-70e6-11ea-95fe-fcd274e920ca.
[33] TCP/IP can be thought of as the technical specification which allows one computer to talk to another computer via the internet.
[34] Marco Hogewoning, "Do We Need a New IP?," RIPE Network Coordination Centre Labs, April 22, 2020, https://labs.ripe.net/Members/marco_hogewoning/do-we-need-a-new-ip.
[35] As outlined in the Oxford Information Labs' report for NATO, quoted in Phil Muncaster, 'NATO Report Warns of New Authoritarian Chinese Splinternet', Infosecurity Magazine, March 31, 2020, https://www.infosecurity-magazine.com:443/news/nato-warns-new-authoritarian/.

concern is that acceptance of New IP as an international standard will facilitate adoption in other authoritarian governments providing a new tool for control. This proposal has also been criticized as being duplicative, as the IETF has historically led on internet protocols standards development to date.[36]

- *Technical standards are certain to be central to U.S.-China technology competition because of their power and that we are on the cusp of significant transformative innovations. The multitude of actors, issues, and fora make it increasingly important that the U.S government develops a strategy to help the broader of U.S. actors navigate and engage more effectively in these organizations.*

Flailing Internet Governance and A Deeply Fragmented Standards Development Ecosystem

"*We made it to where we are by flailing around.*"

– Scott Bradner, Co-Founder Internet Engineering Task Force, on the evolution of the SDO ecosystem[37]

For most of its history, the internet has been governed in an ad-hoc fashion by SDOs and private companies performing key roles as network operators and intermediaries.[38]

The technical standards that are agreed upon in the hundreds of SDOs create the rules for whomever adopts them. However, the SDO ecosystem has no overarching coordination mechanism. It is a hodgepodge of entities with different governance models, philosophies, and levels of influence. SDOs sometimes have overlapping technological remits, and the technical standards produced by these bodies vary greatly in their levels of enforceability.

There are two main kinds of standards-making governance models: multi-stakeholder and multilateral. The U.S. is a proponent of the multi-stakeholder model which can be understood as the convening of governments, private sector, civil society, and intergovernmental

[36] As outlined in the Internet Society's (the IETF parent organization) blog and by RIPE NCC a regional internet registry for Europe, West Asia and the former USSR here: Hogewoning, 'Do We Need a New IP?'
[37] Scott Bradner, "Eight Hundred and 8 down, none to go" *Network World* 2013. Available at https://www.sobco.com/nww/2013/bradner-2013-06-10.html. Accessed on May 22, 2020.
[38] Mark Raymond and Laura DeNardis, 'Multistakeholderism: Anatomy of an Inchoate Global Institution', *International Theory* 7, no. 3 (November 2015): 585, https://doi.org/10.1017/S1752971915000081.

organizations.[39] In contrast, multilateral models such as the ITU rely on government-to-government negotiations.[40] Diverging preferences for multilateral versus multi-stakeholder fora was demonstrated at the 2012 ITU World Conference on International Telecommunications, a treaty instrument that sets out practices for fixed-line telecommunications where less-liberal countries sought to apply the same treaty that outlined a more centralized control of fixed-line telecommunications to the internet.[41] The current SDO ecosystem does not satisfy all actors and as a result there is an element of "forum shopping", where work on certain technical standards are proposed in fora that are most advantageous to the actors in question.[42] Forum shopping is indicative of the underlying problem with the current SDO ecosystem. Many SDOs have tacitly agreed remits and due to the horizontal and fast-moving nature of information technologies overlap has likely been exacerbated. Liaisons between certain SDOs are in place to facilitate the exchange of to prevent duplicative work.[43] In addition, it is sometimes not clear which is the best forum for certain standards and this can result in industry and civil society dedicating resource to first trying to understand who the key players are. Due to the opaque nature of many SDO processes and the impact of technical standards that have been developed it is not always clear who has the most impact.

The financial cost of membership in some SDOs is high. Required time investment is also substantial. The British Standards Institute estimates that it takes between one and four years to develop a standard at the national level with a range of experts, and estimates that standards at

[39] Raymond and DeNardis, 576.
[40] Lazanski, "Governance in International Technical Standards-Making," 365.
[41] Ibid.
[42] Stacie Hoffman, Dominique Lazanski, and Emily Taylor, 'Standardising the Splinternet: How China's Technical Standards Could Fragment the Internet', *Journal of Cyber Policy* 5, no. 2 (29 August 2020): 252.
[43] 'Liaisons', IETF, accessed September 22, 2020, /about/liaisons/.

the international level which include a broader range of stakeholders would take longer.[44] If government, industry, or civil society want to exert meaningful influence they need to commit significant resources to be a meaningful participant. There are an estimated 7 standards development meetings happening per day at the ISO,[45] and participation in these lengthy discussions is very difficult for developing countries, SMEs, non-profits, and civil society.

Table 2 provides an overview of the above SDOs as well as two others: the Internet Engineering Task Force (IETF) and World Wide Web Consortium (W3C) who are influential in the internet and web standards development space.[46]

American and Chinese Influence in the ISO/IEC JTC, ITU, and 3GPP

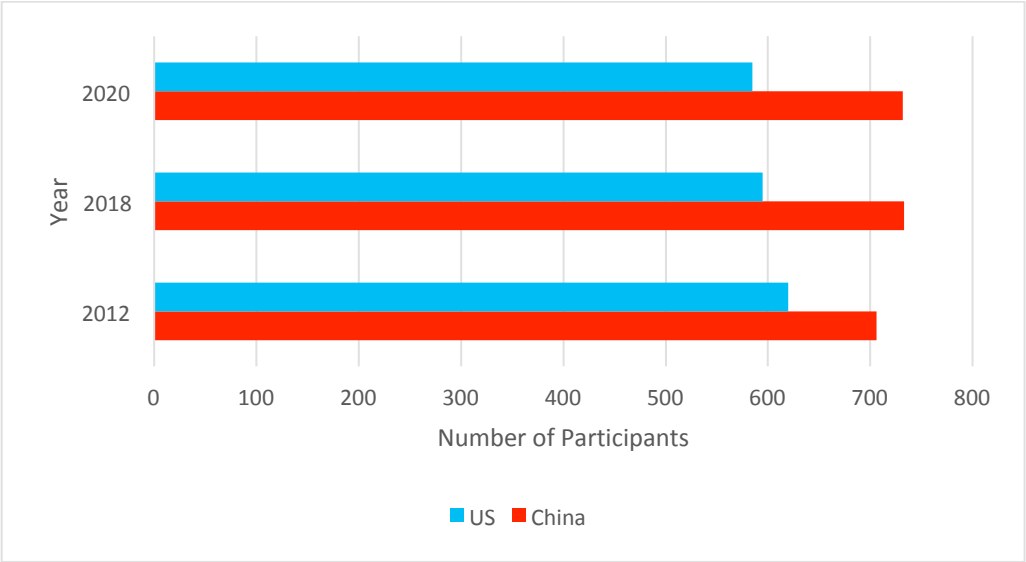
Twenty years ago, the EU was perceived as the U.S.' chief competitor in standards development organizations. Twenty years later, it is clear that China is a significant force across the standards system and in key standards bodies. At the highest level, Chinese experts have held the top positions in the ITU, the ISO, and the IEC. In 2015, Zhang Xiaogang was elected for a three-year term as the president of the ISO; in 2019, Shu Yinbao was elected to serve as President of the IEC after having served as Vice President between 2013-2018; and in 2019, Zhao Houlin will serve his second term as Secretary General after having served as Deputy Secretary General for eight years from 2007-2015.[47]

Increased influence at the working level is also clear as delegations from China to SDOs have increased in size, gained leadership roles in working groups and subcommittees; and

[44] "How Are Standards Made?," British Standards Institute, accessed September 22, 2020, https://www.bsigroup.com/en-GB/standards/Information-about-standards/how-are-standards-made/.
[45] This figure was provided in 2011. As the number of technical committees have increased in number from 210 in 2011 to over 300 today the number of daily ISO standardization meetings is likely much higher than seven per day now. See Büthe and Mattli, *The New Global Rulers*. Page 139
[46] See Table 1 for an explanation of these SDOs.
[47] John Seaman, 'China and the New Geopolitics of Technical Standardization', *Notes de l'Ifri*, January 2020, 34. Page 20-21.

actively sought to influence the standards-setting agenda through written contributions. This section demonstrates how China's influence compares to the U.S. in the ISO/IEC JTC1, ITU, and 3GPP.

Graph 1: Comparison of U.S. and China's Participation in ISO/IEC JTC (2012-2020)[48]



Graph 1 shows that, over the past 8 years, China's participation across all 22 ISO/IEC JTC subcommittees has consistently surpassed the U.S. In addition, this data shows that the U.S. participation is on a downwards trajectory.

[48] Data compiled from 1) Choi and Puksar, 2014, 'NISTIR 8007; 2) SOSi, "China's Internet of Things"; and 3) ISO website accessed on June 3, 2020.

Table 2: Key ICT Standards Development Organizations

Name	Key Internet Governance Tasks[49]	Type	Fee	Background	Membership	Technical Standards Produced
ISO/IEC JTC1	Swath of communication standards	Multi-stakeholder	Differentiated membership fee. Full fee for the national representative based on units which reflect gross national income, exports, and imports. Partial memberships pay less.[50]	Created in 1987, the ISO and IEC combined their ICT standards groups to form the Joint Technical Commission (JTC 1) to establish voluntary, market-driven, international standards group for information technology. Since JTC's inception 3239 standards have been published, subcommittees work on 22 information technology areas,[51] and the community comprises 4500 registered technical experts.[52]	One member per country and that organization must have the status as the organization most representative of standardization in your country. Many ISO members are part of the government structure by private-sector organizations are also present. U.S. is represented by American National Standards Institute (ANSI); China is represented by Standardization Administration of China (SAC)	Moving Pictures Experts Group (MPEG)

[49] Mostly adapted from Table 2: Disaggregated Integrated Governance Taxonomy. Raymond and DeNardis, 'Multistakeholderism'. Page 590-591.
[50] 'ISO Membership Manual' (International Organization for Standardization, n.d.).
[51] 'ISO/IEC JTC 1 - Information Technology - Technical Committees', International Organization for Standardization, accessed 9 September 2020, https://www.iso.org/cms/render/live/en/sites/isoorg/contents/data/committee/04/50/45020.html.
[52] 'ISO - ISO/IEC JTC 1 — Information Technology Achievements', International Organization for Standardization, accessed 9 September 2020, https://www.iso.org/isoiec-jtc-1.html.

3GPP	Primarily focusing on network communications for fixed line and mobile networks.	A consortium of seven national regional telecommunications standards organizations.	Members of standardization bodies who are organizations partners of 3GPP have the right to participate.[53]	Created in 1988, 3GPP was initially tasked to produce the technical standards for a 3G Mobile system. Their remit has since evolved.[54] Notable for its leadership role in setting 5G standards.	The seven organizations at the core are: Association of Radio Industries and Businesses (Japan); Alliance for Telecommunications Industry Solutions (U.S); China Communications Standards Association (China); European Telecommunications Standards Institute (Europe); Telecommunications Standards Development Society (India); Telecommunications Technology Association (RoK); and Telecommunication Technology Committee (Japan) and other affiliated organizations	Mobile cellular network technology: 2G, 2.5G, GPRS, EDGE, 3G, 4G, 5G[55]

[53] 'Frequently Asked Questions Concerning 3GPP', European Telecommunications Standardization Institute, accessed 21 September 2020, https://portal.etsi.org/new3g/faq/faq.htm#A1.1.
[54] 'About 3GPP', accessed 13 September 2020, https://www.3gpp.org/about-3gpp.
[55] Triolo and Allison, 'The Geopolitics of 5G'. Page 8-10.

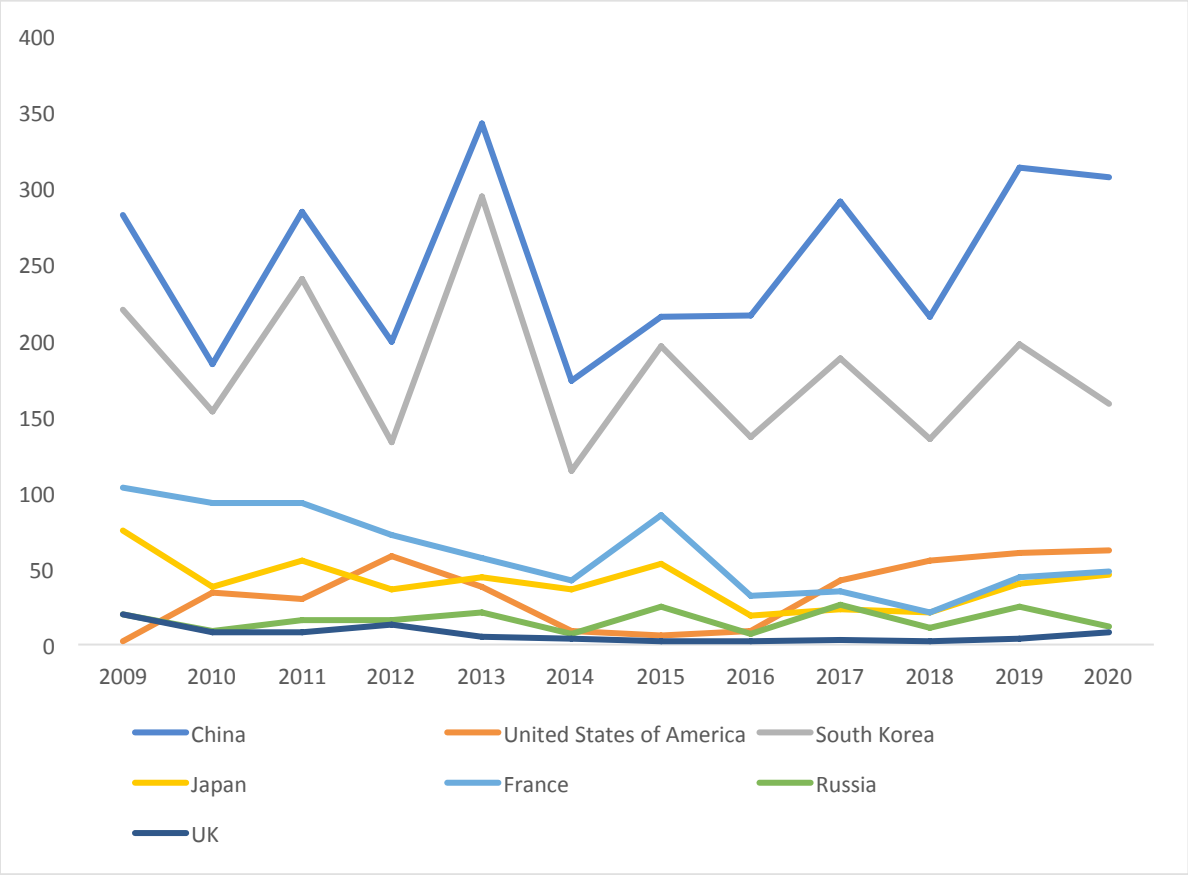
ITU	Swath of communication standards	Multilateral	Differentiated membership fee based on whether you are a national representative, have membership of all ITU sectors,[56] are from a developing country, SME, or academia.[57]	Founded in 1865 to standardize telegraphy exchange and international tariff and accounting rules. As communications evolved the ITU then focused on telephony and radio.[58] Notable for its ongoing discussions on New IP and DOA.	ITU is a UN institution therefore all 193 UN Member States are members. Government representatives are core members. The US is represented by National Telecommunications and Information Administration and the State Department. Multilateral = "one country, one vote".[59] Payment is through a contribution-based system and it varies depending on the size of the Member State.[60]	ITU standards are called "recommendations". The failed OSI. Public Key Infrastructure (PKI), Digital Subscriber Line (DSL).

[56] Not only ITU-T for Telecommunications, but also ITU-D for Telecommunications Development and ITU-R for Radio.
[57] "ITU Sector & Academia Membership Fees," International Telecommunications Union, accessed September 21, 2020, https://www.itu.int/en/join/Pages/fees.aspx.
[58] "History," International Telecommunications Union, accessed September 13, 2020, https://www.itu.int/en/about/Pages/history.aspx.
[59] Jeff Ding, "Balancing Standards: US and Chinese Strategies for Developing Technical Standards in AI," *The National Bureau of Asian Research.*
[60] Tchioffo Kodjo, "How Is ITU Funded? - ITU PP-18 - Plenipotentiary Conference," ITU Plenipotentiary Conference 2018 (PP-18), accessed 14 September 2020, http://plenipotentiary.itu.int/web/pp-18/en/backgrounder/how-is-itu-funded.

World Wide Web Consortium (W3C)	Core web standards	Multi-stakeholder	Differentiated membership fee based on location, World Bank country income classification, and annual revenues among other things.[61]	Founded by Tim Berners-Lee in collaboration with support from DARPA and the European Commission.[62]	Private-sector-led (428 members). Membership fee required, fees vary depending on the annual revenues, type, and location of the organization's headquarters.	Hypertext Markup Language (HTML), Hypertext Transfer Protocol (HTTP), Extensible Markup Language (XML)
Internet Engineering Task Force (IETF)	Technical design of IP addresses; standards for interconnection	Multi-stakeholder.	No membership fee. Fee to participate in each in-person IETF meeting. Student discount. Free remote participation.[63]	The first IETF meeting was held in 1986. It is a loosely self-organized group of people. The IETF comes under the Internet Society, which is an international, non-profit, membership organization.	All participants are volunteers. Discussions are held in person and via email lists. "No members and no dues".[64]	Trans-mission Control Protocol/ Internet Protocol (TCP/IP), Internet Protocol version 6 (IPv6)

[61] 'About W3C Membership: Membership Fees (April 2007)', World Wide Web Consortium (W3C), accessed 21 September 2020, https://www.w3.org/Consortium/fee-200705.
[62] 'Facts About W3C', World Wide Web Consortium (W3C), accessed September 13, 2020, https://www.w3.org/Consortium/facts.
[63] 'Participation Options', IETF, accessed September 21, 2020, /how/meetings/99/participation/.
[64] 'The Tao of IETF', IETF, accessed September 13, 2020, /about/participate/tao/.

Graph 2: Number of Written Contributions by Member State at the ITU-T in Study Groups 11, 13, and 17 (2009-2020).[65]

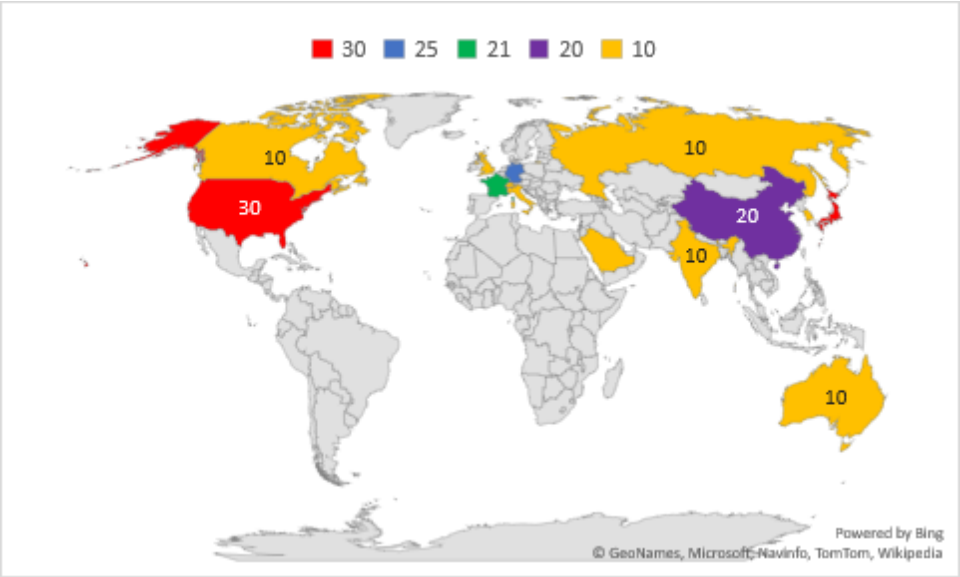


Graph 2 shows that between 2009-2020 the number of written contributions[66] across three study groups were dominated by China and South Korea. Of a total of 7508 written contributions across three study groups, China submitted 3021, South Korea submitted 2164, and the U.S. submitted 405.

[65] These study groups are: Study Group 11: Signaling Requirements and Protocol; Study Group 13: Future Networks; and Study Group 17: Security.

[66] This data is significant because the process of developing a standard in the ITU is contribution-led. That means that if a Member wants to work on a certain area then it submits a written contribution into the relevant study group which is then discussed at the next ITU meeting.

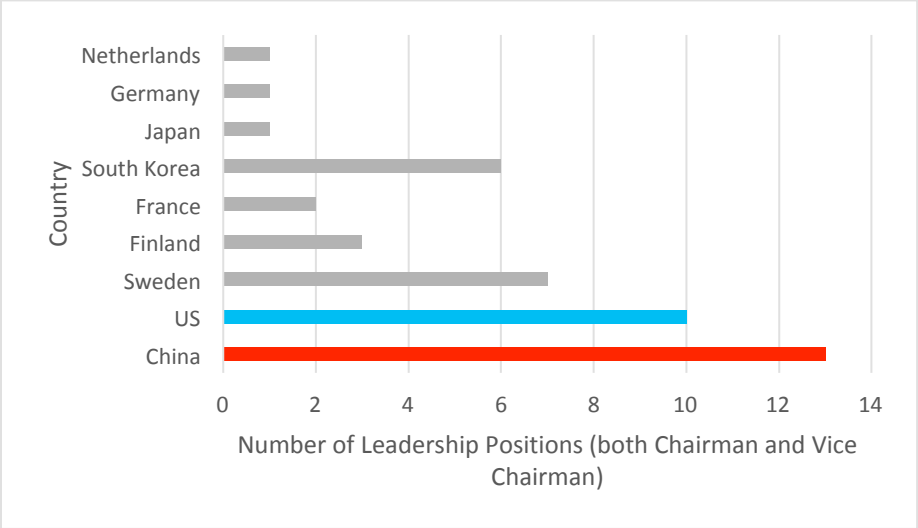
Map 1: Top Member Contributors to ITU Funding in 2016



The map shows the top member contributions to ITU in 2016. The funding is calculated by unit where one unit is 318,000 Swiss Francs (USD350,490). In 2016, the U.S. and Japan were the largest contributors to the ITU paying a total of just over USD 10 million. China was the fifth largest contributor paying just over USD 7 million.[67]

[67] 'ITU Membership: Top Contributors', International Telecommunications Union, 2016, https://www.itu.int/en/membership/top-contributors/Pages/top-contributors.aspx.

Graph 3: Comparison of the Leadership Positions in 3GPP Subgroups (Sept 2020)[68]



Graph 3 shows that out of a total of 44 leadership positions of the 3GPP subgroups which generally include one Chairman and two Vice Chairman per subgroup, China holds 13 of these positions. Other reports state that in 2017 China held 10 out of a possible 57 leadership positions at 3GPP.[69] The data in this graph shows that China's influence has continued to grow.

Challenges Facing the U.S.' Current Approach

When U.S. technological leadership was assured, the USG's hands-off approach to standards development was not an issue. U.S. leadership in innovation combined with the widespread use of U.S. technology across the world resulted in U.S. industry wielding *de facto* influence in SDOs.

Integrating China into the international standards system was part of a drive by the U.S. and its allies to integrate China into the global economy more broadly. As the world's second largest economy and the world's premier manufacturing superpower, it is reasonable for China to have a leading role in influencing global standards. Increased Chinese influence is to be expected

[68] Data from 3gpp.org
[69] The number of leadership seats China held in 3GPP is documented in "The Geopolitics of 5G." The number of subgroups fluctuates as workstreams are completed and others are initiated.

and to some degree is in fact beneficial for other countries, including the U.S. However, the U.S. faces specific challenges in the current SDO ecosystem that are either exacerbated by China's growing influence or because of it. These challenges are outlined below:

Preserving the "Status Quo" Preserves a Broken SDO Ecosystem

U.S. participation in major 5G international standards bodies has been described by a subject matter expert as preserving the status quo due to confidence that major U.S. telecoms would continue to play a leading role in determining future standards by default.[70] "Preserving the status quo" appears to also be the approach of the U.S. and allies at the ITU. This is a problem on two levels: first, the "status quo" of the current SDO ecosystem is deeply inefficient and the U.S. has a vested interest in ensuring that global technology governance is functional and not fractured; two, the "status quo" of the U.S. hands-off approach is not effective in a world where there is increased technological competition. This method may have worked in a different era, but the U.S.' leading role is not assured, and this short sightedness has the potential to undermine the U.S.' strategic objectives.

Maintaining the current USG "Hands-Off" Approach Disadvantages U.S. Industry

U.S. influence in international standards setting relies on private sector leadership, supplemented by federal government contributions to discrete standardization processes.[71] There are some examples of USG introducing specific initiatives to become more involved in certain areas of standardization. For example, following the publication of the Executive Order on Maintaining American Leadership in Artificial Intelligence, the U.S.' National Institute of

[70] John Chen et al., "China's Internet of Things," US-China Economic and Security Review Commission, (October 2018): 100, https://www.uscc.gov/research/chinas-internet-things.
[71] White House (January 7, 2012), Memorandum for the Heads of Executive Departments and Agencies – Principles for Federal Engagement in Standards Activities to Address National Priorities.

Standards and Technology[72] announced that it would coordinate between federal agencies and the private sector to drive the development of AI technical standards. [73]

In contrast to the U.S., China's technical standards process is state-driven. China's national standards body, the Standardization Administration of China, sits under the State Administration for Market Regulation.[74] It coordinates standards development in China and represents China at the ISO and IEC and through Chinese projects overseas like the Belt and Road Initiative.[75]

China, the Second Largest Economy in the World, Should be Shaping Global Standards

Much blame for an overly aggressive pursuit of technological leadership has been assigned to Chinese President Xi Jinping, but in this respect, it does not matter who occupies that position. China's influence in SDO's will not diminish and a high level of influence should be expected, not only because of China's global ambitions but also due to the size of its economy and its role as the world's manufacturing superpower.[76] In addition, China's dominant role in SDOs was facilitated by western countries as they sought to integrate China into the global economy.[77] Over the years, China has excelled at understanding and navigating the standards development process. An integrated global economy is preferable for all, and if that is to remain then China should have a seat at the table.

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[72] Huawei Technologies et al., 'ITU-T Technical Standard Advisory Group, Contribution 83 "New IP, Shaping Future Network"'; 'Plan Outlines Priorities for Federal Agency Engagement in AI Standards Development', text, National Institute of Standards and Technology, August 12, 2019, https://www.nist.gov/news-events/news/2019/08/plan-outlines-priorities-federal-agency-engagement-ai-standards-development.
[73] 'Annual Report', US-China Economic and Security Review Commission, (2019): 219, https://www.uscc.gov/annual-reports.
[74] Seaman, "China and the New Geopolitics of Technical Standardization," 17-18.
[75] Hoffman, Lazanski, and Taylor, "Standardising the Splinternet: How China's Technical Standards Could Fragment the Internet," 246.
[76] Felix Richter, "China Is the World's Manufacturing Superpower," Statista, accessed September 15, 2020, https://www.statista.com/chart/20858/top-10-countries-by-share-of-global-manufacturing-output/.
[77] Stephen Ezell and Robert D. Atkinson, "The Middle Kingdom Galapagos Island Syndrome: The Cul-De-Sac of Chinese Technology Standards," (Information Technology and Innovation Foundation, December 15, 2014), https://itif.org/publications/2014/12/15/middle-kingdom-galapagos-island-syndrome-cul-de-sac-chinese-technology.

China has repeatedly attempted to set key ICT standards, most notably, the mobile cellular standard TD-SCDMA 3G and the wireless LAN standard WAPI, which have failed.[78] However, this series of high-profile standardization flops has not deterred China. In some standardization areas there have been successes where China has successfully secured the approval of indigenous standards for the Internet of Things at the ISO/IEC JTC.[79]

As the CCP continues to upgrade the Chinese economy, standards remain an important tool to increase the quality of domestically produced goods and services, to potentially transform Chinese industry into a royalty collector as opposed to a licensee, and to strengthen China's brand and influence. Being a standards-setter has an element of prestige demonstrated in this saying in China's industry: *"Third-tier companies make products; second-tier companies make technology; and first-tier companies make standards"*.[80] In comparison to the U.S., China has a centralized, top-down standardization system with both government and industry working hand in hand to set global standards in strategic areas. China aims to continue influencing global technologies and its new plan will be set out in "China Standards 2035," the latest iteration of the CCP's national standards plan that will complement China's existing industrial policies such as Made in China 2020.

China's development of 5G allows the rest of the world to benefit from this technology too. Certainly, the royalty payments flow both ways between U.S. and Chinese companies, although most payments in previous decades have flowed from China to the U.S. and the rest of the world when China's levels of innovation trailed behind.

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[78] Jimmy Hsu and Adam Hwang, "China to Launch CBHD High-Definition Disc Format but Taiwan Makers Not Optimistic about Its Prospects," *DIGITIMES*, July 28, 2008, http://www.digitimes.com/news/a20080727PD200.html.
[79] "Profile - IGRS Industry Alliance," Intelligent Grouping and Resources Sharing, accessed September 21, 2020, http://www.igrs.org/en/channel.php?id=34.
[80] Dan Breznitz and Michael Murphree, "The Rise of China in Technology Standards: New Norms in Old Institutions," US-China Economic and Security Review Commission, January 16, 2013, 4, https://www.uscc.gov/research/rise-china-technology-standards-new-norms-old-institutions.

The Multi-stakeholder Model Is Not Inclusive Enough

In some ways, it is a misnomer to speak of the multi-stakeholder model of internet governance.[81] Multi-stakeholder SDOs are not monolithic, and many of the multi-stakeholder SDOs that are preferred by western governments have quite different governance models. Unfortunately, many multi-stakeholder SDOs unwittingly exclude certain actors such as developing countries and civil society due to cost or less visible thresholds such as the expertise required to participate in discussions.

Many developing countries as well as those who prefer a centralized internet governance system prefer the ITU. However, it is also a forum in which some liberal countries such as South Korea and France appear to have invested significant resources in influencing, but many believe that the ITU has no business developing telecommunications standards.[82] That the U.S. and others do not consider ITU-T to be a legitimate forum for standards development does not remove the legitimacy of the technical standards produced and the inclusion of these standards in procurement contracts and trade agreements that could affect U.S. industry in those markets. The question is then what kinds of technical standards processes would be inclusive and address the concerns of other actors which will in turn help contribute to a better global technology governance framework and market access.

CCP Incentives Could Result in Low-Quality Standards Proposals Overwhelming SDOs

As outlined in Article 9 of the 2017 Standardization Law of China, "commendation and reward shall be given to unit or individual who made remarkable contribution to standardization

[81] Raymond and DeNardis, "Multistakeholderism," 588.
[82] Lazanski, "Governance in International Technical Standards-Making," 364.

work in accordance with relevant provisions of the State."[83] The CCP provides financial incentives simply for filing a standards application regardless of whether the standard is adopted.[84] These incentives encourage China's delegates to submit proposals at volume. If the quality of recommendations is low, then this "flooding of proposals" presents a significant amount of unnecessary work for SDOs.

There is a risk that even if in some SDOs like the ITU, a national committee China gets one vote, the volume of standards proposals made by representatives from Chinese universities, industry, and government bodies can drown out the proposals made by other countries' representatives. Increasingly the agendas in certain SDOs are set by those chiefly representing Chinese interests.

The Quality of Standards Proposals from China Will Become Difficult to Ignore

At the same time, China's technological capabilities are improving, and the controversial 5G standards are a good example of Chinese innovation. This is not a winner-take-all-game and standards proposed by Chinese representatives are not necessarily intrinsically bad. The U.S.' inclusion of Huawei on the Entity List in 2019 unwittingly prevented American companies from collaborating with Huawei in SDOs. For U.S. industry, this would mean that they could no longer be party to the conversation around the suite of 5G standards that is being developed at 3GPP where Huawei is heavily involved. Huawei's inclusion on the Entity List made it unclear whether U.S. industry would need permission to collaborate. If U.S. industry are unable to participate in the 5G standards development process then U.S. industry interests, unless shared by another participant, would not be reflected. The USG belatedly recognized how this move

[83] Betty Xu, "English Translation of the Standardization Law of People's Republic of China," Seconded European Standardization Expert in China (SESEC), (November 10, 2017): 3.
[84] Seaman, "China and the New Geopolitics of Technical Standardization."

could damage U.S. interests, and in June, U.S. Secretary of Commerce Wilbur Ross corrected this oversight, with the accompanying statement: "the United States will not cede leadership in global innovation… the Department is committed to protecting U.S. national security and foreign policy interests by encouraging U.S. industry to fully engage and advocate for U.S. technologies to become international standards."[85] U.S. industry is now able to collaborate with Huawei and other companies on the Entity list in SDOs without requiring additional permissions.[86] This case underlines how technical standards are an afterthought for USG, but most interestingly it also demonstrates that U.S.-China collaboration in SDOs is key to U.S. innovation.

Furthermore, as highlighted at the 2014 U.S.-China Economic and Security Review Commission in 2014, "China's international negotiators are becoming more adept than those in the U.S. It is, therefore, no longer clear whether the U.S. would prevail against Chinese efforts in cases of standards disputes at the international level."[87] Undergraduate and graduate degree programs focused on training technical standards experts have been commonplace in not only China, but also Japan and some European countries for decades. Between 2000-2007, one Chinese university alone produced 800 students with standardization degrees and the Chinese government provided resources to train 1,200 professionals on the job.[88]

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[85] This action allows U.S. technology designated as EAR99 or controlled only for Anti-Terrorism reasons on the Commerce Control List without a license, in the context of "voluntary consensus standards bodies" for the purpose of contributing to the revision of development of a "standard" as defined by the Office of Management and Budget Circular A-119.

[86] "Commerce Clears Way for U.S. Companies to More Fully Engage in Tech Standards-Development Bodies," U.S. Department of Commerce, accessed September 1, 2020, https://www.commerce.gov/news/press-releases/2020/06/commerce-clears-way-us-companies-more-fully-engage-tech-standards.

[87] Breznitz and Murphree, "The Rise of China in Technology Standards: New Norms in Old Institutions," 7.

[88] Breznitz & Murphree (2013) report that the China National Institute for Standardization is developing masters-degree programs in technology standardization that train engineers to focus on the legal and policy aspects of technology standards development. Deep understanding of the laws and regulations surrounded standards certainly contribute to China's representatives at SDOs in promoting China's interests: 3.

5G is Not the Last Challenge in SDOs that the U.S. will Face

The U.S. and China competing to take leading roles in the emerging space of technical standards for artificial intelligence demonstrates this. China has been very clear about its intention to become a global leader in artificial intelligence, publishing plans to build more reliable AI-enabled systems and influence international norms to China's strategic and economic advantage.[89] Some of these reasons include: generating more value out of systems to facilitate data pooling and improving interoperability of systems; strengthening Chinese industries' commercial competitiveness; preventing a societal backlash through improving the quality of AI products and services; and taking a leading role in international governance on the safety and ethics of AI.[90] Similarly, the U.S. views AI as a strategically important technology. Both countries sought to gain leadership roles in influencing AI related technical standards demonstrated by the creation of the ISO/IEC JTC Subcommittee 42 on AI. Both the chair and the location of the first meeting was hotly contested by the national standards representatives. The outcome was that the Chair was given to Wael Diab a Senior Director at Huawei and the Secretariat to the American National Standards Institute, and the first meeting was held in Beijing.[91]

China is Encouraging the Adoption of Its Technology on the Ground

China has strong supplier relationships in many third markets that the U.S. does not. Xi Jinping's Belt and Road Initiative means that it is well- positioned to leverage its relationships

[89] Jeff Ding, "Deciphering China's AI Dream," Future of Humanity Institute, Oxford University, March 2018, https://www.fhi.ox.ac.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.pdf.
[90] Jeffrey Ding, Paul Triolo, and Samm Sacks, "Chinese Interests Take a Big Seat at the AI Governance Table," *New America*, June 20, 2018, http://newamerica.org/cybersecurity-initiative/digichina/blog/chinese-interests-take-big-seat-ai-governance-table/.
[91] Ding, "Deciphering China's AI Dream," 31.

with partner countries in the digital space (also known as the Digital Silk Road).[92] In terms of technical standards, this means that China can set the *de facto* technical standards in these markets through encouraging the adoption of China-made technologies through its existing supplier relationships and subsidization programs.

The multifaceted approach that the Chinese government pursues to shape global technologies is likely to have significant implications for U.S. long-term competitiveness in ICT. If the U.S. as a collective does not also pursue at minimum a dual approach to encourage the uptake of U.S.-designed technologies, then the risk of being locked out of new markets that adopt Chinese technologies becomes higher. This can have broader impacts on the quality of technologies adopted.

Policy Recommendations

Any USG approach should recognize that China's role as a technological leader and challenger in some areas of technology are unlikely to change. USG should seek to simultaneously improve the global technology governance framework and to identify areas of collaboration with China. The ideal strategy will set out how the U.S. can shape global technology governance technology through two routes: 1) the international rules-based order, and 2) market power.

Make Multi-stakeholder Governance Truly Multi-stakeholder

On paper, multi-stakeholder models are open to all, but that is not the case. Due to physical barriers, resource barriers (e.g., location, fees, time investment), and technical barriers (e.g. the high technical knowledge threshold that bars certain players from participating), SDOs

[92] One prong of President Xi's flagship Belt and Road Initiative.

that claim to be open to all participants remain effectively cloistered. Multi-stakeholder models are most accessible to certain well-resourced, highly skilled players. This cuts out many civil society representatives, smaller companies, and developing countries. To make the global standards development ecosystem truly multi-stakeholder, the USG and other supporters of this model must work to lower barriers and make it truly inclusive.

Streamline the SDO Ecosystem

SDOs themselves have varying levels of credibility within the ICT sector. This lack of clarity and efficiency in the system should be remedied. Addressing these systemic issues will help all countries participate more effectively in SDOs to create quality technical standards that will contribute to global peace and security. An evidenced-based assessment of the most effective SDOs needs to be taken.

As many standards development processes and adoption decisions are made behind closed doors by private organizations, the various data points that are needed to make that assessment are difficult to collate alone. The USG could lead a knowledge gathering exercise to develop a live database of technical standards for ICT with other governments, industry, and SDOs. This database should include information on which standards have been passed and adopted as well as more granular information, such as who proposed it and what was its intended impact. This information would help identify what standards processes and actors have had most impact to date, and it could be applied in many use cases including both improving global technology governance and national strategies.

Identify Strategically Important Technologies and The Components the U.S. Can Produce

The USG should work with industry and academia to identify the key technologies along with a map of which companies are attempting to shape the relevant technical standards through

which SDOs. The U.S. should get a clear view on exactly what components of these developing technologies are strategically important, whether it has or can create the industrial base to be a leader, and whether collaboration with other countries including China is beneficial.

China will lead in some technology areas that the U.S. cannot compete in. For example, in telecommunications, the U.S. has no vendors comparable to Huawei, Ericsson, and Nokia. In these situations, the U.S. should not forsake its seat at the standards-setting table but rather use its weight and influence to support the standards makers that most align with its interests.

Align Wider Policies to Complement U.S. Standards Strategy

Be aware of the broader ways in which technical standards and norms for global governance are set, particularly in relation to privacy, security, and data localization. Some key policy areas to consider are:

Development Financing: For example, the USG could align the infrastructure projects funded by the new U.S. Development Finance Corporation in Africa and Latin America.[93] This alignment will simultaneously help U.S. industry and allies compete for contracts in developing markets and support the uptake of preferred technologies thereby embedding preferred technical standards. Introducing more competition to developing markets could improve the quality of the technology being offered.

The U.S. might also seek to influence the proliferation of technology in India as that is a key market with standard setting power. There are also important connections between India and

[93] Julia Voo, "A Case for Fortifying the BUILD Act: The U.S., China, and Internet Infrastructure in the Global South," Belfer Center for Science and International Affairs, July 2019, https://www.belfercenter.org/publication/case-fortifying-build-act-us-china-and-internet-infrastructure-global-south.

the U.S. and EU as India provides large volumes of ICT services to the U.S. and services the EU data processing market.[94]

Trade Agreements: Bilateral and regional trade agreements will shape global digital governance whether the U.S. is a direct participant or not. In the absence of a seat at the table, the U.S. needs to consider how to influence these policies that govern technology by other means.

Work with Industry to Develop an Overarching Strategy for International SDO Engagement

The USG should take a proactive role in supporting the proliferation of quality technical standards and a multi-stakeholder model. Its current laissez-faire approach to standards setting perpetuates an inefficient system and leaves too much to chance.

Leveraging a deep understanding of the entire SDO ecosystem and armed with knowledge of which standards have been the most impactful, USG should develop an engagement strategy together with industry, civil society, and technical experts. A more effective mechanism to share information on activities in SDOs between relevant U.S. government departments, industry, civil society, and the various activities in SDOs would facilitate this.

Introduce Mechanisms to Support a Broader Range of US Representatives' Participation in Key SDOs

Encouraging more U.S. representatives to commit to participating in the standards development process is critical to continued influence. However, this additional work would place a greater burden on industry, and smaller companies in particular. The USG might create additional support for smaller companies to participate or encourage technical consortia among key technology areas.

[94] "Digital Economy Outlook 2017," OECD Digital Economy Outlook, 2017, http://www.oecd.org/internet/oecd-digital-economy-outlook-2017-9789264276284-en.htm.

Build A Pipeline of Standards Experts in Government and Industry

The loss of U.S. intuitional memory is on the horizon. The many American engineers who played a key role in the first days of the internet still hold positions of influence in certain SDOs, but they are aging and will soon retire. There is a risk that being part of the technical standards development process will not be appealing to the next generation and that U.S. representation in SDOs could decrease. To help combat this, USG should support the introduction of technical standards education in U.S. university degree programs spanning, at a minimum, Engineering, Business Administration, Legal, and Policy.

Conclusion

Competition between the U.S. and China has increased, and this state of competition will not disappear. Technological primacy has provided the U.S. with *de facto* influence in SDOs, but this can no longer be taken for granted. In addition, the piecemeal, inefficient, and duplicative ecosystem of technical standards bodies facilitates a bifurcation of technical standards development processes. This bifurcated system is not ideal for the U.S.' long term security, prosperity, or innovation. The USG must take a more hands-on approach across these organizations together with industry and civil society to ensure that the U.S. does not cede too much ground.

In addition, U.S. policymakers must realize that standards proposed by China are not intrinsically bad. The U.S. Department of Commerce amendment of a rule this summer to allow U.S. industry to collaborate with Chinese companies on the Entity List to develop technical standards demonstrates how joint U.S.-China collaboration in technical standards is key to U.S. innovation.

The strategy that the U.S. develops to increase its influence in international standards making to maintain a leading role in strategic technologies should be based on data that can be collected from key standards development organizations with partners. Identifying the most effective standards development processes, fora, and actors, and triangulating these with the standards that are adopted and by whom will help to identify where the SDO ecosystem can be made to be more agile, inclusive, and effective. These steps will not only improve the U.S.' overall influence in SDOs, but an internationally-engaged, proactive U.S. shaping global technology governance based on data will benefit all stakeholders and embed U.S. as a positive global leader for a better 21st Century.

Acknowledgements

Thank you to Jacques deLisle, Avery Goldstein, and Neysun Mahboubi, for leading the Penn Project on the Future of U.S.-China Relations with heroic patience and good humor, and to Amanda Morrison for her excellent copyediting. Thanks also to Paul Triolo and James Shires for their insights and incisive feedback. And to the Future of Humanity Institute at Oxford University and Jeff Ding for their support for this project over the summer.