

SMALL YARDS, BIG TENTS: HOW TO BUILD COOPERATION ON CRITICAL INTERNATIONAL STANDARDS

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EXECUTIVE SUMMARY

Technical standards can be easy to overlook. They are arcane, granular, and full of jargon. But as the world grapples with the risks and opportunities of artificial intelligence (AI) and other emerging technologies, mastering these details will be essential.

The United States, China, and the European Union (EU), three major players in the global economy, all have recently identified standards as critical to their strategies for AI and other emerging technologies and have propounded strategies to increase their engagement accordingly. This paper analyzes these strategies in the context of the system of international standards development and examines both the need to improve the system to meet broad societal implications of AI and the ways government engagement can undermine bottoms-up, research-driven, and adaptive features that make this system an effective tool of technology policy. The paper concludes with a series of recommendations both for strengthening standards development and for avoiding harm.

At a recent of roundtable convened as part of a joint project of The Brookings Institution and Centre for European Policy studies (the Forum for Cooperation on AI), participants were asked in which of six international channels cooperation on AI is most needed. More than 40% identified international AI standards as the top priority. Indeed, standards help enhance safety, improve management, enable interoperability for business and consumer, and provide coherent frameworks that can improve compliance across national borders and differing systems of law and governance. The World Trade Organization (WTO) recognizes that differing national standards can operate as barriers to trade and encourages adoption of international standards.

The US, EU, and China roles in international standards

The leading international standards organizations (SDOs)—especially when it comes to standards for AI—are the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), the International Telecommunications Union (ITU), and the IEEE Standards Association (IEEE). Most notably, ISO and IEC have formed a joint subcommittee, ISO/IEC JTC 1/SC 42, which has issued 17 standards and

reports, with 27 more in progress. IEEE adopted one of the first AI ethics frameworks in 2015 and since then has developed some 20 standards on AI and machine learning. The broad societal impact of AI changes the nature of standards development; unlike purely technical issues like the design of a mechanical part or mobile device chip, AI involves standards that are described as “socio-technical systems,” combining the technical with a range of broader considerations.

These SDOs operate with broad participation and consultation from industry and experts and adopt standards primarily on this basis of voluntary consensus. The resulting standards are not inherently binding, but individual governments can adopt or adapt them into law and regulation. The decisionmakers in these bodies vary; IEEE has members, while ISO and IEC operate through national standards bodies designated by governments, and in some instances are government bodies and in other cases are independent. In either case, it is usually the stakeholders who lead development standards based primarily on their technical soundness, and the main test of a standard’s quality is its adoption in the marketplace.

THE UNITED STATES

The U.S. approach has a well-established industry-led system that relies on stakeholders to establish voluntary consensus standards through a wide variety of mostly sectoral standards development organizations under the umbrella of the American National Standards Institute, an independent nonprofit. Under this approach, the government operates mainly as a convenor and a stakeholder, a role led by the National Institute of Standards and Technology (NIST), which operates adeptly as a

proponent of standards development while remaining a facilitator. The White House issued a strategy on standards development for AI and other critical emerging technologies such as quantum, biotechnology, and semiconductors that calls for (1) increased funding for fundamental research and pre-standardization research, (2) increasing U.S. stakeholder participation in international SDOs; (3) promoting greater workforce skills development; (4) increasing engagement with international partners and increasing the diversity of interests among stakeholders.

“The U.S. approach has a well-established industry-led system that relies on stakeholders to establish voluntary consensus standards...”

THE EUROPEAN UNION

The EU has a 2012 regulation on standards development founded on WTO principles that relies primarily on voluntary standards developed by a multistakeholder approach. It establishes an EU-wide system by authorizing the European Commission to request for the development of “harmonised standards” by recognized European standards organizations that override any standards developed at the EU member-state level. These can and often do adopt ISO/IEC standards, sometimes with modifications, and member-

state standards bodies participate in ISO/IEC. Commission-initiated EU harmonized standards make up only 20% of standards in the EU, with balance based on industry proposals in member state or European bodies.

In 2022, the Commission issued a standards strategy that includes increasing transparency and participation in standards organizations, pre-standardization research, and education on standards. In addition, a major element of the strategy is increasing the Commission's role in standards development and international standards bodies, assisted by an advisory body, and planning legislation to enlarge Commission authority to prescribe "common specifications" in lieu of standards if harmonized standards do not meet Commission requests or the Commission deems them "inadequate." The Commission's proposal for the EU Artificial Intelligence Act contained similar authority for AI standards, which was adopted in narrower form in the final agreement released in January 2024.

CHINA

The PRC has a state-driven dual-track approach led by the Standardization Administration of China under the State Administration for Market Regulation and State Council, with various ministries leading in the sectors they administer—subject to "Xi Jinping Thought" and the "comprehensive leadership" of the Communist Part of China.

These agencies organize stakeholders—primarily industry—to conduct the actual work of standards development. China's State Council outlined a standards strategy in 2021 that, like the U.S. and EU, identified AI along with quantum, biotechnology, and other areas as key areas of focus. The goals include expanding standardization research and incentives for participation in standards development, with an emphasis on adoption of international standards involvement in international SDOs, standards partnership, and involvement on standards through regional organizations, the Belt and Road Initiative to build a network of alliances, and the Brazil-Russia-India-China-South Africa (BRICS) group. In October 2023, China announced a "Global AI Governance Initiative aimed at "AI governance frameworks, norms and standards based on broad consensus." These elements reflect a dual strategy: increased stakeholder involvement and international cooperation alongside a China-centered effort to promote standards based on Chinese interests.

Despite their differing approaches, the EU, U.S., and Chinese standards strategies all include international engagement as a component. A number of bilateral and multilateral initiatives have identified standards development as key areas for collaboration. These include the U.S.-EU Trade and Technology Council (TTC); the G7; technology dialogues between the U.S. and Singapore, Singapore and the EU, and U.S. and the U.K.; and the Quadrilateral Security Dialogue among Australia, India, Japan, and the U.S. The U.K.'s Safety Summit in October 2023 spurred the U.K. and U.S., and likely others, to initiate research bodies for AI safety, and the New Zealand-U.K. Free Trade Agreement includes reference to industry-led standards for regulation of emerging technology, including AI. The TTC in particular has produced concrete results with agreement on terminology, comparison of risk assessment approaches, and agreement to develop a

code of conduct for AI, which resulted in G7 adoptions of codes for AI.

Balancing government roles in critical technology standards

The strategic implications AI and emerging technologies and socio-technical aspects warrant greater attention to standardization and increased participation in development of standards that affect the public interest. Even so, existing SDOs and standards development processes have strengths that need to be recognized and preserved. Their structures and processes involve wide participation, operate to distill input into fair and sound outcomes, and weed out unsound proposals. Their results are iterative and adaptive and generally better-informed and more agile than governments. These attributes have made them useful models of multistakeholder technology governance.

Both the EU and U.S. have been strong proponents of this approach to standards development as an element of a rules-based international order. Indeed, representatives of EU member states hold a majority of secretariat positions within the ISO and IEC and their committees and working groups. Yet there are elements of their standards strategies that could undermine the system of research-based consensus standards development and the benefits of international standards. As leaders in establishing and promoting this system, the U.S. and EU will need to exercise restraint in implementing their standards strategies. Rather than follow China in placing the thumb of government on standards development, they should act to strengthen the system and avoid a standardization arms race.

DON'T OVERREACT TO CHINA.

The U.S. and EU standards strategies both react in part to China's increased role in international standards in recent years and its explicit effort to steer these toward China's interests, especially in 5G and 6G standards. They should not view these developments with undue alarm. China's western trading partners have long urged China to participate in international standards development in communications technology (among others) rather than impose its unique national standards. Participants in international SDOs where China has participated report that its participants have often been constructive. They also note that when China has participated in ways that try to game the system, it has met with little success because the processes have mostly weeded out weak proposals.

CONSTRUE U.S. NATIONAL SECURITY OBJECTIVES PRECISELY.

The U.S. standards strategy strongly affirms support for voluntary consensus standards, and the steps outlined are consistent with this premise. The strategy does carve out an active role for the federal government in standards that address "risk, security, and resilience" and states that "the federal government is uniquely suited to lead standards development on topics of national security." This carve-out has

the potential erode the U.S. commitment to stakeholder-driven standards if either the scope of “national security” or the role of government leadership are interpreted broadly. The government should hew closely to concrete, identifiable interests (such as procurement for defense and government information systems) and tailor its role in standards development, working with stakeholders on how to meet identified needs.

DON'T SUBSTITUTE EUROPEAN COMMISSION PRESCRIPTION FOR CONSENSUS STANDARDS.

The EU's standards strategy also contains elements that work to strengthen the standards system. However, the Commission's proposed changes to the EU standards tip toward an EU-centric approach that could undermine the EU's commitment to voluntary and market-driven standards. The proposal to broaden to all EU harmonized standards the potential use of common specifications developed by the Commission would hand the Commission a powerful lever with which to insert its will into standards development. The Commission already has considerable influence with the authority to issue requests for standards development, but the proposal gives the Commission discretion to deem the resulting standards “inadequate.” The Commission's legislative proposal for the AI Act included common specifications authority along these lines, but the final agreement released in January 2024 narrowed the grounds on which the authority can be exercised and expressed the intention that it should be used sparingly. It also expressed a preference for incorporation of international standards for AI. The Commission should heed this instruction and exercise the authority it is being given with careful restraint.

Summary of recommendations

STANDARDS DEVELOPMENT ORGANIZATIONS MUST TAKE THE LEAD IN INCREASING PARTICIPATION.

Government can and should take steps to enable greater participation from a wider range of stakeholders but, if the system of standards development for AI and other critical emerging technologies is to be led by key SDOs, these organizations will have to do the most to broaden participation. This will require enlarging their traditional role as industrial organizations toward a greater public interest outlook and providing greater transparency and accountability to the public.

1. Broad public publication of final standards is complicated by a business model for most SDOs that depends on membership and licensing of standards for their revenue. Nevertheless, there are helpful steps that SDOs can take to provide greater transparency without impairing this business model.

- Certain SDOs take steps to make final standards available, such as read-only access on their websites or to specific categories of viewers. This practice should expand to standards of public interest (which would include many AI

standards).

- Standards of particular public importance should be made available. The risk management standard issued in December 2023 by ISO/IEC JTC 1/ SC42 is an example of such a standard.
- ISO and other SDOs publish abstracts of final standards and other information that can be more detailed and informative to enable public input.
- SDOs can provide more information about who the participants are in specific processes.

2. SDOs involved in standards development for AI and other high-impact technologies will need to broaden lines of communication with stakeholders outside their usual participants.

- This will require building community relations capacity to identify and reach out to civil society, academia, small-to-medium enterprises, and governments.
- Because active participation in standards development will be beyond the skills or resources of most of these players, the SDOs will need to develop mechanisms to keep them informed and channel their input.
- SDOs and policymakers should explore establishing bodies to act as intermediaries on behalf these nontraditional stakeholders.

3. SDOs will need help from all parts of the standards ecosystem: from companies to step up engagement and conduct their own outreach to additional stakeholders, from trade associations to broaden their involvement in standards development, from foundations to provide grants to support civil society participation in important standards, and from academic institutions to incorporate standardization into STEM and entrepreneurship teaching.

GOVERNMENTS HAVE AN ESSENTIAL SUPPORTING ROLE.

Governments can heighten awareness of standards and participation among their own personnel and the public. Elevating the level of the leadership involved standards-related activities will help increase their visibility.

1. The U.S. Congress needs to increase funding for NIST to enable the agency to carry out the numerous tasks assigned to it in the socially and strategically significant area of standards development. The administration's budget request for NIST asks for an additional \$358.5 million, but Congress has yet to fund a NIST-National Science Foundation pilot program called for in the CHIPS & Science Act to provide grants for building standards development capacity.

2. The U.S. Internal Revenue Service—or U.S. Congress if necessary—should also clarify that participation in standards development activities is eligible for research and development tax credits. This would mitigate the unwillingness of companies to divert science and engineering talent into standards development. Congress should also except participation in international SDOs from a requirement that eligible research and development (R&D) activities must be conducted within the U.S.

3. The U.S. government should increase funding for basic R&D, which has seen a 60-year decline as a percentage of GDP and which will drive the innovations and advances that will shape standards development.

4. The U.S government should elevate standards functions within the government.

- The NIST Information Technology Laboratory, which leads work on AI, should be combined with the emerging technology and standards arms as a separate division of NIST with its own associate director. This would strengthen NIST's leadership role within the federal government and with international partners.
- An expired National Science and Technology Council (NSTC) subcommittee on standards should recharter as a full NSTC committee to coordinate standards development across the federal government, with agency standards coordinators at the deputy assistant secretary or Senior Executive Service level.
- The White House should establish a national advisory committee along the lines of the National Security Telecommunications Advisory Committee, with high-level security clearances to provide advice on priorities for standards in AI and other critical technologies.
- A broader range of agencies and programs can support small and medium-sized enterprise capacity building and participation in standards development, including the Small Business Administration and NIST Baldrige fellowship and Manufacturing Enterprise Partnerships.

LIKE-MINDED COUNTRIES SHOULD ALIGN STANDARDS DEVELOPMENT AROUND AI.

The U.S., EU, China, and other governments and international bodies have recognized a need for international engagement on standards. Like-minded governments should coordinate engagement in various respects to maximize the coherence in the architecture of technical systems across differing legal and regulatory systems and promote use of international standards developed through open processes based on research and consensus.

- 1. A template for collaboration is the concrete EU-U.S. Trade & Technology Council work or terminology, risk assessment, and specific research collaboration.** As with the code of conduct originated in the TTC that migrated to the G7, these discussions should expand into the G7.
- 2. In addition to these topics, these forums should take up concrete areas of focus that can help to align approaches.** These include comparing standards priorities for AI and emerging technologies; analyzing gaps in existing standards development; and identifying opportunities to collaborate on increasing participation both among stakeholder groups and countries, transparency of processes, and both foundational and pre-standardization research on AI.
- 3. Governments themselves need to increase the transparency of their collaboration.** Engagement with stakeholders should take place not only alongside international meetings at the principals' level, but also in ongoing ways as the agendas and outcomes are being worked on. These processes should mirror aspects of the multistakeholder processes of standards development itself.
- 4. ISO/IEC is a key focus for collaboration because of its international recognition, and because its standards are able to be adopted for conformity assessment under the EU AI.** But coordination should take into account the work of IEEE and ad hoc consortia like the Coalition for Content Provenance and Authenticity and the Frontier Model Forum.
- 5. International collaboration should also expand use of trade agreements to align on standards for AI and other sectors, extending the scope of the WTO Technical Barriers to Trade agreement.**
- 6. Collaboration of both foundational and pre-standardization research and on a network of AI safety institutes will help lay the foundation for standards development and best practices.**

INTRODUCTION

Standards development can be arcane. They are... well...technical—the products of specialized knowledge emerging from obscure procedures with an alphabet soup of organizations and number salad.

They are presented in elaborate detail heavy with jargon and precise specifications. (In fact, a useful ChatGPT4 prompt for brainstorming this introduction was “Why are technical standards boring?”)

And yet, the United States, European Union, and China have each identified standards development as critical to strategically important technologies. The White House issued a “National Standards Strategy for Critical and Emerging Technology” in May 2023 that affirms the importance of standards and calls for “[b]olstering U.S. engagement in standards for critical and emerging technology spaces”¹ In 2022, the European Commission published a standards strategy that called for strengthening the global role of European standardization because “the strategic importance of standards has not been adequately recognized at the cost of EU leadership in standards-setting.”² The U.S. and EU strategies follow on China’s 2021 outline plan to improve standards development and increase incorporation of international standards because they are “an important aspect of the country’s foundational systems.”³

These parallel initiatives recognize how much technical standards and the organizations that develop them can shape 21st century information society. Across industries, technologies, and countries, standards help enhance safety, improve management practices, and enable interoperability for businesses and consumers. They also can provide coherent frameworks by which products and services comply with a given law. In the digital arena, standards permit different systems to communicate and share data with one another reliably, reduce the costs of the communication and data exchange, and provide more secure and resilient data storage and transmission.

A familiar example of such standards is IEEE 802.11, which enables seamless Wi-Fi connections as the bandwidth of routers expands and devices move about.⁴ In addition to using Wi-Fi, consumer smart phones rely on a host of hardware and software standards, such as ISO/IEC 14496 (ITU H.264) and ISO/IEC 23008 (ITU H.265)⁵ for media playback; IETF ICE for FaceTime;⁶ and specifications from Bluetooth SIG,⁷ and defense against liquid and dust under IEC 60529 (ingress protection ratings).⁸ (I did mention alphabet soups and number salads). These are just some of the many standards that enable the connections and devices bundled into mobile phones and many other connected devices. “God is in the details,” said the architect Ludwig Mies

van der Rohe, and, in today's technology-driven societies, standards drive the details.

As the world grapples with the risks and opportunities of artificial intelligence and other emerging technologies, mastering the details will be necessary for understanding the implications of these technologies and managing those implications in policy and application. So it makes sense for governments to sharpen their focus on standards and standards development as they address the economic, social, and geopolitical impact of technology policy and development. Yet government attention also has the potential to undermine attributes that are fundamental to the effectiveness of standards and the processes by which they are developed. This working paper examines how governments can work to strengthen international standards commensurate with the importance of standards for emerging technologies while sustaining the independent, collaborative, and research-driven role of standards development organizations (SDOs) and broadening their participation and transparency.

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After a brief overview of standards and SDOs, the paper explores the leading government strategies in this field focusing especially on standardization related to artificial intelligence (AI). It looks first at the White House approach announced in May 2023. It then compares this approach with the EU's strategy adopted in 2022, and with China's ambitious 2021 strategy. The paper stresses the valuable role of international standards and SDOs in bridging differences in approaches to law, regulation, and governance and preventing fragmentation among systems. Finally, it analyzes ways these national strategies may impair this role and the effectiveness of standards, and proposes ways the U.S., EU, and like-minded countries can strengthen cooperation on standards for trustworthy artificial intelligence and other critical emerging technologies in ways that strengthen the development, adoption, and effectiveness of technical standards.

BACKGROUND AND APPROACH

This paper emerges from discussions of the Forum for Cooperation on AI (FCAI),⁹ a joint project of The Brookings Institution and the Centre for European Policy Studies to explore issues in AI policy and development.

Since early 2020, FCAI has convened 21 virtual roundtables to date, bringing together officials from Australia, Canada, the European Union, Japan, Singapore, the United Kingdom, and United States with experts from academia, civil society, and the private sector. Standards have been a recurring subject in these discussions.

Our outlook in this paper has been broad: international standards development in general and cooperation in this area among leading economies. Our lens for analysis is narrower. First, it spotlights AI both because that is the original context for the FCAI project and because intense concern about AI puts policies on standards development into sharp relief. In addition, AI differs from other technologies. Its state of development and general-purpose application mean that standards for AI will follow the development of the technology rather than leading and enabling it, as they do for many of the information technology standards involved in mobile communications. Its broad implications affect a wider set of issues and stakeholders.

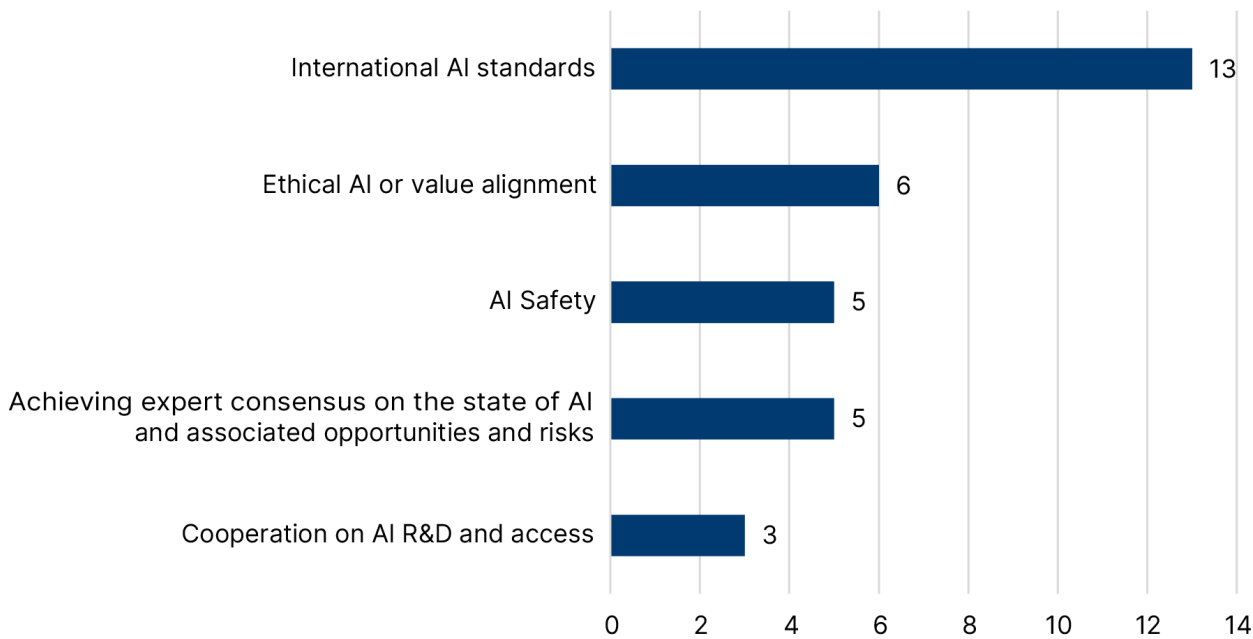
Second, the paper focuses on the United States, European Union, and collaterally on China. Each is a major economic and geopolitical power that has great impact on the development, deployment, and rules of technologies. Each has made standards a significant matter of government strategy with policies that have significant similarities as well as differences. China and the U.S. are the world's leaders in AI R&D and deployment, and the EU aspires to spearhead global norms for trustworthy AI.¹⁰ What the U.S. and EU are able to achieve—or fail to achieve—in their cooperation on AI and standards will shape AI outcomes from mechanisms like their bilateral Trade & Technology Council, as well as the G7, Organisation for Economic Cooperation & Development (OECD), and Global Partnership on AI (GPAI). The paper therefore concentrates on this vanguard.

A 2021 FCAI progress report made 15 recommendations in four key areas for further work toward cooperation: regulatory alignment, standards development, trade policies, and collaborative research and development projects.¹¹ Of these 15 recommendations, six touched directly on standards development under the heading “map cooperation

toward global AI standards.” Since then, FCAI roundtables have explored ways to put these recommendations into effect. This paper sharpens our broad recommendation on standards in 2021 with discussion of ways to align on effective standards development for AI. It reflects (1) review of government policies relating to standards development as well as relevant literature, (2) interviews with policymakers and experts about standards development; and (3) additional convening on June 22, 2023, to explore views on issues discussed in this paper, as well as involvement in other programs on standards development.

Another roundtable on October 17, 2023, explored the growing array of policy proposals and multilateral initiatives around global governance of AI, including the “Hiroshima process” underway in the G7 to develop codes of conduct, the Global Partnership on AI made up of 29 member states, and the effort toward a United Nations Global Digital Compact and a global governance body. We polled roundtable participants on where they think global efforts are best directed, including standards development among the options. As shown in the table below, standards came out well on top.

FIGURE 1
Number of first choice preferences for areas of international cooperation on AI
Poll results from FCAI roundtable



SOURCE: Author’s calculations using Mentimeter poll results from survey of FCAI roundtable participants, October 17, 2023.

More than 40% of participants in the roundtable listed international AI standards development as the first global priority. This paper addresses ways to strengthen and align the development of AI standards as well as ways that likeminded international partners can cooperate to these ends.

I. THE INTERNATIONAL STANDARDS DEVELOPMENT LANDSCAPE

The United States and its main trading partners share a broad commitment to international standards that are technically sound and adopted through consultative and consensus-based processes.

The Code of Good Practice, adopted as part of the WTO Agreement on Technical Barriers to Trade (TBT), calls for participating bodies to “ensure that standards are not prepared, adopted, or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade” and for application of international standards where they exist and apply.¹² Though the terms of the TBT agreement apply only to products and not to services, many countries apply its approach across the range of standards development functions.

The system that develops these international standards involves a wide variety of standards bodies and their stakeholders. Leading international SDOs involved in AI standards development (described in Table 1 below) are the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC); the International Telecommunications Union, a United Nations body; and the IEEE Standards Association (a unit of the Institute of Electrical & Electronic Engineers) (IEEE). In 2018, the ISO and IEC joint technical committee on information technology established a subcommittee (ISO/IEC JTC 1/SC 42) to promulgate standards on artificial intelligence with a view toward accelerating responsible adoption across applications and sectors.¹³ JTC 1/SC 42 has organized working groups and joint working groups with other ISO/IEC subcommittees; issued at least 17 technical specifications and reports relating to AI, including concepts and terminology, bias, risk management, trustworthiness, and assessment;¹⁴ and it convened an open biannual workshop series to engage stakeholders across industry, academia, government, and civil society.¹⁵ The ITU has “pre-standardization focus groups” on AI for several sectoral applications of AI¹⁶ and an annual AI for Good Global Summit.¹⁷ The IEEE was an early actor on AI ethics and has engaged actively in AI standardization;¹⁸ it has developed a series of standards and resources addressing what it refers to as autonomous and intelligent systems.¹⁹ Among current standards, as Hans Micklitz puts it, “ISO/IEC and IEEE on trustworthy AI already

firmly occupy the field.”²⁰

TABLE 1

Global SDOs operating procedures and membership

	Operation	Membership
International Electrotechnical Commission (IEC)	Not-for-profit, quasi-governmental international organization	The IEC is composed of National Committees (one per country) that appoint experts and delegates from industry, government bodies, associations, and academia to participate in the work of the IEC
Institute of Electrical and Electronics Engineers (IEEE)	Non-profit, technical professional association IEEE Standards Association (IEEE SA) is the standards setting body within the IEEE	IEEE SA Working Groups are open groups comprised of individuals for individual standards project, while corporate standards projects are comprised of representatives from corporations, government agencies, and academic institutions
International Organization for Standardization (ISO)	Quasi-governmental international organization Global network of national standard setting bodies	Full members (member bodies) participate and vote in ISO technical and policy meetings Correspondent members attend ISO technical and policy meetings as observers and have no voting rights
International Telecommunication Union Telecommunication Standardization Sector (ITU-T)	The ITU is the United Nations specialized agency for information and communication technologies (ICTs) ITU-T develops standards through multistakeholder study groups	Sector member can access all ITU-T Study Groups and the full range of ITU-T activities Associate can participate in one chosen Study Group Academic can access all ITU-T study groups

Source: Joshua P. Meltzer, “Critical Technology Standards Metric”, Brookings 2022²¹

In addition to these broad umbrella groups for standards at the international and national levels, there are many sector-based SDOs at these levels. The American Society for Testing and Materials International (ASTM International) is a prominent example, originating in materials and manufacturing standards; it develops AI-related standards for connected consumer products and various automated systems.²² There are emerging consortia that parallel standards development on specific aspects of AI: the Frontier Model Forum²³ through which model developers are exploring best practices for implementing voluntary commitments made to the White House on development of future models, and the Coalition for Content Provenance and Authenticity, a group of content and technology providers working on technical standards to authenticate media content.²⁴

The participants in these various organizations are both stakeholders—companies, researchers and developers, and nonprofit organizations—and national standards bodies. The latter are designated by governments, but in most instances, it is these bodies themselves and the stakeholders that lead standards development. Government employees may also be involved as stakeholders.

These organizations and their activities provide the setting where the engagement of China, the EU, and U.S. and their approaches to standards play out. This paper looks at the policies and strategies of these players. By way of comparison, most other FCAI countries rely primarily on stakeholders in standards development like the U.S., with the EU choosing greater government direction and Singapore's national standards body operating as a government department but relying on industry to do the work of developing standards that ensue. (See Appendix 1 for descriptions of standards development regimes under FCAI participating governments.) In all, there are 170 national bodies represented in ISO,²⁵ and a wide range of countries are seeking to engage on emerging technologies.²⁶

THE U.S. INDUSTRY-LED APPROACH

The May 2023 White House strategy for standards on critical and emerging technology reflects and reaffirms an approach that relies on stakeholders, including industry, academia, and nonprofit organizations, to establish voluntary consensus standards in various sectors, with government playing a role as a convenor, promoter, and adopter of standards.²⁷ This system is enshrined in law by the National Technology Transfer and Advancement Act of 1995²⁸ and implemented by the Office of Management & Budget (OMB) through Circular A-119, “Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities” (1998, revised 2016)(OMB Circular A-119).²⁹ The circular describes the system as “reliance on private sector leadership, supplemented by Federal government contributions to discrete standardization processes...” and requires federal agencies to use “non-governmental voluntary consensus standards unless doing so would violate law or be impractical.”

Under this voluntary consensus system, the U.S. “national standards body” is the American National Standards Institute (ANSI), a private, nonprofit organization. ANSI

represents the U.S. in the ISO and IEC, advocates for U.S. policy and technical positions in international and regional SDOs, coordinates standards development activity in national priority areas, accredits SDOs, and approves American national standards. Within the U.S., it operates as an umbrella for an array of SDOs for specific industries or disciplines, such as IEEE,³⁰ ASTM International,³¹ the American Society of Mechanical Engineers (ASME),³² and Underwriters Laboratories.³³ These organizations operate through expert participants and stakeholders in working groups and committees to identify needs for standards and revisions, draft standards, seek public review and comment, and approve and publish standards. The procedures aim to ensure transparency, representation of diverse stakeholders, and the development of high-quality standards. The quality of a standard is ultimately judged by adoption, a measure of its fitness for purpose.

OMB Circular A-119 designates the National Institute of Standards and Technology (NIST) of the Department of Commerce to coordinate government engagement with standards. NIST does not itself develop standards; instead, it provides support to nongovernmental SDOs through services such as conformity assessment guidance and educational resources; collaborates with industry and academia; and develops measurement standards and reference materials, guidelines, and best practices. Regulatory agencies, such as the Occupational Safety and Health Administration and the Environmental Protection Agency, may adopt voluntary standards as mandatory requirements or incorporate them by reference in their regulations. Last year, for example, the Energy Department incorporated ISO 2715:2017, which updated methodology for testing commercial and industrial pumps.³⁴

The White House standards strategy builds on a series of steps by the U.S. government to adapt this approach to the growing impact of technology. In 2012, the White House Office of Science and Technology Policy (OSTP) issued a memorandum that allows for “active engagement or a convening role...to accelerate standards development and implementation” in areas of “national priority.”³⁵ In 2016, the Obama administration updated OMB Circular A-119 to reflect this policy, strengthening coordination among federal agencies and emphasizing compliance with international obligations, including “[t]aking into account international standards—and basing standards upon them if appropriate.”³⁶ In the wake of these steps, in 2020 ANSI published the fifth U.S. national standardization strategy, which reiterated a call for the U.S. government to “engage actively in the development of standards to address [common standards-related] needs.”³⁷ In the AI space, a 2019 Executive Order on AI,³⁸ the White House OSTP’s AI Bill of Rights blueprint in 2022,³⁹ and

“The quality of a standard is ultimately judged by adoption, a measure of its fitness for purpose.”

NIST's 2023 AI Risk Management Framework (NIST RMF)⁴⁰ all identified standards as an area for engagement.

The 2023 White House strategy identifies a number of “critical and emerging technologies” and applications of these as areas of focus; these include “trustworthy and risk-managed” artificial intelligence and machine learning in addition to communications and networking, semiconductors and microelectronics, biotech, quantum computing, and others.⁴¹ To support these priorities, the strategy calls for (1) increased funding for fundamental research and pre-standardization research, (2) encouraging U.S. stakeholder participation in international bodies; (3) promoting greater workforce skills in standards development; and (4) increasing engagement with international partners and inclusion among standards professionals. The October 2023 executive order on AI builds on these with a specific plan for “a coordinated effort with key international partners and with standards development organizations, to drive the development and implementation of AI-related consensus standards, cooperation and coordination, and information sharing” guided by the 2023 strategy and the NIST RMF.⁴²

THE EUROPEAN UNION'S CO-REGULATION

The EU also has standards policies founded on voluntary standards adopted through open and participatory multistakeholder processes and founded on sound research and technology. This is reflected in the EU's 2012 standards regulation (Regulation 1025/2012),⁴³ which is founded on WTO principles of “coherence, transparency, openness, consensus, voluntary application, independence from special interests and efficiency,” and establishes an EU-wide system that is binding on member states through standards development by European standards organizations (ESOs). The ESOs are the European Committee for Standardisation and the European Committee for Electrotechnical Standardisation (together, CEN-CENELEC),⁴⁴ which are governed through national standards bodies, and the European Telecommunications Standards Institute (ETSI), governed by its member organizations.⁴⁵ The 2012 regulation calls on European standards bodies to “encourage and facilitate the participation of stakeholders.” CEN-CENLEC JTC 21 is the committee that leads development of AI standards in the EU.⁴⁶

The EU regime also provides for a significant European Commission role to further the EU's foundational objective of a single market among its members. The 2012 regulation provides for European “harmonised standards” (EUHS), standards initiated by the European Commission that enable compliance within the EU.⁴⁷ European standards (also sometimes referred to as “European norms”) can be initiated in two ways: (1) the Commission can issue a request to CEN-CENELEC or ETSI to initiate standards development, specifying areas where they are needed, or (2) member organizations with CEN-CENELEC or ETSI affiliation can initiate standards process. The ESOs in turn develop standards with the participation of member-states' national standardization bodies, partners, liaisons, and consumer, labor, environmental, and small-to-medium business organizations recognized as eligible for EU funding.⁴⁸ European standards can—and often do—build on ISO/IEC standards or other international standards and protocols by adopting them in full or with modifications.⁴⁹ Where such standards are

developed in response to a request from the Commission and deemed to satisfy the request, they are supposed to be published in the EU's Official Journal and become harmonized standards.⁵⁰ Adherence to published EUHS offers a presumption of conformity where conformity assessment is required. To date, this authority has been exercised mainly with manufactured goods to ensure they are consistent throughout the EU.

Under this approach, standards development is primarily industry-driven: harmonized standards only make up about 20% of all European standards, with the remaining 80% coming from industry proposals.⁵¹ In either event, ESOs and national bodies must provide easy access to draft standards to relevant stakeholders for comment and take into account feedback. The EU also funds a Small Business Standards Association (SBS)⁵² that operates as a voice of small businesses within EU standards bodies and encourages SME participation.⁵³ In certain areas such as product safety or health care, the Commission has been granted authority to adopt "common specifications," prescribed standards where no EU harmonized standards exist.

"AI is one of the digital components of the standardization strategy, following on the Commission's 2018 communication that AI is 'one of the most strategic technologies of the 21st century' and calling for improved standards in the field."

In 2022, the Commission propounded a new standardization strategy that recognizes "standards have become a matter of global importance" and proposes "an assertive global role."⁵⁴ It identifies vaccines and medicine, a green and climate neutral economy, and digitization as key strategic areas for standards-setting. AI is one of the digital components of the standardization strategy, following on the Commission's 2018 communication that AI is "one of the most strategic technologies of the 21st century" and calling for improved standards in the field.⁵⁵

The EU strategy outlines a number of concrete steps to support these objectives and enlarge the EU's role in global standardization: (1) taking a more active role for the Commission both in EU standards and engagement with international SDOs, assisted by an advisory body of national and EU-wide standards bodies and stakeholders to steer key standards; (2) revising governance of CEN-CENELEC and ETSI and increasing representation of SMEs and civil society as well as increasing transparency; (3) supporting pre-standardization research; and (4) increasing expertise by sponsoring education on standardization.

Alongside this strategy, the Commission proposed amending the 2012 regulation to reduce the role of "actors from outside the EU and EEA[European Economic Area]" in EUHS development by requiring that decisions on such standards be made

“exclusively” within EU national standardization bodies. In addition, the strategy announced plans for a “horizontal approach” to the issuance of “common specifications” in default of EUHS standards, expanding the Commission’s authority provided in various sectoral legislation.

Consistent with the standardization strategy, standards will play a significant role in the EU’s proposed Artificial intelligence Act (AI Act).⁵⁶ The major focus of this legislation is on “high-risk AI”—AI that may present safety risks in regulated products such as transport or medical devices or that may affect fundamental rights or decisions about individual welfare such as access to benefits, employment, or credit. Such AI applications will have to undergo a specified conformity assessment process, and compliance with EUHS will enable a presumption of conformity with the regulation. The AI Act also directs the Commission to request development of EUHS for AI, which the Commission already issued in May 2023. As of this writing, the final text of the legislation is being circulated and prepared for final adoption by EU legislators.

The AI Act text as circulated also allows for the Commission to issue “common specifications” in default of EUHS. As proposed by the Commission in 2021, this authority would have applied where “the Commission considers that the relevant harmonized standards are insufficient or that there is a need to address specific safety or fundamental rights concerns....” The agreed text narrows this latitude by setting precise conditions: (1) the Commission has issued a standards request and the request has not been accepted by any ESO, (2) standards have not been delivered in a timely way, or (3) the EUHS “insufficiently address fundamental rights concerns” or does not comply with the standards request; and no EUHS has been officially published. A recital to the legislation states that such common specifications “should be an exceptional fall-back solution...” where these conditions can be met, and also encourages the Commission “to cooperate with international partners and international standardisation bodies” in developing the specifications.

In directing the Commission to request EUHS, Article 40 of the released text also specifies that the “actors involved” (which include the Commission at a minimum) should “contribute to strengthening global cooperation on standardisation and tak[e] into account existing international standards in the field of AI” that are consistent with EU values, fundamental rights, and interests.

CHINA’S SUPERVISED DUAL-TRACK

China established a new regime for standardization under a new law that took effect in 2018, initiated by the State Council in 2015 and elaborated in a Central Committee and State Council national standards strategy in 2021.⁵⁷ The latter aims to “construct a standards system for promoting high-quality development, support high-tech innovation, spur high-level opening up to the outside....” A major element of this initiative is a dual shift in approach: (1) from “government-driven” standards to those “driven equally by the government and the market; and (2) a focus broadened from “industry-and-trade-driven” to “the economy and society as a whole.”

The 2018 law maintains a system of state control at both the national and sub-national levels.⁵⁸ Under this law, the system is led by the Standardization Administration of China (SAC), which reports to the State Administration for Market Regulation (SAMR) of the State Council. The China National Institute of Standardization is also subordinate to SAMR and engages in international standards activities, while SAC represents China in ISO and IEC. SAC also coordinates the work of standards through government ministries that work through sectoral standards development organizations such as the China Electronic Standardization Institute in the field of information and communications technology (including AI) and the National Technical Committee for Automotive Standardization for vehicles, including electric and autonomous ones. Government departments are instructed to “organize relevant parties” to be “in charge

of the standards drafting and technical review.”⁵⁹ The law provides for compulsory standards where they affect health and safety, state security, environmental security, and fundamental social and economic needs; other standards are “recommended” standards, which can include those developed by associations and individual enterprises.

As in the U.S. and EU, China’s strategy identifies “key technical fields” for standardization as AI, quantum computing, and biotechnology along with a range of information technology applications across healthcare, manufacturing, transportation, and energy. It expresses a wide range of ambitious goals and targets. Many of these are aspirational (such as improving and broadening standards for “quality of life”) but they also include some specific activities. Among these are increasing the number of standardization research institutions and laboratories, awards for key technical standards, systems for financing credit for standards.

“Notably, a major aspect of these goals and targets is increased engagement in international standards development.”

Notably, a major aspect of these goals and targets is increased engagement in international standards development. The strategy calls for strengthening international partnerships on standards, increasing transparency, greater alignment with international national standards (to reach 85% of national standards), establishing new research institutions on international standards, and expanding international exchanges and cooperation with ISO as well as in the BRICS group of Brazil, Russia, India, China, and South Africa; countries in the Belt and Road infrastructure initiative; Asia-Pacific Economic Cooperation (APEC); and regional standardization bodies. It explicitly proposes a project “to boost internationalization of standards...to promote the compatibility of Chinese standards with international standards.” A 2022 implementation plan from the State Administration for Market Supervision and 16 sectoral agencies lays out priorities for standardization, coordination among government departments and SDOs, and incentives for participation, especially in international SDOs.⁶⁰

The Chinese strategy on standardization resembles those of the U.S. and EU in its

recognition of the increased strategic and societal importance of technical standards and in responding with policies to promote and strengthen standards development. At the same time, there is an obvious duality to China's approach. John Seaman of the French Institute of International Relations (IFRI) describes this as a "dual-track approach" with increased reliance on stakeholder engagement and cooperation on standards in ISO and other forums operating in parallel with a "China-centered track that involve[s] promoting 'mutual recognition' of standards at the bilateral level and is increasingly coordinating standardization with the context of its Belt and Road Initiative."⁶¹ At its Belt and Road Forum in October 2023, China announced a "Global AI Governance Initiative" aimed at information exchanges and cooperation on technology, AI governance, preventing risks, and "developing AI governance frameworks [and] norms and standards based on broad consensus."⁶²

China's strategy inevitably must be viewed in the context of the overarching presence of the Chinese government and Communist Party of China (CCP) across the Chinese economy and society, and especially so when it comes to critical emerging technologies. The Chinese standards strategy is explicitly subject to "Xi Jinping Thought" and the CCP's "comprehensive leadership of standardization..." and China's standardization law provides for supervision of standards by standardization departments at various levels of government with coordination from the State Council.

Table 2 below summarizes key features of the U.S., EU, and China standards development system and their national strategies on standards.

TABLE 2

Highlights of U.S., EU, and China standards strategies

	United States	European Union	China
Stated objectives	Sustain U.S. technological leadership and promote open and transparent standards and markets	Consolidate the EU single market; promote EU competitiveness and technological sovereignty; facilitate cross-border collaboration and trade	Increase quality and innovation; promote international exports and economic and social development
International role	Harness international support for objectives and broaden representation	Unify standards within the EU and collaborate with other standards bodies	Boost internationalization of China's standards and compatibility with international standards
Leading bodies	NIST, National Science Foundation, ANSI	European Commission, CEN, CENELEC, ETSI	SAMR, SAC, other ministries, sectoral SDOs
Government role	Convening, coordination, and research; standards capacity building; adoption by reference	Selective intervention by requesting standards, common specifications; requiring and funding participation; research; adoption by reference	Setting priorities for standards and supervising SDOs; funding participation; certain compulsory standards

INTERNATIONAL COOPERATION ON STANDARDS DEVELOPMENT

As nation states have increased focus and involvement in technical standards both in science and technology innovation and in the flow of information and services, they have expanded their international engagement in the area. In various international forums, they have focused on the importance of international standards for AI and undertaken initiatives to work together in this arena.

The EU-U.S. Trade & Technology Council

The most concrete and developed initiative in this regard so far has been the EU-U.S. Trade & Technology Council (TTC), which emerged from a summit meeting in June 2021 and aims to address opportunities and frictions in the \$1.1 trillion transatlantic economy.⁶³ Since then, the TTC has met at the principals' level every six months, with a frequent cadence of work in between by working groups. The intensity of this effort has been high compared to many international forums—and especially so for AI and standards.

The TTC working group on technology standards includes a “U.S.-EU Strategic

“In various international forums, they [nation states] have focused on the importance of international standards for AI and undertaken initiatives to work together in this arena.”

Standardisation Information mechanism” for (1) “information-sharing on international standards development relevant to the technology and economic interests of the United States and European Union,” and (2) collaboration “to promote and defend our common interests in international standards activities for critical and emerging technologies.”⁶⁴ In addition, the working group on emerging technologies spun off a group on artificial intelligence that encompasses AI standards.

An AI subgroup of the TTC has produced perhaps the most concrete results of the TTC. It developed a Joint Roadmap for Trustworthy AI and Risk Management in December 2022 and established expert working groups on risk-based approaches to AI governance in three key areas: 1) terminology and taxonomy, 2) cooperation in international technical standards, and 3) monitoring and measuring AI risks.⁶⁵ The work plan for the first area identified the work of ISO and the IEEE among others as references. In addition, the section on standards announced a joint plan “to support and provide leadership in international standardization efforts” by working with stakeholders to identify critical gaps in international AI standardization and cooperate on pre-standardization research, with an initial focus on AI trustworthiness, bias, and risk management.

Following its May 2023 meeting, the TTC released a list⁶⁶ of shared definitions for 65 key AI terms to provide a basis for technical standards for trustworthy AI and announced it had completed mapping of U.S. and EU involvement in standardization activities to identify AI standards “of mutual interest.”⁶⁷ Another outgrowth of this meeting was an agreement to work on a proposed code of conduct for AI and to cooperate in the G7, OECD, and GPAI.

The G7

The Hiroshima G7 Summit in May 2023 built on earlier AI principles issued in 2019 under the auspices of the G20 conducted in Osaka,⁶⁸ also under a Japanese presidency, adding a more expansive and detailed statement that supported development of international standards for trustworthy AI through “in standards development organizations through multistakeholder processes.” The Hiroshima G7 also announced a “Hiroshima AI process” to produce recommendations on generative AI, with the EU and U.S. undertaking a completion of the code of conduct announced at the TTC to meet the G7 schedule for the end of 2023 and with the U.S. announcing a set of “voluntary AI commitments” by generative AI model developers.⁶⁹

The outgrowth of these initiatives was a succession of outcomes from the G7: a

leaders' statement endorsing "Hiroshima Process International Guiding Principles" and "Hiroshima Process International Code of Conduct" aimed at "organizations developing advanced AI systems" in October 2023, a set of 11 principles accompanied by additional explanation in the guiding principles and code of conduct, which organizations are urged to abide by.⁷⁰ These were followed in December 2023 by a ministers' statement on a "Hiroshima AI Process Comprehensive Policy Framework" based on the 11 principles but without added explanation and issued as guiding principles "aimed at all AI actors," not just foundational models.⁷¹ These common principles include "advance the development of and, where appropriate, the adoption of international technical standards."

Other frameworks

The impact of U.S. and EU combined economic power plus U.S. technology leadership and EU regulatory ambition make the TTC and G7 the leading centers of energy for AI standards. Standards development also figures in several more recent multilateral frameworks where digital issues have been a focus.

The TTC provides a general template for other emerging bilateral and plurilateral technology cooperation discussions. The Biden administration's proposal for an Indo-Pacific Economic Framework includes provisions for the development of standards around the digital economy and emerging technologies, governance of the digital economy and open data flows, and the advancement of resilient supply chains.⁷² The

U.S. and Singapore have held a number of dialogues bringing together officials from both countries to discuss AI advancement and culminating in cross-mapping the NIST RMF and Singapore Infocomm Media Development Authority's AI Verify.⁷³ Singapore also launched a parallel discussion with the EU on AI as part of the EU-Singapore digital partnership for bilateral cooperation that contemplates discussion of standards for trade documentation, cybersecurity, and "interoperability on AI governance, AI standards and testing frameworks." A U.S.-U.K. "Comprehensive Dialogue on Technology & Data" held an inaugural meeting in January 2023 that included a focus on "collaboration on AI technical standards development and tools...including through joint research and information sharing, and support for commercial cooperation."⁷⁴

The Quadrilateral Security Dialogue, or Quad, is a multilateral security partnership formed in 2017 and comprised of Australia, India, Japan, and the U.S. Through this partnership, Quad countries have engaged in significant cooperation on critical and emerging technologies, including AI. These efforts have resulted in various forms of collaboration on innovation and,

"The impact of U.S. and EU combined economic power plus U.S. technology leadership and EU regulatory ambition make the TTC and G7 the leading centers of energy for AI standards."

at its leader summit in May 2023, Quad members iterated “Principles on Critical and Emerging Technology Standards” with a commitment to support “industry led, consensus-based multi-stakeholder approaches” in creating technology standards that promote interoperability while “fostering an open, accessible and secure technology ecosystem.”⁷⁵ To this end, the Quad established a “Quad international Standards Cooperation Network” to widen monitoring of standards developments by exchanging information and identifying areas in which to work with each other and private sectors.⁷⁶

At the U.K.’s AI Safety Summit in October, the U.K. and the U.S. announced formation of, respectively, an “AI Safety Institute”⁷⁷ and an “AI Safety and Security Board”⁷⁸ to evaluate AI safety risks as well as best practices and guidelines for testing and managing safety risks. Japan’s prime minister disclosed⁷⁹ that the country expects to form a similar body early in 2024, and both Canada⁸⁰ and Singapore⁸¹ are reported to be considering following suit.

As outlined in our October 2021 report, trade commitments can promote cooperation on AI regulation, standards, and conformity assessments.⁸² The New Zealand-U.K. Free Trade Agreement has gone furthest among free trade agreements so far in specific AI commitments in a digital trade chapter.⁸³ These contain commitments around emerging technology to consider principles and guidelines of the OECD and GPAI when developing governance frameworks for emerging technology regulation, including AI, and taking a risk-based approach to regulation that acknowledges industry-led standards development and best practices. Bilateral and plurilateral agreements like the Singapore-Australia Digital Economy Agreement⁸⁴ and the Digital Economy Partnership Agreement (DEPA)⁸⁵ among Singapore, Chile, and New Zealand, are starting to address AI specifically in the context of standards development, as well as ethical use, talent, and more. The use of digital economy agreements to promote AI collaboration is still in a very nascent stage, with more that can be done in this vein.

Table 3 summarizes the relevant outcomes of key international forums that have focused on standards development.

TABLE 3

International outcomes on standards

Forum	Participants	Key outcomes
EU-U.S. Trade & Technology Council	United States, European Union	Published the TTC Joint Roadmap for Trustworthy AI and Risk Management to “advance shared terminologies” and “inform our approaches to AI risk management”.
G7	Canada, France, Germany, Italy, Japan, U.K., U.S., and EU	Launched International Guiding Principles and the International Code of Conduct for Advanced AI Systems.
Quadrilateral Security Dialogue	Australia, India, Japan, U.S.	Quad Principles affirm “private sector-led, consensus-based, and multi-stakeholder approaches;” Quad International Standards Cooperation Network for information exchange and monitoring.
U.S.-Singapore Critical and Emerging Technology Dialogue	United States and Singapore	Published a Joint Vision Statement meant to “foster open, accessible, and secure technology ecosystems;” mapping exercise between NIST Risk Management Framework and AI Verify to support complementary approaches.
EU-Singapore	EU and Singapore	Created a Free Trade Agreement and Investment Protection Agreement following two negotiation sessions in 2023.
New Zealand-Singapore Free Trade Agreement	New Zealand and Singapore	Began a Closer Economic Partnership in 2001 and updated in 2020, which reduces red tape around standards.

II. ENSURING THE EFFECTIVE INTERNATIONAL STANDARDS

The preceding overview of key approaches to standardization shows significant commonalities among the U.S., EU, and China in appreciation of the role that international standards play as bridges of interoperability among differing approaches to law, regulation, and policymaking, and the value of open standards development processes rooted in diverse technical expertise and market awareness.

At the same time, each of these governments chooses differing degrees of government engagement in shaping the processes. There are elements of the U.S. and EU strategies that could undermine their affirmations of research-based consensus standards development, but they also recognize significant challenges of adapting to the broadening role of standards in society.

This section explores ways that the U.S. and EU strategies could diminish the benefits of international standards development by overplaying the government role. The final section will suggest ways to manage the government role and to adapt standards development for the larger stage that standards occupy today.

KEEPING CHINA IN PERSPECTIVE

The expanded government involvement common in some measure to the U.S., EU, and China standards strategies presents tensions for the effectiveness of international standards. It can be tricky for governments to think strategically about technology and standards development and increase engagement in development of standards without politicizing SDOs or undermining the integrity of their processes. And specific goals of each government's standardization strategy can work against promoting interoperability

through international standards. As John Seaman observes about China's dual-track approach, it "reflects competing tendencies toward greater cooperation and convergence on standards, one the one hand, and a broader fragmentation or bifurcation of international standards regimes on the other."⁸⁶

The current U.S. and EU standardization strategies are in part responses to China's stepped-up role in international standards development, and they could produce some of the same duality. The White House strategy calls out China's active engagement and is explicitly a response and counter to China's approach. The European Commission does not mention China but calls out "other actors" that take "a much more assertive approach" in standardization bodies, a description that fits China and suggests that the Commission's proposal for the EU itself to "promote a more strategic approach" and play "an assertive global role" is also a counter to China.⁸⁷

The U.S., the EU, and other democratic and liberal economies should recognize China's efforts to steer international standards for its own aims, but they should not exaggerate China's role or overreact to it in response. For a long time, it was a talking point among the U.S. and other Western countries to urge China that it refrain from imposing its own national standards and instead engage with international SDOs. Now that China has made a significant turn in this direction, they should not ring fire alarms at Chinese involvement in SDOs.

"The current U.S. and EU standardization strategies are in part responses to China's stepped-up role in international standards development, and they could produce some of the same duality."

Indeed, Chinese experts can bring considerable expertise and practical knowledge to the table to contribute to standards. This is especially the case when it comes to AI, where China is a leader in the field. Our roundtables and our individual interviews with both private sector and SDO participants in standards development indicate that these stakeholders do not view China's role with great alarm. They report that Chinese participants make constructive and substantive contributions to significant standards (in 3GPP, for example). In some processes, Chinese participants may submit poorly developed proposals to support Chinese interests, sometimes in response to government incentives for making standards proposals. But participants note that governance procedures, transparency, and consensus decisionmaking in SDOs operate to weed these out and work against gaming the system. And even where poor proposals manage to be adopted in standards, they generally do not win acceptance in the marketplace—the ultimate measure of a standard's success.

Our take-aways from stakeholders are corroborated in a study by Matt Sheehan of China's role in SDOs, "What Washington Gets Wrong About China and Technical

Standards.”⁸⁸ In addition to similar interviews, this study included an analysis of filings with NIST in response to a request for comments on China’s activities on standards development and their influence on standards for emerging technologies. It found that “most industry commenters do not believe China is manipulating or breaking the rules of international SDOs.” Similarly, a review of telecommunications standards development by the National Security Telecommunications Advisory Committee reported “no empirical evidence that China or other governments have comprehensively co-opted the standards process to their own advantage.” The inclusion of China as a participant in the U.K. AI Summit Safety and a signatory to the Bletchley Declaration and the initiation of U.S.-China government-to-government discussions on AI coming out of the Biden-Xi summit in November 2023 provides some signal that the Biden administration and allies do not see China’s role in AI as entirely adversarial.⁸⁹

Given the broad role of China’s government in its standardization system, in governance of the firms and other organizations that participate in SDOs, and in China’s economy broadly and specifically the protection of domestic industries, there is still reason to be concerned about the impact China could have. Rather than responding in kind and turning standards into weapons of economic warfare, however, the U.S., EU, and likeminded countries should focus on protecting the integrity of international standards development processes and improving their transparency and inclusiveness, as discussed further below.

KEEPING “RISK, SECURITY, AND RESILIENCE” IN A SMALL YARD

As described above, the White House strategy reaffirms U.S. commitment to “an open and transparent standards system” that is led outside government. It does envision expanded government involvement in a line of effort to increase R&D and pre-standardization research to develop standards that “address risk, security, and resilience.” Here, the explanation begins by stating, “the federal government is uniquely suited to lead standards development on topics of national security.”

Whether this reservation for a hands-on government role could be problematic depends on how broadly it is construed. Both “national security” and “lead standards development” are terms open to wide interpretation. The first affects the scope of issues in which the government will be involved, the second the extent of the involvement and how it fits with the U.S. system of standards development. There are trade-offs involved in the play between the two: If the meaning of national security in this context is narrowly tailored to concretely identified government interests, then a prescriptive government will have less impact on standards development more generally. On the other hand, a broad view of national security could become disconnected from material government interests involved, leading to possible over-involvement that erodes the U.S. commitment to stakeholder-driven standards.

The government’s reading of this carve-out should borrow from its approach to export controls, which national security adviser Jake Sullivan has described as “a small yard with a high fence.”⁹⁰ A narrowly tailored conception of subjects that warrant government leadership would be the equivalent of a small yard. In the context of

standards development, however, the government's role should not amount to a very high fence; it should be primarily to identify what it needs for national security and then work with stakeholders on how to meet these needs.

In gauging governmental interests involved, there are governmental functions like procurement for defense and government information systems, where some standard-setting is inherent in the role. In these arenas, NIST develops standards and guidelines for federal agency acquisition of information systems and Department of Defense acquisition regulations mandate that federal contractors implement the procedures required of federal agencies.

The procurement role carries over into federal government use of AI. The 2020 AI in Government Act⁹¹ and a 2020 executive order⁹² task the Office of Management and Budget with issuing guidance for federal agency use of AI. That executive order also laid out principles that include making federal government use of AI reliable and accurate; safe, secure, and resilient; responsible, understandable; continuously monitored; and transparent, traceable, and accountable. Draft guidance is in progress.

Subsequent executive orders have built on the government's institutional role. The February 2023 Biden executive order on equity in government programs established agency equity teams whose mission includes preventing AI and automated systems from producing algorithmic discrimination.⁹³ The October 2023 AI executive order has several provisions relating to the procurement function; most significantly, it directs OMB to develop ways to ensure all federal agency contracts meet what will be extensive guidance on agency management and use of AI.

Under the heading of risk, security, and resiliency, the National Cybersecurity Strategy issued in March 2023 retains an overarching approach of "public-private partnership" but proposes to increase the accountability of private actors by increasing liability exposure for vulnerabilities and breaches.⁹⁴ For AI, the government should be mindful that the more prescriptive role envisioned in cybersecurity can draw on a broad base of mature security and resiliency practices and procedures established over more than two decades. AI, on the other hand, is in its youth.

"As it moves forward, the U.S. government should be wary of unintended consequences."

As it moves forward, the U.S. government should be wary of unintended consequences. Again, export controls provide an example. The Trump administration's designation of Huawei and its foreign affiliates to the "entities list"⁹⁵ subject to export controls was followed by issuance of a temporary general export license⁹⁶ that permitted U.S. firms to work with these entities on development of 5G in certain SDOs. This had the effect of suggesting that participation in international SDOs is subject to export controls. This was counter-productive, not only by deterring U.S. participation and effectiveness instead of affecting Huawei but, according

to participants, it also sent a message that the U.S. government was using standards development as a political instrument. The Biden administration revised licensing requirements to enable information-sharing in national and international standards-setting broadly.⁹⁷ Even so, FCAI participants report lingering uncertainty about engagement in international SDOs and doubt about U.S. commitment to research-based and open standards development processes.

CONTAINING THE EU-CENTRIC APPROACH

The European Commission's increasing role under its 2022 standardization strategy and prospective application in the AI Act present tension with a nominal general preference in the 2012 EU Standards Regulation for standards that are "voluntary" and "market-driven" and with the EU's commitment to cooperation on international standards reflected in the TTC AI roadmap and other forums.⁹⁸

Standards bodies of EU member states have been influential in standards development; their representatives hold a majority of secretariat positions within ISO and IEC and their committees and working groups, more than either the U.S. or China.⁹⁹ A key element of this leadership has been upholding a rules-based system that is driven by industry expertise and focused on the technical suitability of the end product. European influence in this area reflects both its strength in sectors like manufacturing and pharmaceuticals, where technical standards and specifications play vital roles, and the contribution of standards-setting to the EU's foundational role in promoting a single market. The development of EUHS serves this role by enabling products to be sold throughout the union.

The Commission's 2022 standards strategy can tip too far toward China's state-driven approach. First and foremost is the proposed broadening of the Commission's role in establishing common specifications where ESOs do not deliver standards that meet Commission standardization requests. To assist the Commission in this role, the proposal would establish an "excellence hub on standards" to monitor and coordinate international standardization. Tim Rühlig, who has written extensively about EU standardization, sees the 2022 strategy in general as preserving the EU role and its rule-based, technical approach but observes "pitfalls" in the standards hub. He writes:

"...the hub could too easily become the origin of a parallel system that ultimately undermines Europe's prized public-private partnership model...becoming an agency that develops a broad range of Commission-led 'Common Specifications' to replace official European standards created by ESOs [which] would to some extent mimic the Chinese state-led approach to standardization."¹⁰⁰

Rühlig is correct that that the hub could enlarge this potential but, depending on the makeup and governance of the hub in relation to the Commission and to nongovernmental stakeholders, it also could act as a check. The risk of the Commission displacing ESOs is not solely a function of the standards hub, however; it is inherent in the proposed authority to issue common specifications across all sectors. The authority to issue standards requests to ESOs gives the Commission a significant influence on the direction of standards but leaves it to the ESOs' processes and participants to determine the ultimate standards (including possible adoption of international standards). The authority for the Commission to issue common specifications where it deems harmonized standards "insufficient" could provide determinative leverage over these standards.

The political dimension of the EU standards strategy is most evident in a second feature, excluding non-European actors from voting on the adoption of EUHS.¹⁰¹ This has the effect of cutting out one of the three ESOs, ETSI, which (like numerous SDOs) allows participating companies to vote on standards.¹⁰² This is explicitly aimed at sidestepping the voting power within ETSI of "some multinationals"—plainly aimed at reducing the influence of large U.S. and Chinese players information and communications technology players. This carries the whiff of using standards development as a "protectionist tool,"¹⁰³ using a tool designed to promote a single market as a weapon to exclude foreign competition in that market. In announcing the standards strategy, EU Commissioner Thierry Breton said that "if we want to ensure Europe's technological sovereignty in crucial disruptive sectors such as 5G, batteries, hydrogen, or quantum technologies, we must occupy the field of standard setting. We must become standard-makers, and not just standard-takers."¹⁰⁴ As noted above, Europe has been highly influential in international standards development, and the way to be a standards-maker in emerging technologies is by making the technologies, not by European Commission fiat.

It is reasonable for the Commission to be concerned about the influence of large companies in standards development. The remedy for disparities in influence is not to exclude some players, however, but to expand the playing field, as the Commission also proposes to do, and as we discuss further below. The advantages for large firms come from the resources to deploy in lengthy SDO discussions and their motivation to push for standards favorable their own technologies and business models. These advantages are there regardless of whether firms involved are European or "multinational." Indeed, some of these same non-European companies participate in the committees of EU standards bodies that do much of the work of developing CEN-CENELEC standards, and the advantage of large companies is endemic to all SDOs, not just ETSI. Especially when it comes to AI, where EU companies lag way behind those from China and the U.S., the exclusion could limit the contribution of firms that bring the greatest technical know-how to the table, thereby increasing the risk that standards will not be fit for purpose and fail to win adoption in the marketplace.

The Commission's steering hand and the exclusion of non-European actors come together in prospective treatment of standards development under the AI Act. The regulation calls for such standards to be the basis for conformity assessments that

will be required for AI applications deemed high risk and for compliance with published EUHS to establish a presumption of compliance with the regulation.

The Commission got a head start on development of these standards before the EU Council or Parliament arrived at their proposals on the Act and long before final agreement on the legislation. On December 5, 2022, the Commission issued for public comment a draft request for drafting of “new European standards or European standardisation deliverables” to support the AI Act.¹⁰⁵ In jarring fashion, the Commission issued this draft standardization request the very same day that the TTC met outside Washington and issued its AI roadmap laying out joint plans to cooperate on AI standards. In May 2023, the Commission completed its final standardization request, which acknowledged “international standardisation can help to consolidate a common vision of trustworthy AI across the globe and removing technical barriers in relation to products that are powered by artificial intelligence.”¹⁰⁶ To that end, the Commission allowed for adoption of ISO standards and cooperation with ISO, IEC, and “other standardisation organizations,” and for taking “into account, as appropriate” work by ETSI. The request also called on CEN-CENELEC to develop European standards to address “European values and specificities” including the EU fundamental rights and the Commission’s policy objectives on AI and annexed a set of deliverables to be completed by April 30, 2025.

“The near-final text of the AI Act circulated in late January 2024 narrows the Commission’s proposed authority to issue common specifications by comparison to the original AI Act proposal from the Commission or to the Commission’s standards strategy.”

The near-final text of the AI Act circulated in late January 2024 narrows the Commission’s proposed authority to issue common specifications by comparison to the original AI Act proposal from the Commission or to the Commission’s standards strategy. It would allow the Commission to deem ESO harmonized standards insufficient only in how they address “fundamental rights concerns,” and expresses EU legislators’ intention that use of common specifications in place of EUHS should be the exception rather than the rule. The current Commission has not introduced legislation further amending the 2012 standards regulation to incorporate its proposal to expand common specifications, so evidently it will be up to the next Commission to decide whether to do so once it is constituted following upcoming EU elections. Perhaps that Commission will be instructed by the outcome on this issue in the AI Act.

BROADENING ENGAGEMENT IN STANDARDS DEVELOPMENT

The broad impact of artificial intelligence

and other technologies emerging at large scale societal impact presents a new set of issues for standards development. AI systems are “are inherently socio-technical...,” as NIST states in its AI Risk Management Framework¹⁰⁷ “Socio-technical” introduces a new term to the lexicon of NIST’s information technology frameworks that involves “the interplay of technical aspects combined with societal factors....” NIST also introduces “people and planet”, a new core dimension in the RMF. This dimension encompasses a wide variety of actors beyond industry groups—“researchers, advocacy groups, environmental groups, civil society organizations, end users, and potentially impacted individuals and communities”—that can inform the socio-technical aspects of AI systems. Standards development for AI needs to adapt to this broader context.

Both the EU and the U.S., along with many analysts of standardization, recognize a need to bring additional voices into standards development and make standards even more transparent. This is a necessary response to the larger role that standards and SDOs play in today’s society, and to longstanding criticism of standards development as dominated by private interests and lacking democratic oversight.¹⁰⁸ Increasing transparency and broadening participation can increase trust in standards not only within the United States and Europe, but also elsewhere around the world. In the next section, we explore ways to increase participation and transparency in standards development to these ends.

At the same time, it is important to recognize some strengths of existing standardization institutions and methods. SDOs and the processes they administer have proved to be useful methods of governance of information and communications technology. Despite their limitations, the structure and processes of SDOs make them open to a wide variety of participants. Their participatory and iterative deliberations allow them to distill the input of these participants effectively and fairly, protecting against abuse. As a result, SDOs are generally well-informed about the markets and technologies involved.

This form of collective decisionmaking, mediating private interests while establishing a form of social good, presents an effective model of multistakeholder governance. For a notable example, the SDO model has served well in areas like internet governance, where it is employed by a loose confederation of organizations. Standards are iterative and usually more adaptive and agile than legislation and regulation, despite common concerns about the speed of their development.

SDOs and standards development processes have proved capable of dealing with broader social issues in the context of AI. As mentioned above, the IEEE was one of the first bodies to propound ethics guidelines for AI in 2015. Human research ethics in the U.S. are founded on the Asilomar Principles¹⁰⁹ developed by convening experts to arrive at consensus, and this same multistakeholder approach arrived at the Asilomar Principles on AI in 2017, another early framework for AI ethics. Governments can and should set norms of conduct and apply them to AI—to provide that AI systems cannot discriminate on the basis of protected categories, that they protect individual rights like privacy and individuals themselves, and that they do not infringe on intellectual property, for examples. But governments’ declarations of these social policies need implementation in practice. In the U.S., for example, a range of antidiscrimination

laws protect individuals and groups from discrimination on the basis of race, gender, and other categories; as federal agencies apply these in the context of algorithmic decisionmaking for access to financial services, housing, and other life-affecting services, the challenge becomes how to test for discrimination both before deployment and in application.¹¹⁰ Management and measurement are at the heart of such issues: A key take-away from FCAI's June 22, 2023, roundtable exploring AI standards is the central role of measurement and process in putting responsible AI into practice. Standards on data quality, risk assessment, and validation—to name some key issues—can provide valuable tools to align the deployment of AI systems

Standards under the EU AI Act are not exceptional in this respect. Addressing what the Commission called “European values and specificities” has focused on perceived gaps relating to fundamental rights and individual health.¹¹¹ But assessing the impact of AI systems on fundamental rights will require processes that are reproducible and reliable, as well as measurement tools. These are functions where standards and standards development can make essential contributions. Indeed, the deliverables in the annex to the May 2023 Commission request for EU harmonized standards lists risk management, data quality and governance, logging, transparency, human oversight, accuracy, robustness, cybersecurity, quality, management, and conformity assessment—precisely the kinds of processes and tools that can have general application across legal

systems. These deliverables “greatly overlap with ISO/IEC and IEEE standards” and address issues that are common to most frameworks for responsible AI and that are undergoing deliberation across the globe.¹¹²

“The scale of the challenges warrants a collective approach. Standards can provide a mechanism that bridges differences in regulation as a result of differing approaches to law and governance, but only if they avoid fragmentation.”

The scale of the challenges warrants a collective approach. Standards can provide a mechanism that bridges differences in regulation as a result of differing approaches to law and governance, but only if they avoid fragmentation. A major focus of our October 2021 progress report is the importance of international cooperation to maximize scale and build common approaches to responsible AI that can harness benefits and provide an alternative to the increasingly state-centric model promoted by China.¹¹³ Standards can provide a mechanism that bridges differences in regulation as a result of differing approaches to law and governance, but only if they avoid fragmentation.

III. STRENGTHENING INTERNATIONAL STANDARDS FOR THE FUTURE

Section II covered the reasons for increased government attention to standards development along with downsides of too much attention. This section proposes specific ways to respond to the increased impact of technical specifications in a digital economy and society.

Heightened government attention does not mean that improving standards development systems to meet challenges of emerging technologies should be done primarily by governments. It is incumbent on the U.S. and EU in particular to avoid a national standards development arms race because they are leaders in promoting consensus, research-driven standards, and in upholding a rules-based international order. SDOs, the private sector, civil society, and academia need not only to participate, but to take the lead.

Even though the systems of standardization are able to address many issues in AI and other emerging technologies, they will need both additional participation across disciplines and value chain by the researchers, advocacy groups and others NIST identified as stakeholders in its RMF and broader public engagement. Such participation will introduce additional competence and perspective and contribute to broader buy-in to the outcomes. Governments can help but they should not be the prime movers. Expanding participation in standards development will require systematic and sustained effort by SDOs and their leading participants.

→ BROADEN SDO LEADERSHIP

Ultimately, it will fall on standards development organizations to do the most to broaden participation. The increased importance and visibility of standards places SDOs at a watershed—especially with respect to AI. No technology has ever achieved the level of adoption and awareness generative AI has over the past 18 months and, as the 2023 pace of initiatives on AI policy demonstrates, demand for technologies that are safe and

trustworthy is widely felt. This puts a spotlight on major SDOs that deal with information technology.

In response, these SDOs will need to adapt their roles. Historically, they have operated primarily as industry organizations. They have evolved systems of consultation and convening toward consensus that have proved well-suited to the demands of technology and the marketplace and remain essential to effective standards development. For standards that combine social with technical components, however, SDOs must also take on broader roles as stewards of the public interest. This must include additional efforts toward transparency and accountability to the broader public, which will help legitimacy of their outcomes and strengthen insulation against undue influence from government industrial strategies or from other actors.

1. This evolution includes increasing transparency. The release of final standards is complicated by the dependence of most SDOs on subscriptions, memberships, or licensing for their revenue. They are nonprofits that cover costs of their activities with such revenues, and therefore place them behind paywalls. Although there are some alternative funding models, these revenues are chiefly what sustain the system of standardization.

- SDOs nevertheless have been able to take steps toward access to some final standards. In the U.S., when standards are incorporated by reference into law or regulation, federal regulations require that such standards be “reasonably available,”¹¹⁵ which agencies can accomplish by posting them in read-only format on their websites during rulemaking or on the website of the copyright holder.¹¹⁶ Many individual SDOs as well as ANSI acting as a hub have taken steps over the past decade to provide access to standards on some basis; these include IEC, ISO, the British Standards Institute, and IEEE.¹¹⁷
- Certain AI standards of public importance should be made publicly available, at least in read-only format, as ASTM International did with a standard for personal protective equipment during the COVID-19 pandemic,¹¹⁸ and IEEE has done with its GET program.¹¹⁹ At a minimum, such information should be available to those within certain defined categories, such as media, academia, and nonprofits, and could be protected from republication by nondisclosure agreements. A leading example of such a significant AI standard is the first risk management standard, ISO/ IEC 42001 issued in December 2023. This long-awaited standard addresses a common element of AI frameworks including the EU AI Act and the NIST RMF. ISO has recognized the public significance of such work by honoring the ISO/ IEC JTC 1/SC 42 committee with its annual standards leadership award in 2023 as “critical to addressing global challenges and accelerating progress toward a more sustainable, equitable and inclusive world.”¹²⁰
- There is more SDOs can do when it comes to shedding light on the general content of final standards and standards in development without

preempting the market for final standards. ISO and its national members, as well other bodies, publish some information or drafts on standards in development for public comment and provide brief abstracts of final standards. The summary information made available can be more detailed and extensive—especially to inform outsiders to SDOs whether they might want to engage—without preempting the market for the information needed to implement the standards. The ISO/IEC JTC 1/SC42 committee set an example by conducting biannual public forums on its AI standards development.

- Along with disclosure of the substance of significant standards, SDOs should provide more information about participants in their development. To take the pivotal ISO/IEC JTC 1/SC 42 committee as an example again, ISO touts it as “unit[ing] a diverse array of global stakeholders from 59 countries, ranging from those deeply engaged in development, to those overseeing regulations, to those seeking to leverage AI technology.”¹²¹ It should help the credibility of the work product to know more about these stakeholders and the interests they represent.

2. Convening is integral to what SDOs do but, when it comes to discussions of critical standards, they will also need to curate. SDOs will have to become evangelists for engagement by identifying and reaching out to additional stakeholders affected by particular standards. Where many of these will be unable to participate extensively in development of the standards, SDOs will also need to develop channels to act as conduits to ensure their input is presented.

- SDO leaders at the organizational and the committee levels will need to supplement their avenues of participation by identifying and inviting additional voices needed for complete discussion of standards for AI and other high-impact technologies.
- Conducting such outreach will require skill sets more like those for government and community relations or community organizing than for traditional SDO functions.
- There are practical limits to how much nonprofit sectors will be able to participate in standards development. The process is complex and time-consuming, and it is difficult for even large corporations with robust standards programs to find the bandwidth and resources to cover all the standards development in play. More than tiered costs of membership in SDOs or of purchasing standards, the major barrier to participation is expertise and time. SDOs can mitigate these challenges by keeping nonprofit stakeholders informed about standards development, and by soliciting their views and channeling them into the standards development process.
- To institutionalize such outreach, U.S. SDOs should work with their

members, Congress, and the executive branch to explore establishing a vehicle (or vehicles) to represent SMEs, consumers, and other interests in SDO processes, including voting on final standards. Given its socio-technical elements, AI standardization could offer an appropriate occasion for such experimentation.

3. SDOs will need help in broadening participation in standards development.

The task will take concerted effort across standards ecosystem:

- The private sector makes up the dominant share of participants in most standards development and will remain so even if more players join the discussion. Standards are complementary to R&D, public policy engagement, and the sustainability of business plans. Companies that have been active participants in standards development should consider increasing their investment and engagement to deal with the increased influence of standards in the global marketplace and growing array of standards development processes. Many such companies also have cultivated relationships with civil society and social organizations in their government and community affairs that they can draw on for input on standards of public interest. Other companies should inform themselves about standards development to assess whether it may be worthwhile to engage.
- Similarly, more trade associations should consider monitoring standards development and providing information and capacity building for their members as well as participating on their behalf.
- Artificial intelligence has attracted attention from foundations interested in responsible and equitable AI. Their efforts to these ends should include funding for standardization capacity building and participation by civil society and other groups that have not generally participated in standards development (including SMEs).
- The White House strategy appropriately notes that academic institutions “should renew a commitment to teaching and highlighting the value, development, and use of standards and standardization in a range of career fields.”¹²² Compared to commercialization programs for intellectual property coming out of academic research, standards development offers a less significant stream of revenue for universities. Nonetheless, it plays a role in commercialization of research alongside entrepreneurship and other practical skills. Academics have played especially significant roles in the development of AI methods, models, and datasets and the commercialization of AI models; they should do so in AI standards as well by incorporating standardization into skills teaching and offer credit and internships for related work. This will add to the expertise available to SDOs and their participants.

→ GOVERNMENT SUPPORTING ROLES

Government efforts can play an adjunct role to nongovernmental efforts across the standards ecosystem. They need to strengthen support and funding for standardization and heighten awareness of standards development across government while protecting the quality of research-driven consensus standards and in avoiding a top-down approach by government.

The U.S. government must walk a fine line toward standards development as it proceeds in the “areas of focus” for critical and emerging technologies identified in the May 2023 White House strategy on standards and as agencies implement the October 2023 executive order. Correspondingly, the European Commission should not let its ambition to make the EU a rule-setter in AI allow it to politicize standards-setting in ways it has criticized as “limiting the evolution of the global open market and hampering the digitization process across the world” when it comes standards for internet protocols. A commitment to international standards and the processes of international SDOs has been integral to the EU’s commitment to a rules-based international order. The EU should not make an exception for standards on AI.

“Government efforts can play an adjunct role to nongovernmental efforts across the standards ecosystem.”

Accordingly, the Commission should use restraint in the exercise of its authority under the AI Act and heed EU legislators’ counsel to strengthen global cooperation, draw on international standards, and make common specifications rare exceptions. Nor should the Commission, as a legal opinion for the German Federal Ministry for Economic Affairs and Energy puts it, “use the assessment of the harmonised standard as an opportunity to duplicate the standardisation process or even to replace the contents agreed by the standardisation organisations with its own technical rules.”¹²³

There are valid reasons not to rush AI standards and to default to international standards rather than develop national or regional ones. The Act and the Commission standards development request allow for standards “under development” and the request reserves the ability to revise the scope and the April 2025 deadline. There is much yet to understand about AI and processes for measurement and control. International collaboration in this regard will bring more resources and expertise to the task and greater critical mass and interoperability to the end products.

1. **First and foremost, the U.S. government needs to increase funding to support the broad responsibility for AI policy and standards development assigned to NIST.** The October 2023 executive order on AI assigns more tasks to the Department of Commerce than to any other agency, and NIST has the lead on carrying out these tasks, including developing a plan for international engagement on AI standards development before the end of 2024. NIST commands wide respect as an honest broker and source of science-based solutions on a broad

range of issues and will need additional resources and authority commensurate with its expanded role. (Disclosure note and background: As General Counsel and Acting Secretary of the Department of Commerce from 2009–13, I worked closely with NIST on a range of issues and had some hand in developing the flexible approach in its Cybersecurity Framework, which was precursor for NIST AI Risk Management Framework. My assessment of NIST is based on my observation then and subsequently, including at numerous FCAI roundtables and public events on AI policy where NIST representatives have contributed).

- The administration’s 2024 budget request includes a 29% increase for NIST of \$358.5 million.¹²⁴ Congress should authorize an amount on this order and appropriate funds to support U.S. leadership in AI policy and standards development and make good on the recognition it has given to importance of standards development. The increased budget for NIST would support the agency’s increased responsibilities under the 2023 executive order, including international outreach, as well as enable it to expand existing programs like NIST’s standards development curriculum, scholarships for students of standardization, increased outreach on standards, and additional pre-standardization research.
- Moreover, the CHIPS & Science Act has a provision expressing Congress’s sense that “strengthening the unique United States public-private partnership approach to standards development is critical to United States economic competitiveness” and “effective Federal engagement in the development and use of international technical standards.”¹²⁵ It directs NIST, the National Science Foundation, and other agencies to establish a “capacity building pilot program” to provide grants for the costs of participating in international standards development. Congress has yet to authorize and appropriate funding for this purpose.
- In addition, the IRS—or Congress if necessary—should clarify the eligibility of standards development expenses for R&D tax credits. Participants in our discussions point out that within companies—even those that take an active interest in standards development—it can be challenging to bring in expertise from engineers and other specialists because involving them may pull them away from other projects with more direct and immediate impact on bottom lines. Allowing tax credits for these expense lines would mitigate this disincentive and recognize the long-term benefit to technology development and leadership. This endemic tension between short-term interests and long-term strategy could be eased by making expenses of participation in standards development eligible for R&D tax credits. Moreover, the activities of developing technical specifications and requirements for standards are the same sorts of activities that qualify for credit when done as part of in-house R&D. The White House standards strategy treats SDO participation as within the scope of R&D for purposes of federal grants; tax policy should do likewise. In addition, the federal tax credit does not apply to the expenses of work outside the U.S.; there should

be exceptions for participation in meetings of international SDOs.

- Increased federal support for basic R&D will also support standards engagement. U.S. Government spending on R&D as a percentage of GDP has been in a steady decline over the last 60 years.¹²⁶ The National Security Commission on AI, among numerous others, has pointed to this decline as a threat to U.S. technological leadership.¹²⁷ That leadership goes hand in hand with leadership in standards, because in the end technological advances are what will shape standards development. Pre-standardization research is an important way government can support standards development, and basic R&D can operate as a foundation for pre-standardization research.

2. Standards development functions within government need to be elevated.

The EU's 2022 standards strategy established a position of "chief standardisation officer" to coordinate action on various standards-related activities across the EU, increase awareness of standardization, and partner with stakeholders in overseeing some standardization efforts. This role has been assigned to a deputy director-general within the Directorate-General for Internal Market, Industry, Entrepreneurship (better known as DG-GROW), a high-level management position within the European Commission. The U.S. government has a similar coordinating function within NIST as well as cross-agency coordinating mechanisms under OMB Circular A-119.¹²⁸ Commensurate with the increased importance of standards, the U.S. government should elevate the visibility and authority of these roles to confer greater clout within the federal government and with international counterparts and increase the visibility of standards development.

- To reflect the greater significance of AI and standards development, what is currently the NIST Information Technology Laboratory within the division for laboratory programs should become a separate division for AI, emerging technologies and standards development headed by its own associate director.¹²⁹ This would strengthen the hand of NIST leadership on these issues within the U.S. government interagency process as well as with diplomatic counterparts. It would also strengthen management for the additional staffing needed to meet NIST's enlarged role under 2023 executive order on AI, the CHIPS & Science Act, and other initiatives.
- Across the federal government, standards activity formerly was coordinated through a subcommittee of the National Science and Technology Council, but this subcommittee's charter lapsed. This group should be rechartered as a full committee of the NSTC in light of the crosscutting impact of standards on science and technology. Agency standards coordinators should be at the deputy assistant secretary or career Senior Executive Service level or above. This should be accompanied by additional capacity building within the government; despite longstanding policy surrounding the voluntary consensus approach, relatively few government officials have a good working understanding of standardization. Such knowledge is especially

needed for funders of research and agencies with oversight of sectors that are regulated or technology-intensive.

- To ensure that government standardization priorities are suited to the needs of technology and the marketplace, the U.S. executive branch should establish a high-level advisory committee comparable to the National Security Telecommunications Advisory Committee (NSTAC).¹³⁰ Indeed, in 2022 the NSTAC was tasked by the White House with reviewing U.S. competitiveness in telecommunications standards, and its work was part of the input for the 2023 White House standards strategy.¹³¹ There is a need to bring in senior corporate executives, scientists, and other experts with high-level security clearances that would complement the NSTAC's review on an ongoing basis for a wider range of critical technologies, including AI.
- In addition to grants called for in the U.S. standards strategy and 2023 executive order on AI, the U.S. government can expand support for SME participation in standards development. Small Business Administration programs should encompass capacity building and support in this arena. NIST should import its standards capacity-building work into the industrial programs of its Manufacturing Enterprise Partnerships, centers of excellence, and Baldrige fellowship program to help bring standardization into the corporate mainstream. Prize challenges, which have been effective in encouraging participation and innovation in other areas, could be adapted to standards participation.

3. In addition to funding for participation in standards development, governments can play a significant role in increasing its visibility among stakeholders. NIST, CEN, and other standards leaders conduct workshops and “summits” but, to some extent these are preaching to the converted—the experts and participants who are familiar with standardization. Elevating the level of leadership involved in such programs would draw a wider circle of participants to build more support and create more visibility. Outreach programs and jawboning can increase awareness.

ALIGNING STANDARDS DEVELOPMENT INTERNATIONALLY

The critical advantage of international standards is their ability to enhance interoperability across international borders and provide coherence to the architecture of technical systems even where overlaying legal and regulatory systems differ. Governments should maximize this advantage by coordinating their involvement in standards development.

The EU, U.S., and Chinese standards strategies all include international engagement as a component. The October 2023 White House executive order on AI takes more concrete and ambitious steps in this direction, calling for the Department of Commerce to lead a broad effort to coordinate with international partners on AI policy, including

“a coordinated effort with key international partners and with standards development organizations” on AI standards. The order sets a 270-day deadline to come up with a plan for this effort, identifying specific subjects that could be included. Most of these subjects track the focus of the TTC AI roadmap: vocabulary, monitoring and measuring, and risk assessment. The concrete progress on these areas within the TTC provides a foundation to enlarge on in the G7’s implementation of its Hiroshima process. An overarching goal of these and other discussions should be reinforcing the use of international standards based on consensus developed through open, participatory procedures and based on sound research input.

1. Within the subtle boundaries on appropriate government roles in this arena, such discussions should include comparing priorities for standards and filling gaps.

If, for example, the EU sees current standardization efforts as omitting EU fundamental rights, can such gaps be fulfilled by enlarging existing international standards development? Are there areas where collaboration on pre-standardization research can speed the development of needed standards? Are there ways that governments can broaden participation in SDOs by aligning their support? How can they work together to build standardization capabilities and participation in countries that have remained outside these ecosystems.

2. The EU and U.S. standards strategies both call for increasing transparency and participation in standards development.

- Clément Perarnaud and others at the Centre for European Policy Studies compared U.S. and EU approaches to opening up standards development through awareness and access, SDO support for SMEs, and outreach channels.¹³² Joint discussions between them and with other international partners should explore how they can coordinate efforts toward broadening access to standardization on these key planes. This should include granting liaison status to each other’s organizations representing SMEs and others from outside their countries, and seeking representation from the Global South.
- The U.S. strategy plans a “standards center of excellence” and training to assist companies in engagement with standards. The EU and U.K. standards hubs and NIST in the U.S. can play valuable convening roles in heightening awareness of standards, building capacity, and amplifying additional voices in standardization processes. These bodies should pool their convening power, visibility, and outreach facilitate identifying additional interests and stakeholders and bringing them or their views into standards development processes. For example, NIST held a two-day “summit” in September 2023 to elicit views on needs for standardization in furtherance of the CHIPS Act.

3. Governments themselves should improve transparency about their discussions among each other on standardization. Lack of information about the progress of discussions in TTC working groups, including the standards group,

has been a common stakeholder concern. Discussions among government on standards development in the TTC, the G7, and other forums should involve entities and organizations that propose and develop standards on an ongoing basis and not just on the side of principals' meetings.

4. The EU and U.S. articulate broad objectives for their standards strategies and various initiatives to strengthen standards development and their own coordination and engagement in the area.

Neither defines measures of success, however. Both the EU Standards Hub and NIST should conduct consultations to define the outcomes that will establish whether the strategies have been successful. Head counts of participation may be one minor measure but, if the success of standards lies in quality and uptake, then the focus should be on standards published, particularly those that can be adopted in multiple jurisdictions.

5. With regard to aligning on AI standards development, the U.S., EU, and other partners should prioritize standards development within ISO because of its advantage in international recognition as a result of its status under the WTO and preferred position in the EU framework under the AI Act and its Frankfurt and Vienna agreements with CEN and CENELEC.

ISO also presents advantages of scale and diversity. Notably, the 59 countries represented in ISO/IEC JTC 1/SC 42 represents a larger number than the members states of the EU or EEA, the OECD, or GPAI. ISO/IEC also have been early movers in AI standards; they have adopted 17 AI standards to date with another 27 under development.¹³³

6. Nonetheless, reliance on ISO/ IEC should not be the exclusive focus.

Coordination among governments should take into account the efforts of other SDOs and paths toward AI standards. The IEEE has adopted some 20 AI standards building on its 2016 AI ethics framework. Other avenues include consortia like the Frontier Model Forum and Coalition for Content Provenance and Authenticity, with others in the works. Because the August 2023 voluntary commitments at the White House underlying the latter efforts align with those emerging from the Hiroshima process, the products of these consortia are likely to do so as well.¹³⁴

7. Alongside efforts within these forums to align on standards, the U.S., EU, and other G7 and OECD partners can work toward trade agreements on

standards alignment and work to extend the Technical Barriers to Trade agreement from products to services, press for broad interpretation of TBT and compliance and national treatment under the General Agreement on Tariffs and Trade¹³⁵ and General Agreement on Trade in Services.¹³⁶ Collaboration on international standards should be the default in such agreements.

8. Collaboration on foundational research and development can enhance development of standards.

In particular, development of privacy-enhancing technologies (PETs) can enable access to data needed for AI development while respecting individual and group privacy rights. Recognizing this, several

governments have initiatives to foster PETs. These include a prize challenge by the U.K. and U.S. jointly and a demonstration project by Singapore and the International Centre of Expertise on AI in Montreal.¹³⁷ Scaling such projects among a wider group of sponsors could speed the development of best practices and standards in this valuable area.

9. Initiatives by the U.K. and U.S. and potentially others to establish AI safety institutes appear to envision collaboration. This an obvious area to increase scale and reach for understanding of AI risks and risk management that would support standards development.

AFTERWORD

As this report was being completed, the World Economic Forum (WEF) met in Davos.

In conjunction with this year's conference and in collaboration with McKinsey & Co., WEF issued a new "global cooperation barometer" on trends in cooperation since 2012.¹³⁸ The report identified technological innovation as one of five pillars where global cooperation is necessary for advancement. It reported an overall decline in cooperation since 2020—including in technology and innovation—and identified "working to harmonize and simplify approaches to global regulation of frontier technologies," including generative AI, as a critical area of cooperation. Standards are essential tools for harmonizing and simplifying approaches to artificial intelligence and other frontier technologies. The recommendations in this report offer ways to cooperate in this critical arena.

APPENDIX I

STANDARDS DEVELOPMENT AMONG FCAI COUNTRIES

Australia

Australia's approach to standards development is industry-led with input from other stakeholders. Like the U.S., EU, U.K., and Canada, their national standards body, Standards Australia, is an independent, nongovernment group that operates in partnership with government and civil society. Their standards are voluntary unless they are referenced in State or Commonwealth legislation.

Standards Australia has a Memorandum of Understanding with the government, particularly the Department of Industry, Innovation and Science, which tasks them with developing standards both nationally and internationally, as well as working with stakeholders in implementing them. The MOU adds that both Standards Australia and the government "will actively maintain a cooperative relationship (including by sharing all relevant information)".

Standards Australia is active with international standardization organizations such as the ISO and IEC. When relevant, the government has committed to implementing standards from trusted international SDOs. Standards Australia also works closely with Standards New Zealand. While the government does prefer to adopt international standards, but, when needed, Australia and New Zealand may develop joint standards. Development of these standards is advised by stakeholders from both countries and cost is split based on resource. Australia is also a founding member of the Pacific Area Standards Congress which allows them to collaborate with APEC and the Association of Southeast Asian Nations.

Canada

Like the U.S., EU, and U.K., Canada has voluntary standards that are developed through an industry-led multistakeholder approach. Canada's national standards body is the Standards Council of Canada (SCC), which was created by the Standards Council of Canada Act. On the national standards level, the SCC accredits SDOs to develop National Standards of Canada. Within the Canadian government, the Canadian General Standards Board (CGSC) is an SCC-accredited SDO which develops National Standards of Canada as well as governmental standards. The members of the CGSC are volunteers who are experts in a relevant field.

On the international level, the SCC establishes mirror committees to work with global standards organizations like the ISO and IEC. These mirror committees are comprised of stakeholders such as industry, government, and civil society. The SCC determines Canada's involvement in international standards development using a list of criteria that standards must follow, such as benefiting trade or supporting government initiatives.

The main national standardization network in Canada is the Standards Council of Canada (SCC)/ Conseil Canadien des Normes (CCN). It takes its mandate from the Standards Council of Canada Act. The SCC reports to Parliament and receives federal funding, as well as funding from private actors and income through its accreditation services. The SCC network includes organizations and individuals involved in voluntary standards development, promotion, and implementation. In June 2021, the Canadian government also released plans to modernize its regulatory system, placing greater importance on standardization. The SCC is leading five initiatives, including 1) the establishment of an artificial intelligence standardization collaborative, a cross-sector group of artificial intelligence developers, users, researchers, and regulators; and 2) the development of an accredited conformity assessment program for AI. Part of this latter initiative is mirrored in Canada's prominent role in the development of the first international conformity assessment standard (ISO/IEC 42001).

On AI standards, the Government of Canada intends to conduct a broad and inclusive consultation of various communities to inform the implementation of the Artificial Intelligence and Data Act (AIDA), once the legislative umbrella of Bill C-27 has received Royal Assent. The consultation will also include a consultation on the types of standards and certifications that should be considered in ensuring that AI systems meet the expectations of Canadians.

Japan

As the country with the current G7 presidency, Japan's role in international standards development is consequential. Japan's national standards body is the Japanese Industrial Standards Committee (JISC). JISC was founded in 1949 to advise Ministers overseeing Japanese Industrial Standards and the application of the Japan Industrial Standards compliance mark to products. While JISC's standards are voluntary, products that adhere to them will have preferential treatment when vying for government procurement, which provides both financial and status benefits. JISC has highlighted three focuses of their work: interoperability within Internet of Things (IoT), care of the elderly, and electric power infrastructure.

JISC has been an active participant in international development through ISO and IEC. JISC also has a Cooperation Agreement with CEN-CENELEC which promotes cooperation in technical areas of mutual benefit. JISC has had an active partnership with IEC Asia-Pacific Regional Centre since 2002 and routinely meets with SDOs from fellow Asia-Pacific countries. Following the WTO Agreement on Technical Barriers to Trade, Japan has worked to harmonize their standards with that of ISOs. As of March 2022, 38% of Japanese Industrial Standards were identical to international standards, 59% were modified from international standards, and 3% were not equivalent to international standards at all. At G7 in May 2023, leaders discussed the importance of international standards for trustworthy AI and planned to have an ongoing dialogue, the Hiroshima AI process, with results reported at the end of this year.

For Japan, the Japanese Standards Association (JSA) is the national industrial standard development organization. The JSA started from the merger of two independent

associations, until it was incorporated by the Minister of Trade and Industry in 1945. It promotes standardization through the development of Japanese Industry Standards (JIS).

In 2019 Japan released its first AI Strategy, which was updated in 2021 and in April 2022. A major goal in the AI Strategy 2022 in the field of restructuring the R & D system is “ensuring international initiatives in advanced AI technology and standardization where Japan can take leadership.” As the Japanese AI strategy appears to be moving away from rule-based regulations toward goal-based regulation that strives to realize specific principles, collaborative nonbinding guidelines and standards will play an important role for Japan.

Singapore

Singapore’s standards development is government supported with input from industry and civil society stakeholders. Singapore’s national standards body is Enterprise Singapore, a governmental department. Enterprise Singapore, administers the Singapore Standardisation Programme through its industry-led Singapore Standards Council (SSC.) The SSC is charged with collaborating with stakeholders to advise on and review standards. The SSC is composed of 12 standards committees, three coordinating committees, and a standards promotion committee.

Enterprise Singapore designates SDOs to develop both international and national standards. These SDOs are appointed around certain fields of standards based on their areas of expertise. They also oversee their relevant standards committees, technical committees, and working groups. The SSC represents Singapore in international standards development such as the ISO and IEC.

Enterprise Singapore is a government agency, which serves as the national standards body responsible for standards development and implementation. It administers the standardization process through an industry-led council known as the Singapore Standards Council (SSC), which consists of representatives from industry, professional bodies, trade and consumer associations, academia, and government agencies. SSC is also responsible for encouraging the adoption of international and national standards by local stakeholders. SSC represents Singapore in technical committees in global SDOs, such as the ISO, IEC, and IEEE Standards Association.

Singapore’s Infocomm Media Development Authority (IMDA) manages the standardization work of some critical technologies through its Information Technology Standards Committee (ITSC). The ITSC is an industry-led effort appointed by the SSC and jointly supported by IMDA. The ITSC’s ten technical committees include an Artificial Intelligence Technical Committee (AITC), which is responsible for adopting international AI standards, supporting the development of new standards as needed, and promoting awareness of AI standards. The AITC was formed in 2019 and represents Singapore’s SSC in the AI efforts of both the ISO/IEC joint technical committee subgroup on AI and the IEEE Standards Association. In addition to its contributions to international standards efforts, the AITC has also published a technical reference offering guidance

for assessing and defending against AI security threats.

The United Kingdom

The U.K. develops voluntary standards through advice from a multistakeholder team of experts and a participatory review process. Their national standards body is the British Standards Institution (BSI.) The British Standards Institution is a private company that was established by Royal Charter in 1929 to “set up, sell and distribute standards of quality” and “promote the general adoption of British and international standards.” Their four areas of purpose are support of government policy; U.K. business and industry; U.K. education; and consumer rights and safety.

Despite leaving the EU, the U.K. standardization process is still very entwined with that of its neighbors. Following Brexit, the U.K.’s national standards body, the British Standards Institution retained full membership of CEN-CENELEC. This decision was reaffirmed in 2021, with the goals of preserving stability in European standards systems and providing clarity for stakeholders. As a non-EEA member of CEN-CENELEC, the BSI’s role is slightly different than that of EU member states. While their voting power in the first stage of voting is the same as before Brexit, if a proposal does not pass the first stage but does pass in the second stage, where only member states’ votes are counted, and BSI voted against it, they would not need to implement it. The U.K. is also a member of several global standards groups such as ISO and IEC. The BSI also implements some national-only standards as needed.

Within the U.K. government, the Department for Business, Energy and Industrial Strategy (BEIS) oversees standards policy. The BEIS provides funding to the BSI in three main areas: (1) providing the government with access to standards, (2) standards development, and (3) participation of U.K. experts in international standards work.

The U.K.’s formally designated national standards body is the British Standards Institute (BSI). BSI coordinates and facilitates technical committees that develop U.K. standards and also represents the U.K. in both international SDOs, such the ISO and IEC, and regional standards bodies, including CEN-CENELEC and ETSI. Most of its standards are developed at the international level, and as a member of CEN-CENELEC, it is required to adopt European standards.

In 2021, the U.K. released its National AI Strategy, which sets out its aims to invest in the AI ecosystem over the long term, support the transition to an AI-enabled economy, and ensure that it gets national and international AI governance “right”. The regulatory approach aims to be innovation-friendly and is sector specific. The emphasis lies in mitigating harmful impacts of AI in specific contexts, while regulating with a light touch as much as possible. Its vision for AI governance includes both engagement in global AI standardization and the creation of an AI Standards Hub to help stakeholders navigate and participate in international standards efforts. Led by the Alan Turing Institute and supported by the British Standards Institution (BSI) and National Physical Laboratory, the Hub is organized around four pillars: creating an observatory for AI standardization and related developments, building community and collaboration across stakeholder

groups, providing knowledge and training to stakeholders, and producing research and analysis on strategic questions around AI standardization.

APPENDIX II

STANDARDS ACCORDING TO CHATGPT4

Prompt: *Why are technical standards boring?*

Technical standards may be perceived as boring for a number of reasons, although the level of interest may vary depending on the individual and their background. Some reasons for this perception include:

1. Complexity: Technical standards often contain intricate details and specifications that can be difficult for those without specific knowledge to comprehend. This complexity can make them seem tedious to read and understand.
2. Dry language: Standards are usually written in a formal, technical, and precise language to ensure clarity and minimize ambiguity. However, this style of writing may come across as dull, lacking the storytelling or conversational aspects that make other content more engaging.
3. Specialization: Technical standards are often specific to a particular industry or field, which means they may not be relevant or interesting to people outside of that area.
4. Length: Standards documents can be quite lengthy, as they need to cover every aspect and requirement of a particular technology or process. The sheer volume of information can be overwhelming and may contribute to the perception of boredom.
5. Focus on minutiae: Standards tend to focus on the minutest details to ensure compatibility and interoperability. While these details are crucial for their purpose, they may not be particularly engaging for a general audience.
6. Lack of immediate application: Technical standards are often aimed at professionals who need to apply them in their work. If you are not directly involved in that field, it may be difficult to see how the standards are relevant or useful to you.
7. It's important to remember, however, that despite being perceived as boring, technical standards play a crucial role in ensuring compatibility, safety, and efficiency across various industries and technologies.

ENDNOTES

1. The White House, “United States Government National Standards Strategy for Critical and Emerging Technology” (May 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf> (accessed Jan. 17, 2024).
2. European Commission, Communication, “An EU Strategy on Standardisation” (Feb. 2, 2022), European Commission Docsroom <https://ec.europa.eu/docsroom/documents/48598> (accessed Jan. 17, 2024).
3. Center for Security and Emerging Technology, “The Chinese Communist Party Central Committee and the State Council Publish the ‘National Standardization Development Outline’ (Translation, Nov. 19, 2021). <https://cset.georgetown.edu/publication/the-chinese-communist-party-central-committee-and-the-state-council-publish-the-national-standardization-development-outline/> (accessed Jan. 17, 2024).
4. IEEE Standards Association, “IEEE SA-IEEE Standard for Information Technology—Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks—Specific Requirements-Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications,” <https://standards.ieee.org/ieee/802.11/7028/> (accessed Jan. 27, 2024).
5. ISO, “ISO/IEC 23008-1:2023: High Efficiency Video Coding” (January 2023), <https://www.iso.org/standard/76386.html> (accessed Jan. 17, 2024).; IEC, “ISO/IEC 23008-1:2023: High Efficiency Video Coding” (January 2023), <https://webstore.iec.ch/publication/81713> (accessed Jan. 17, 2024).
6. Internet Engineering Task Force, Datatracker, “RFC 8445: Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal.” (July 2018), <https://datatracker.ietf.org/doc/html/rfc8445> (accessed Jan. 17, 2024).
7. Bluetooth Special Interest Group, “Specifications” <https://www.bluetooth.com/specifications/> (accessed Jan. 17, 2024).
8. International Electrotechnical Commission (IEC), “IIP ratings,” <https://www.iec.ch/ip-ratings>. (accessed Jan. 27, 2024).
9. Brookings, The Forum for Cooperation on Artificial Intelligence, <https://www.brookings.edu/projects/the-forum-for-cooperation-on-artificial-intelligence/> (accessed Jan. 17, 2024).
10. European Commission, press release, “Europe fit for the Digital Age: Commission proposes new rules and actions for excellence and trust in Artificial Intelligence” (Apr. 21, 2021), <https://digital-strategy.ec.europa.eu/en/news/europe-fit-digital-age-commission-proposes-new-rules-and-actions-excellence-and-trust-artificial> (accessed Jan. 29, 2024).
11. Cameron F. Kerry, Joshua P. Meltzer, Andrea Renda, Alex Engler, and Rosanna Fanni. “Strengthening International Cooperation on AI.” Brookings Institution (Oct. 25, 2021) <https://www.brookings.edu/articles/strengthening-international-cooperation-on-ai/> (accessed Jan. 17, 2024).
12. World Trade Organization (WTO), “The Code of Good Practice for the Prepa-

- ration, Adoption and Application of Standards,” https://www.wto.org/english/res_e/publications_e/ai17_e/ai17_e.htm (accessed Jan. 24, 2024).
13. ISO/IEC JTC 1, “SC 42” (May 2023), <https://jtc1info.org/sd-2-history/jtc1-subcommittees/sc-42/>. (accessed Jan. 17, 2024).
 14. ISO/IEC, “Standards by ISO/IEC JTC 1/SC 42. -Artificial intelligence,” Jan. 20, 2020, <https://www.iso.org/committee/6794475/x/catalogue/p/1/u/1/w/0/d/0>. (Jan. 17, 2024).
 15. ISO/IEC, “ISO/IEC AI Workshops,” <https://jtc1info.org/technology/subcommittees/ai/workshops/>. (accessed Jan. 17, 2024).
 16. ITU: AI For Good, “AI/ML (Pre-)Standardization”, <https://aiforgood.itu.int/about-ai-for-good/ai-ml-pre-standardization/> (accessed Jan. 29, 2024).
 17. ITU: AI for Good, “AI For Good Global Summit”, <https://aiforgood.itu.int/summit23/> (accessed Jan. 29, 2024).
 18. IEEE SA, “Ethically Aligned Design—Version One, Request for Input, https://standards.ieee.org/uploads/import/documents/other.ead_v1.pdf (accessed Feb. 6, 2024).
 19. IEEE SA, “Autonomous and Intelligent Systems (AIS)”, <https://standards.ieee.org/initiatives/autonomous-intelligence-systems/> (accessed Jan. 29, 2024).
 20. Hans-W. Micklitz, “The Role of Standards in Future EU Digital Policy Legislation” (July 2023) .https://www.beuc.eu/sites/default/files/publications/BEUC-X-2023-096_The_Role_of_Standards_in_Future_EU_Digital_Policy_Legislation.pdf (accessed Jan. 17, 2024).
 21. Joshua P. Meltzer, “Critical Technology Standards Metric,” Sept. 22, 2022, Brookings Institution, <https://www.brookings.edu/articles/critical-technology-standards-metric/> (accessed Jan. 17, 2024).
 22. National Institute of Standards and Technology (NIST), “U.S. Leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools.” August 9, 2019. https://www.nist.gov/system/files/documents/2019/08/10/ai_standards_fedengagement_plan_9aug2019.pdf (accessed Jan. 17, 2024).
 23. Frontier Model Forum, “Frontier Model Forum” Advancing Safe AI Development,” <https://www.frontiermodelforum.org/>. (accessed Jan. 17, 2024).
 24. Coalition for Content Provenance and Authenticity, “Overview,” <https://c2pa.org/>. (accessed Jan. 17, 2024).
 25. International Standards Organization, “Members,” <https://www.iso.org/members.html>. (accessed Jan. 17, 2024).
 26. Joshua P. Meltzer, “Critical Technology Standards Metric,” (June 4, 2023) Brookings Institution <https://www.brookings.edu/articles/critical-technology-standards-metric/> (accessed Jan. 17, 2024).
 27. The White House, “Fact Sheet: Biden-Harris Administration Announces National Standards Strategy for Critical and Emerging Technology.” (May 4, 2023), <https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/04/fact-sheet-biden-harris-administration-announces-national-standards-strategy-for-critical-and-emerging-technology/> (accessed Jan. 17, 2024).
 28. NIST Standards.gov, “National Technology Transfer and Advancement Act of 1995.” (Mar. 7, 1996), <https://www.nist.gov/standardsgov/national-technology-transfer-and-advancement-act-1995> (accessed Jan. 17, 2024).
 29. The White House Office of Management & Budget, Circular no. A-119 revised,-

- (February 10, 1998), <https://www.whitehouse.gov/wp-content/uploads/2017/11/Circular-119-1.pdf> (accessed Jan. 17, 2024).
30. IEEE, "IEEE", <https://www.ieee.org/> (accessed Jan. 17, 2024).
 31. ASTM, "ASTM International", <https://www.astm.org/>. (accessed Jan 17, 2024).
 32. ASME, "The American Society of Mechanical Engineers", <https://www.asme.org/> (accessed Jan. 17, 2024).
 33. UL Solutions, "UL Empowering Trust®", <https://www.ul.com/> (accessed Jan. 17, 2024).
 34. Department of Energy, "Energy Conservation Program: Test Procedure for Commercial and Industrial Pumps," Feb. 28, 2023, <https://www.energy.gov/sites/default/files/2023-03/pumps-tp-fr.pdf> (accessed Jan. 17, 2024).
 35. Obama White House, "Memorandum for the Heads of Executive Department and Agencies", (Jan. 17, 2012) https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2012/m-12-08_1.pdf (accessed Jan. 17, 2024).
 36. The White House, Office of Management & Budget, "Revised Circular A-119." (January 22, 2016), https://www.whitehouse.gov/wp-content/uploads/2020/07/revised_circular_a-119_as_of_1_22.pdf (accessed Jan. 17, 2024).
 37. American National Standards Institute, "United States Standards Strategy," (2020), <https://share.ansi.org/Shared%20Documents/Standards%20Activities/NSSC/USSS-2020/USSS-2020-Edition.pdf> (accessed Jan. 17, 2024).
 38. The White House, "Maintaining American Leadership in Artificial Intelligence," Executive Order of February 11, 2019, Federal Register Vol.84, No. 31 <https://www.federalregister.gov/documents/2019/02/14/2019-02544/maintaining-american-leadership-in-artificial-intelligence> (accessed Jan. 17, 2024).
 39. The White House, "Blueprint for an AI Bill of Rights" (Oct. 4, 2022), <https://www.whitehouse.gov/ostp/ai-bill-of-rights/#applying>. (accessed Jan. 17, 2024).
 40. NIST, "Risk Management Framework" (Ja26, 2023), <https://www.nist.gov/itl/ai-risk-management-framework> (accessed Jan. 17, 2024)
 41. The White House, "Fact Sheet: Biden-Harris Administration Announces National Standards Strategy for Critical and Emerging Technology" (May 4, 2023), <https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/04/fact-sheet-biden-harris-administration-announces-national-standards-strategy-for-critical-and-emerging-technology/> (accessed Jan. 17, 2024).
 42. The White House, "Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence," (Oct. 30, 2023), <https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/> (accessed Jan. 17, 2024).
 43. EUR-Lex, "Regulation 1025/2012 on European Standardisation" (Oct. 15, 2012), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R1025> (accessed Jan. 17, 2024).
 44. CEN-CENELEC, "CEN-CENELEC", <https://www.cencenelec.eu/> (accessed Jan. 29, 2024).
 45. European Telecommunications Standards Institute, "ETSI - Welcome to ETSI - The Standards People" <https://www.etsi.org/>. (accessed January 28, 2024).
 46. CEN-CENELEC, "CEN and CENELEC launched a new Joint TC on Artificial Intelligence", (Mar. 3, 2021), <https://www.cencenelec.eu/news-and-events/news/2021/>

- [briefnews/2021-03-03-new-joint-tc-on-artificial-intelligence/](#) (accessed Jan. 17, 2024).
47. EUR-Lex, “Regulation - 1025/2012 - En - EUR-Lex”, (Oct. 25, 2012) <https://eur-lex.europa.eu/eli/reg/2012/1025/oj> (accessed Jan. 17, 2024).
 48. ERU-Lex, “EU Regulation 1025/2012”, Footnote 38, Annex III, (Oct. 25, 2012), <https://eur-lex.europa.eu/eli/reg/2012/1025/oj> (accessed Jan. 17, 2024).
 49. ISO, “Vienna Agreement (English)—The Agreement on technical cooperation between ISO and CEN” https://www.iso.org/resources/publicly-available-resources.html?t=OF7wvV-X6LuuN83VzEkv_3lzqOrVr-81T8F6C-LeoojI3L9z5x-mi0rAB1sxObxW6&view=documents#section-isodocuments-top (accessed Jan. 29, 2024).
 50. European Commission, “Harmonized Standards,” https://single-market-economy.ec.europa.eu/single-market/european-standards/harmonised-standards_en (accessed Jan. 29, 2024).
 51. European Commission, Your Europe, “Standardisation in Europe,” https://europa.eu/youreurope/business/product-requirements/standards/standards-in-europe/index_en.htm#:~:text=Harmonised%20standards,-Harmonised%20standards&text=are%20a%20specific%20category%20of,request%20from%20the%20European%20Commission. (accessed Jan. 25, 2024).
 52. Small Business Standards, “Making standards work for SMEs” <https://www.sbs-sme.eu/>. (accessed Jan. 28, 2024).
 53. Clément Perarnaud, Camille Ford and Tomiris Amirova (2022) Supporting SME participation in technology standardisation: A comparative analysis of the EU and US frameworks and options for stronger cooperation. CEPS/TTD report, Brussels. Unpublished.
 54. European Commission Communication. “An EU Strategy on Standardisation - Setting Global Standards in Support of a Resilient, Green and Digital EU Single Market.” (Jan 2, 2022), <https://ec.europa.eu/docsroom/documents/48598> (accessed Jan. 17, 2024).
 55. European Commission, “Artificial Intelligence for Europe”, (April 25, 2018), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0237&from=EN> (accessed Jan. 29, 2024).
 56. LinkedIn post by Dr. Laura Caroli, “AI Act consolidated version,” (Jan 2024), https://www.linkedin.com/posts/dr-laura-caroli-0a96a8a_ai-act-consolidated-version-activity-7155181240751374336-B3Ym (accessed Jan. 29, 2024).
 57. Center for Security and Emerging Technology, “The Chinese Communist Party Central Committee and the State Council Publish the ‘National Standardization Development Outline’ (Translation, Nov. 19, 2021). <https://cset.georgetown.edu/publication/the-chinese-communist-party-central-committee-and-the-state-council-publish-the-national-standardization-development-outline/> (accessed Jan. 17, 2024).
 58. Standardization Administration of P.R.C. , “Standardization Law of the People’s Republic of China (Full Text),” (adopted November 4, 2017, translation posted January 2, 2018) .https://www.sac.gov.cn/Law/art/2018/art_5c7c04aba2904d859d0fd-dce72257f6c.html (accessed Jan. 17, 2024).
 59. Ibid, Article 18.
 60. Dezan Shira & Associates, China Briefing News, “The China Standards

- 2035 Strategy: Analyzing Recent Developments.” (July 26, 2022) <https://www.china-briefing.com/news/china-standards-2035-strategy-recent-developments-and-their-implications-foreign-companies/#:~:text=On%20July%208%2C%202022%2C%20the,was%20released%20in%20October%202021> (accessed Jan. 17, 2024).
61. John Seaman, “China and the New Geopolitics of Technical Standardization,” Institut français des relations internationales, January 27, 2020. <https://www.ifri.org/en/publications/notes-de-lifri/china-and-new-geopolitics-technical-standardization> (accessed Jan. 17, 2024).
 62. Ministry of Foreign Affairs of the People’s Republic of China Communique, “Global AI Governance Initiative.” 中华人民共和国外交部, (Oct. 20, 2023) https://www.mfa.gov.cn/eng/wjdt_665385/2649_665393/202310/t20231020_11164834.html (accessed Jan. 28, 2024).
 63. U.S. Department of State, “U.S.-EU Trade and Technology Council (TTC)” <https://www.state.gov/u-s-eu-trade-and-technology-council-ttc/> (accessed Jan. 17, 2024).
 64. U.S. Department of State, “U.S.-EU Trade and Technology Council (TTC)”, <https://www.state.gov/u-s-eu-trade-and-technology-council-ttc/> (accessed Jan. 17, 2024).
 65. European Commission “TTC Joint Roadmap for Trustworthy AI and Risk Management.” (Dec. 2, 2022) <https://digital-strategy.ec.europa.eu/en/library/ttc-joint-roadmap-trustworthy-ai-and-risk-management> (accessed Jan. 17, 2024).
 66. NIST, “EU-U.S. Terminology and Taxonomy for Artificial Intelligence First Edition” <https://www.nist.gov/system/files/documents/noindex/2023/05/31/WG1%20AI%20Taxonomy%20and%20Terminology%20Subgroup%20List%20of%20Terms.pdf> (accessed Jan. 17, 2024).
 67. The White House, “U.S.-EU Joint Statement of the Trade and Technology Council.” (May 31, 2023) <https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/31/u-s-eu-joint-statement-of-the-trade-and-technology-council-2/> (accessed Jan. 17, 2024).
 68. G20 Summit Outcome Documents, “G20 AI Principles,” (June 29, 2019) <https://wp.oecd.ai/app/uploads/2021/06/G20-AI-Principles.pdf> (accessed Jan. 17, 2024).
 69. Matthew Newman, “EU, US Push for ‘global AI Code of Conduct’ by Year-End, Vestager Says.” MLex (June 5, 2023), <https://mlexmarketinsight.com/news-hub/editors-picks/area-of-expertise/data-privacy-and-security/eu-us-push-for-global-ai-code-of-conduct-by-year-end-vestager-says> (accessed Jan. 17, 2024).
 70. Ministry of Foreign Affairs of Japan, “Hiroshima Process International Guiding Principles for Organizations Developing Advanced AI Systems” October 30, 2023, <https://www.mofa.go.jp/files/100573471.pdf> (accessed Jan. 29, 2024); Ministry of Foreign Affairs of Japan, “Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI System” October 30, 2023, <https://www.mofa.go.jp/files/100573473.pdf> (accessed Jan 29, 2024).
 71. Japan Ministry of Internal Affairs and Communications, “Hiroshima AI Process G7 Digital & Tech Ministers’ Statement, (Dec. 1, 2023) .” 広島AIプロセス, <https://www.soumu.go.jp/hiroshimaaiprocess/> (accessed Jan. 17, 2024).
 72. U.S. Department of Commerce, “Indo-Pacific Economic Framework”, <https://www.commerce.gov/ipef> (accessed Jan. 17, 2024).

73. Infocomm Media Development Authority “Joint Mapping Exercise between Singapore Imda and the US NIST” .<https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/nist-imda-joint-mapping-exercise> (accessed Jan. 17, 2024).
74. U.S. Department of State “Inaugural Meeting of U.S.-UK Comprehensive Dialogue on Technology & Data” (Jan. 12, 2023) <https://www.state.gov/inaugural-meeting-of-u-s-uk-comprehensive-dialogue-on-technology-data/> (accessed Jan. 17, 2024).
75. Australian Government, “Quad Principles on Critical and Emerging Technology Standards”, (May 20, 2023), <https://www.pmc.gov.au/resources/quad-principles-critical-and-emerging-technology-standards> (accessed Jan. 17, 2024).
76. The White House, “Quad Leaders’ Summit Fact Sheet”, (May 20, 2023) <https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/20/quad-leaders-summit-fact-sheet/> (accessed Jan. 17, 2024).
77. The U.K. Government “Introducing the AI Safety Institute” (Nov. 2023) <https://www.gov.uk/government/publications/ai-safety-institute-overview/introducing-the-ai-safety-institute> (accessed Jan. 17, 2024).
78. U.S. Department of Commerce, “At the Direction of President Biden, Department of Commerce to Establish U.S. Artificial Intelligence Safety Institute to Lead Efforts on AI Safety,” (Nov. 1, 2023), .<https://www.commerce.gov/news/press-releases/2023/11/direction-president-biden-department-commerce-establish-us-artificial> (accessed Jan. 17, 2024).
79. The Japan News by The Yomiuri Shimbun, “Japan Planning New Official Body to Ensure AI Safety; Standards to Be Formulated for Generative AI Creators, Others” (Dec. 17, 2023), .<https://japannews.yomiuri.co.jp/politics/politics-government/20231217-156252/> (accessed Jan. 17, 2024).
80. Paul Waldie, The Globe and Mail, “Ottawa to Consider Setting up AI Safety Institute, Industry Minister Champagne Says,” (Nov. 2, 2023), <https://www.theglobeandmail.com/world/article-ottawa-to-consider-setting-up-ai-safety-institute-industry-minister/> (accessed Jan. 17, 2024).
81. Dan Hendrycks and Aidan O’Gara, AI Safety Newsletter, “National Institutions for AI Safety,” (Nov. 15, 2023), <https://newsletter.safe.ai/p/national-institutions-for-ai-safety> (accessed Jan. 17, 2024).
82. Brookings Institution, “Strengthening Cooperation on AI” (Oct. 25, 2021) https://www.brookings.edu/wp-content/uploads/2021/10/Strengthening-International-Cooperation-AI_Oct21.pdf#page=95 (accessed Jan. 17, 2024).
83. “New Zealand - United Kingdom Free Trade Agreement.” New Zealand Ministry of Foreign Affairs and Trade. Accessed January 17, 2024. <https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/new-zealand-united-kingdom-free-trade-agreement/>.
84. Australian Government Department of Foreign Affairs and Trade, “Australia-Singapore Digital Economy Agreement”, (Dec. 8, 2020), .<https://www.dfat.gov.au/trade/services-and-digital-trade/australia-and-singapore-digital-economy-agreement> (accessed Jan. 17, 2024).
85. Ministry of Trade and Industry Singapore, “The Digital Economy Partnership Agreement (DEPA),” <https://www.mti.gov.sg/Trade/Digital-Economy-Agreements/The-Digital-Economy-Partnership-Agreement> (accessed Jan. 17, 2024).

86. Joahn Seaman, "China and the New Geopolitics of Technical Standardization," Institut français des relations internationales, (Jan. 27, 2020), <https://www.ifri.org/en/publications/notes-de-lifri/china-and-new-geopolitics-technical-standardization> (accessed Jan. 17, 2024).
87. European Commission, "An EU Strategy on Standardisation - Setting Global Standards in Support of a Resilient, Green and Digital EU Single Market," (Jan. 2, 2022) <https://ec.europa.eu/docsroom/documents/48598> (accessed Jan. 17, 2024).
88. Matt Sheehan and Jacob Feldgoise, Carnegie Endowment for International Peace, "What Washington Gets Wrong about China and Technical Standards (Feb. 27, 2023) <https://carnegieendowment.org/2023/02/27/what-washington-gets-wrong-about-china-and-technical-standards-pub-89110> (accessed Jan. 17, 2024).
89. The White House, "Readout of President Joe Biden's Meeting with President Xi Jinping of the People's Republic of China," (Nov. 15, 2023), <https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/15/readout-of-president-joe-bidens-meeting-with-president-xi-jinping-of-the-peoples-republic-of-china-2/#:~:text=Both%20sides%20are%20also%20resuming,key%20regional%20and%20global%20challenges> (accessed Jan. 17, 2024).
90. Brookings Institution, "The Biden Administration's International Economic Agenda: A Conversation with National Security Advisor Jake Sullivan," (April 27, 2023), <https://www.brookings.edu/events/the-biden-administrations-international-economic-agenda-a-conversation-with-national-security-advisor-jake-sullivan/> (accessed Jan. 17, 2024).
91. 116th Congress, H.R.2575 - AI in Government Act of 2020" (Dec. 19, 2019), <https://www.congress.gov/bill/116th-congress/house-bill/2575> (accessed Jan. 17, 2024).
92. 116th Congress, "Public Law 116-260: Consolidated Appropriations Act, 2021", (Dec 27, 2020), <https://www.congress.gov/116/plaws/publ260/PLAW-116publ260.pdf> (accessed Jan. 17, 2024).
93. The White House, "Executive Order on Further Advancing Racial Equity and Support for Underserved Communities through the Federal Government," (Feb. 16, 2023), <https://www.whitehouse.gov/briefing-room/presidential-actions/2023/02/16/executive-order-on-further-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/> (accessed Jan. 17, 2024).
94. The White House, "National Cybersecurity Strategy," (March 1, 2023) <https://www.whitehouse.gov/wp-content/uploads/2023/03/National-Cybersecurity-Strategy-2023.pdf> (accessed Jan. 17, 2024).
95. Federal Register, "Addition of Entities to the Entity List", (May 21, 2019), <https://www.federalregister.gov/documents/2019/05/21/2019-10616/addition-of-entities-to-the-entity-list> (accessed Jan. 29, 2024).
96. Federal Register, "Addition of Huawei Non-U.S. Affiliates to the Entity List, the Removal of Temporary General License, and Amendments to General Prohibition Three (Foreign-Produced Direct Product Rule)," (Aug. 20, 2020), <https://www.federalregister.gov/documents/2020/08/20/2020-18213/addition-of-huawei-non-us-affiliates-to-the-entity-list-the-removal-of-temporary-general-license-and> (Accessed Jan. 29, 2024).
97. Bureau of Industry and Security, Commerce, "Authorization of Certain "Items" to Entities on the Entity List in the Context of Specific Standards Activities," (Sept.

- 9, 2022), <https://www.federalregister.gov/documents/2022/09/09/2022-19415/authorization-of-certain-items-to-entities-on-the-entity-list-in-the-context-of-specific-standards> (accessed Jan. 17, 2024).
98. EUR-Lex, "Regulation - 1025/2012 - En," (Oct. 25, 2012) <https://eur-lex.europa.eu/eli/reg/2012/1025/oj> (accessed Jan. 17, 2024).
 99. Dr. Tim Rühlig, Heinrich Böll Stiftung, "Technical Standardisation, China and the Future International Order," (March 2020) <https://eu.boell.org/en/2020/03/03/technical-standardisation-china-and-future-international-order> (accessed Jan. 17, 2024).
 100. Dr. Tim Rühlig, German Council on Foreign Relations (DGAP) Online Commentary, "The Rise of Tech Standards Foreign Policy", (Feb. 3, 2022) <https://dgap.org/en/research/publications/rise-tech-standards-foreign-policy>, (accessed Jan. 30, 2024).
 101. Luca Bertuzzi, Euractiv, "Commission leaves European standardisation body out of AI standards setting," (Dec. 7, 2022), <https://www.euractiv.com/section/artificial-intelligence/news/commission-leaves-european-standardisation-body-out-of-ai-standard-setting/> (accessed Jan. 29, 2024).
 102. Luca Bertuzzi, "Commission leaves European standardisation body out of AI standard-setting," Euractiv, December 9, 2022, <https://euractiv.com/section/artificial-intelligence/news/commission-leaves-european-standardisation-body-out-of-ai-standard-setting/> (accessed February 6, 2024).
 103. Nigel Cory, Information Technology and Innovation Foundation, "How the EU Is Using Technology Standards as a Protectionist Tool in Its Quest for Cybersovereignty." (Sept.19, 2022), <https://itif.org/publications/2022/09/19/how-the-eu-is-using-technology-standards-as-a-protectionist-tool/> (accessed Jan. 17, 2024).
 104. Thierry Breton LinkedIn post, "The Geopolitics of Technology," (July 27, 2021), <https://www.linkedin.com/pulse/geopolitics-technology-thierry-breton/> (accessed Jan. 17, 2024).
 105. European Commission, "Draft Standardisation Request to the European Standardisation Organisations in Support of Safe and Trustworthy Artificial Intelligence." (Dec. 5, 2022,) <https://artificialintelligenceact.eu/wp-content/uploads/2021/08/The-AI-Act.pdf> (accessed Jan. 17, 2024).
 106. European Commission, "Implementing Decision on a Standardisation Request to the European Committee for Standardisation and the European Committee for Electrotechnical Standardisation in Support of Union Policy on Artificial Intelligence." (May 22, 2023), https://ec.europa.eu/growth/tools-databases/enorm/mandate/593_en (accessed Jan. 17, 2024).
 107. NIST, "AI Risk Management Framework," (January 2023), <https://nvlpubs.nist.gov/nistpubs/ai/NIST.AI.100-1.pdf> (accessed Jan. 17, 2024).
 108. Tim Büthe & Walter Mattli, *The New Global Rulers: The Privatization of Regulation in the World Economy* (Princeton University Press & Oxford, 2011).
 109. Future of Life Institute, "Asilomar AI Principles," (Aug.11, 2017,) <https://futureof-life.org/open-letter/ai-principles/> (accessed Jan. 17, 2024).
 110. The White House, "Blueprint for an AI Bill of Rights," <https://www.whitehouse.gov/ostp/ai-bill-of-rights/#applying> (accessed Jan. 17, 2024).
 111. Josep Soler Garrido et al, European Joins Research Centre, "Analysis of the preliminary AI standardisation work plan in support of the AI Act" <https://publications.jrc.>

- ec.europa.eu/repository/bitstream/JRC132833/JRC132833_01.pdf (accessed Jan. 28, 2024).
112. Hans-W Micklitz, BEUC: The European Consumer Organization, “The Role of Standards in Future EU Digital Policy Legislation,” https://www.beuc.eu/sites/default/files/publications/BEUC-X-2023-096_The_Role_of_Standards_in_Future_EU_Digital_Policy_Legislation.pdf (accessed Jan. 17, 2024).
 113. Brookings Institution, “Strengthening Cooperation on AI” (Oct. 25, 2021) https://www.brookings.edu/wp-content/uploads/2021/10/Strengthening-International-Cooperation-AI_Oct21.pdf#page=95 (accessed Jan. 17, 2024).
 114. W3C, “Formal Objections & W3C Council”, <https://www.w3.org/Guide/council/council#:~:text=W3C%20aims%20to%20make%20decisions%20by%20consensus.%20If,substantial%20formal%20and%20informal%20processes%20to%20achieve%20consensus.> (Accessed Jan. 30, 2024); IEEE, “IEEE Standards and the Law,” <https://standards.ieee.org/wp-content/uploads/import/documents/other/std-slaw.pdf#:~:text=IEEE%20standards%20represent%20a%20consensus%20on%20the%20subject,and%20cannot%2C%20guarantee%20performance%2C%20safety%2C%20or%20any%20results>, (accessed Jan. 30, 2024).
 115. Peter L. Strauss, The Regulatory Review, “We Decline to Define ‘Reasonably Available,’” (Jan. 26, 2015) <https://www.theregreview.org/2015/01/26/strauss-reasonably-available/> (accessed Jan. 17, 2024).
 116. National Archives and Records Administration, “Incorporation by Reference Handbook” (June 2023), <https://www.archives.gov/files/federal-register/write/handbook/ibr.pdf> (accessed Jan. 17, 2024).
 117. American National Standards Institution, “ANSI Incorporated by Reference (IBR) Portal”, <https://ibr.ansi.org/> (accessed Jan. 17, 2024).
 118. ASTM, “Standard guide for personal protective equipment for the handling of flat glass E2875/E2875M”, (Jan. 7, 2021), https://www.astm.org/e2875_e2875m-12r21.html (accessed Jan. 17, 2024).
 119. IEEE Standards Association, “IEEE Get Program,” <https://standards.ieee.org/products-programs/ieee-get-program/> (accessed Jan. 17, 2024).
 120. ISO, “ISO/IEC TR 5469:2024,” (Jan. 2024), <https://www.iso.org/standard/81283.html> (accessed Jan. 17, 2024); IEC, “ISO/IEC TR 5469:2024”, <https://webstore.iec.ch/publication/90977> (accessed Jan. 17, 2024).
 121. ISO, “Standards by ISO/IEC JTC 1/SC 42,” <https://www.iso.org/committee/6794475/x/catalogue/p/1/u/1/w/0/d/0>, (accessed Jan. 17, 2024); IEC, “Standards by ISO/IEC JTC 1/SC 42,” https://www.iec.ch/dyn/www/f?p=103:29:::FSP_ORG_ID:21538 (accessed Jan. 17, 2024).
 122. The White House, “United States Government National Standards Strategy for critical and emerging technology”, (May 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf> (accessed Jan. 17, 2024).
 123. Kathrin Dingemann & Dr. Matthias Kottmann, “Legal Opinion on the European System of Harmonised Standards,” (August 2020), https://www.bmwk.de/Redaktion/EN/Downloads/L/legal-opinion-on-the-european-system-of-harmonised-standards.pdf?__blob=publicationFile&v=3 (accessed Jan. 30, 2024).
 124. NIST, “FY 2024: Presidential Budget Request Summary”, (March 14, 2023,) <https://www.nist.gov/congressional-and-legislative-affairs/nist-appropriation>

- tions-summary/fy-2024-presidential-budget (accessed Jan. 17, 2024).
125. 117th Congress, "H.R.4346 - Chips and Science Act", Section 10245(b), (Aug. 9, 2022,) <https://www.congress.gov/bill/117th-congress/house-bill/4346> (accessed Jan. 17, 2024).
 126. Gary Anderson and Francisco Moris, NSF, "National Center for Science and Engineering Statistics," (June 13, 2023) <https://nces.nsf.gov/pubs/nsf23339#:~:text=The%20ratio%20of%20U.S.%20research,funding%20sources%20for%20domestic%20R%26D> (accessed Jan. 17, 2024).
 127. NSCAI, "The National Security Commission on AI," <https://www.nscai.gov/> (accessed Jan. 17, 2024).
 128. The White House Office of Management and Budget, "Circular no. A-119 revised - The White House," (Feb. 10, 1998), <https://www.whitehouse.gov/wp-content/uploads/2017/11/Circular-119-1.pdf> (accessed Jan. 17, 2024).
 129. NIST, "Information Technology Laboratory," <https://www.nist.gov/itl> (accessed Jan. 17, 2024).
 130. Cybersecurity and Infrastructure Security Agency, "The President's National Security Telecommunications Advisory Committee: CISA", <https://www.cisa.gov/resources-tools/groups/presidents-national-security-telecommunications-advisory-committee> (accessed Jan. 17, 2024).
 131. The President's National Security Telecommunications Advisory Committee, "NSTAC Report To The President On Communications Resiliency, May 6, 2021. <https://www.cisa.gov/sites/default/files/publications/NSTAC%20Report%20to%20the%20President%20on%20Communications%20Resiliency.pdf> (accessed Jan. 17, 2024).
 132. Clement Perarnaud, Camille Ford and Tomiris Amirova (2022) Supporting SME participation in technology standardisation: A comparative analysis of the EU and US frameworks and options for stronger cooperation. CEPS/TTD report, Brussels. Unpublished.
 133. Hans-W Micklitz, BEUC: The European Consumer Organization "The Role of Standards in Future EU Digital Policy Legislation," https://www.beuc.eu/sites/default/files/publications/BEUC-X-2023-096_The_Role_of_Standards_in_Future_EU_Digital_Policy_Legislation.pdf (accessed Jan. 17, 2024).
 134. The White House, "Biden-Harris Administration Launches Artificial Intelligence Cyber Challenge to Protect America's Critical Software," (Aug. 9, 2023), <https://www.whitehouse.gov/briefing-room/statements-releases/2023/08/09/biden-harris-administration-launches-artificial-intelligence-cyber-challenge-to-protect-america-critical-software/> (accessed Jan. 17, 2024).
 135. World Trade Organization, "The Text of the General Agreement on Tariffs and Trade," (July 1986) https://www.wto.org/english/docs_e/legal_e/gatt47_e.pdf (accessed Jan. 17, 2024).
 136. WTO, "General Agreement on Trade in Services" https://www.wto.org/english/tratop_e/serv_e/gatsintr_e.htm (accessed Jan. 27, 2024).
 137. Cameron F Kerry, Joshua P Meltzer, and Andrea Renda, Brookings Institution, "AI Cooperation on the Ground: AI Research and Development on a Global Scale." (Nov. 4, 2022) <https://www.brookings.edu/articles/ai-cooperation-on-the-ground-ai-research-and-development-on-a-global-scale/> (accessed Jan. 27, 2024).
 138. World Economic Forum, "The Global Cooperation Barometer 2024" (January

2024), https://www3.weforum.org/docs/WEF_The_Global_Cooperation_Barometer_2024.pdf (accessed Jan. 27, 2024).

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