BRG INSTITUTE

National Institute of Standards and Technology (NIST)
US Department of Commerce
100 Bureau Drive
Gaithersburg, MD 20899
Submitted via https://www.regulations.gov/commenton/NIST-2021-0006-0001

December 6, 2021

Dear NIST Colleagues,

Thank you for the opportunity to comment on the following Request for Information (RFI):

- Study on People's Republic of China (PRC) Policies and Influence in the Development of International Standards for Emerging Technologies (Document Number: 2021-24090, posted at https://www.federalregister.gov/documents/2021/11/04/2021-24090/study-on-peoples-republic-of-china-prc-policies-and-influence-in-the-development-of-international)

This letter intends to offer background perspective related to the following question in the RFI:

"5. Recommendations on how the United States can take steps to mitigate the influence of the People's Republic of China and bolster United States public and private sector participation in international standards-setting bodies."

The BRG Institute strives to advance knowledge on policy and management through research, publication, and public engagement. Further details are provided at the end of this comment letter. Many of our efforts address capabilities and collaborations in science and technology (S&T) fields, and as such, our suggestions here will focus on developing these areas in general, rather than on standards setting in particular. We also primarily discuss improving US capabilities and collaborations, instead of mitigating foreign participation.

Today, 70 percent of R&D funding and over 80 percent of the authorship of S&T publications comes from outside the United States, and domestic and foreign S&T-intensive companies increasingly tap knowledge and talent globally.[1] As S&T becomes a worldwide enterprise, so do technical standards. We strongly recommend NIST, and other federal agencies, acknowledge and engage with the impacts on standards-setting bodies from internationalized scientific research and education, and the globalization of technology-based industries and their supply chains.

[1] NSF *Science and Engineering Indicators 2020.* https://ncses.nsf.gov/pubs/nsb20201/global-r-d and https://ncses.nsf.gov/pubs/nsb20201/global-science-and-technology-capabilities#research-publications

Global Distribution of Science and Technology Knowledge and Research

The persistent growth in several specific indicators should be noted:

1. **Global R&D distribution**: In the mid-20th Century, the US funded nearly 70 percent of global R&D. As noted above, by 2017 that figure is less than 30 percent.[2]
2. **International co-authorship**: There were under 1 million global S&T articles published in 1996, and 12 percent had authors from more than one country. By 2018, those figures had grown to over 2.5 million and 22 percent.[3]
3. **Foreign recipients of STEM doctorates at US universities**: From 1994 to 2018, the number of US doctorates awarded in STEM fields to temporary visa holders increased by 111 percent, compared to 41 percent growth among US citizens and permanent residents.[4]
4. **Informal international engagements**: With the rise of online publication and videoconferencing technologies, it is substantially easier for academic, corporate, and start-up researchers to interact around the world, in a many-to-many format, than at any time in history.

The long-term trend toward global distribution of S&T knowledge, research and innovation will continue, and is likely to accelerate as more nations and companies increase their R&D investments in advanced and emerging technologies.

Engagement with Global Science and Technology in the US National Interest

NIST and other federal agencies should actively partner with other nations on standards setting and development. This is especially true regarding collaborations with other liberal democratic countries. It is important to note that of the approximately twenty countries that spend two percent of GDP or more on R&D, all are multi-party democracies with the exception of China.[5] Active and sustained collaborations with other democracies is an essential mechanism to ensure standards benefit all liberal nations. The US government should work to view the growth of science and technology around the world not only as a challenge to be managed, but as an opportunity to be pursued.

To conduct such engagements on standards, the government must move S&T international collaboration and learning from the periphery to the core of strategy and operations. Standards are set by those who are knowledgeable, influential, and connected. If we do not have these qualities in our

[2] Congressional Research Service. https://fas.org/sgp/crs/misc/R44307.pdf
[3] NSF Science & Engineering Indicators 2020. https://ncses.nsf.gov/pubs/nsb20206/international-collaboration (Table S5a-32)
[4] NSF NCSES. https://ncses.nsf.gov/pubs/nsf21308/data-tables (Table 17)
[5] Eion Lys. https://www.brginstitute.org/s/2020-05-12_RD-20_Nations_Universities_Value-Generation_Value-Capture_v2.pdf

S&T policies and approaches writ large, we will have a much harder time winning them from global standards setting and development opportunities.

Federal agencies should, of course, continue to promote scientific discovery and innovation in the United States. However, an exclusively domestic focus in programs and funding will result in substantial losses in terms of foregone national benefits from programmatic engagement with overseas institutions and researchers, including from international scientists and engineers who have studied in the US and returned to their home countries.

Global distribution of R&D capability and S&T knowledge makes it critical that the US government adopt strategic plans and mount programs with a global perspective. Agencies should recognize that ideas move globally, and that key purposes of funding programs include tapping the best ideas and people around the world, while training and attracting the people needed to be able to use and build on those ideas here at home. For the US to remain competitive in S&T both in general and with specific attention to standards setting, more programs should be designed to support and build on international collaborations.

It is important that these efforts should not be considered as reactive measures to "out-compete" another country. In today's globalized R&D, efforts at decoupling or isolation can be both impractical and counterproductive. Rather, we recommend focusing on these proactive goals to advance and promote the best capabilities of American know-how and expertise, and gain the best and the brightest around the world as innovation collaborators:

(1) Develop useful, objective, and fairly enforced international S&T agreements that promote free societies, open markets, and innovation and entrepreneurship,
(2) Achieve beneficial outcomes and measurable gains for US citizens and companies, and national and economic security writ large, and,
(3) Motivate other nations to align with the US in their own best interests, seeing our country as a global leader that will help enable them to best achieve national and economic security.

Following are several example programmatic strategies, which could be used in creating future programs, policies, and practices, in order to maintain and expand S&T international engagement and capabilities, including as part of a strong and effective contribution to standards-setting.

a. **Encourage international context and comparisons to be part of proposals for many S&T research funding programs.**
   Such context and comparison should be weighted materially in review processes. The means to best implement such an evolution could be determined through experimentation and analysis in different funding programs and scientific fields in the next few years.

b. **Encourage international corporate and non-profit (university and institute) researcher and student participation (i.e., international partnerships) as part of funding proposals.**
The degree of international engagement should be weighted materially in review processes (such as for NSF Mid-Scale Research Infrastructure proposals).

c. **Increase individual investigator and center support for activities that are explicitly "reach across the border" proposals.**
Acknowledge that US researchers and students (and US innovation and the economy writ large) have a great deal to gain by studying and working with research centers of excellence in other countries.

d. **Expand international programs for American graduate students and post-docs to conduct work at leading research institutions in other countries.**
Such exchanges can build long-term international R&D partnerships and ensure connections to the best researchers overseas, which correlate with increasing citations in published work.[6]

e. **Commence sustained outreach with allied countries in creation of international pre-competitive cooperative R&D programs in key areas of mutual interest.**
R&D consortia empower companies, universities, and government labs to collaborate domestically and internationally on pressing problems and emerging technologies, from wireless networks, to digital epidemiology, to sustainable aviation fuels.[7] As demonstrated with past examples such as SEMATECH, consortia build national expertise necessary to contribute to standards setting.[8] This emphasis could begin and grow via a working group or workshop process, with a domestic or foreign company or industry association as the lead organization.

f. **Engage with Congress on legislation relevant to American S&T.**
This component includes science funding proposals, such as the US Innovation and Competition Act. It is also important to ensure other types of bills, such as those on antitrust, do not impinge upon US companies from alliances, platforms, and mergers and acquisitions that encourage innovation and S&T global leadership.

g. **Engage with international organizations and alliances.**
Work with multilateral entities such as the G7, the Quad, and AUKUS, to develop and activate cross-border policies and agreements on standards related areas. The 2021 Framework for

[6] Caroline Wagner, Kenneth Poland and Xiaoran Yan. https://www.brginstitute.org/s/Flows-and-Networks-in-Global-Innovation-Systems_2021-03-08.pdf
[7] Albert Pisano and Bruce Guile, https://www.brginstitute.org/s/6G-Case-Statement_10-12-20_v2.pdf and Bruce Guile and Stephen Johnson, et al., https://www.brginstitute.org/s/Digital-Epidemiology-Case-Statement-5-3-21.pdf
[8] NIST. https://www.nist.gov/news-events/news/2005/06/reference-materials-planned-semiconductor-industry

Collaboration on Digital Technical Standards is a recent agreement that could benefit from follow-on efforts from member nations.

These types of activities could help to ensure federal efforts to maintain US leadership in standards setting best align with trends that have distributed R&D excellence (relative to 20 to 30 years ago) to universities, research institutes, and company laboratories in many countries.

Further, we believe widespread bipartisan endorsement of international R&D engagement is possible, with ongoing legislative dialogue, and with awareness of the linkages of global research to new jobs in local communities and to increased business opportunities for a broad array of SMEs. While there is a deeply ingrained desire to "buy American" with US government research funds, policymakers and legislators across the political spectrum are clearly aware of pervasive globalization and should quickly perceive the benefits and opportunities to constituents from top international S&T collaborations if they are designed and pursued to advance the national interest.

About the BRG Institute

The BRG Institute was founded by Berkeley Research Group, LLC as an independent nonprofit corporation to advance knowledge on the global economy, technological innovation, and elements of law and economics through policy and management research, open publication, and public engagement. More information about the Institute can be found at www.brginstitute.org.

Much of the work of the BRG Institute focuses on global innovation, national interests and economic security, and the roles of international networks of S&T research. The views expressed in this letter, and referenced materials, however, are those of their authors, and are not those of the Institute.

Further Reading

For more detailed analyses of topics related to this subject area, BRG Institute participants have authored several papers, op-eds, and presentations in the last two years. We suggest the following:

1. Christopher Hill, Patrick Windham, David Cheney. Improving the Endless Frontier Act. *Issues in Science and Technology*. August 5, 2020. https://issues.org/improving-the-endless-frontier-act/
2. Albert Pisano and Bruce Guile. Case Statement and Proposal: International 6G R&D and Innovation Consortium. Working Paper 2, BRG Institute Project on Global Innovation and National Interests. October 12, 2020. https://www.brginstitute.org/s/6G-Case-Statement_10-12-20_v2.pdf
3. Bruce Guile, Stephen Johnson, et al. The Case for Cross-Border R&D in Digital Epidemiology: Proposal for an International Research Consortium. Working Paper 8, BRG Institute Project on Global Innovation and National Interests. May 3, 2021. https://www.brginstitute.org/s/Digital-Epidemiology-Case-Statement-5-3-21.pdf

4. Eion Lys. Now Comes The Hard Part: Correctly Implementing Science Funding. *The Hill*. June 24, 2021. https://thehill.com/opinion/technology/560050-now-comes-the-hard-part-correctly-implementing-science-funding
5. Caroline Wagner and Bruce Guile. A New S&T Policy for a New Global Reality. *Issues in Science and Technology*. Summer 2021. https://issues.org/global-science-technology-policy-guile-wagner/
6. Bruce Guile and Laura Tyson. Innovation-Based Economic Security. *Issues in Science and Technology*. Summer 2021. https://issues.org/innovation-based-economic-security-tyson-guile/
7. David Teece and Nicolas Petit. Innovating Big Tech Firms and Competition Policy: Favoring Dynamic Over Static Competition. Industrial and Corporate Change. September 3, 2021. https://academic.oup.com/icc/advance-article/doi/10.1093/icc/dtab049/6363708
8. Marjory Blumenthal and Mike Nelson (co-authors). Three Takeaways From China's New Standards Strategy. Carnegie Endowment for International Peace. October 28, 2021. https://carnegieendowment.org/2021/10/28/three-takeaways-from-china-s-new-standards-strategy-pub-85678
9. Harry Broadman, Bruce Guile, David Delpy, and Albert ("Al") P. Pisano. Capitalizing on the G7 Research Compact. *Science*. November 25, 2021. https://www.science.org/doi/10.1126/science.abm4781
10. David Teece. Intellectual Property & Innovation Policy for 5G and the Internet of Things. Panel 6: Global Differences in the Treatment of SEPs and SSOs. Presentation, December 3, 2021. (Copy attached to this letter.)

We also recommend reviewing the publications and presentations from the following Institute projects:

- Global Innovation and National Interests, https://www.brginstitute.org/project-description
- Big Tech, Dynamic Competition, and Antitrust, https://www.brginstitute.org/dynamic-competition-and-antitrust

We thank you for your consideration of our RFI comments, and would welcome any further questions and comments. Correspondence may be directed to elys@brginstitute.org.

Sincerely,

Eion Lys
Project Coordinator and Secretary of the Institute

(Following: Presentation as referenced above in Further Reading, Item 10.)

Intellectual Property & Innovation Policy for 5G and the Internet of Things

Panel 6: Global Differences in the Treatment of SEPs and SSOs

David J. Teece
Institute for Business Innovation
University of California, Berkeley
And Berkeley Research Group

December 3, 2021

The goals of standards development: building a robust ecosystem for mobile wireless and IOT

*"Standardization is **a framework of agreements for all relevant parties in an industry to ensure the creation of well-performing systems**, products, and services in accordance with set guidelines. The objective is to **maximize capability, interoperability, safety, repeatability, and quality.**"* [1]

- 3GPP governs a collaborative effort amongst hundreds of different entities.
  - An iterative, non-linear, consensus-based approach
  - Criterion: standardization on the best technologies

1. "Setting Standards," Ericsson, https://www.ericsson.com/en/future-technologies/standardization.

Appreciating the fragility of the global open standards miracle for wireless technology[2]

- Standards development and standards setting is a much underappreciated and often misunderstood aspect of globalization.
- ETSI/3GPP is perhaps the world's greatest collaboration research "consortium"; with way more players than exists for global vaccine development or global warming abatement.
- Standards development has facilitated tremendous technological advances, and the mobile wireless revolution itself with considerable benefits to global society.

2. See D.J. Teece "Technological Leadership and 5G Patent Portfolios: Guiding Strategic Policy and Licensing Decisions" *California Management Review* Vol. 63(3) 5–34 (May 2021).

The Swedish Institute of International Affairs notes that standards development is now complicated by strategic rivalry between China and the rest of the world

- *"For decades, and almost unnoticed by the general public and politicians, technical standards have been a driving engine behind globalization . . . they [now] run the risk of turning into a core subject of great power competition over high technology . . . Europe emphasizes its commitment to rules-based institutions in world affairs."* [3]

- *"The CCP has seized on the importance of these [standard development] bodies for the dual and mutually reinforcing objections of increasing national competitiveness and building international influence on technology adoption."* [4]

  - Geopolitical rivalries are augmented (and sometimes related to) firm level rivalries/disputes between inventors (and patent holders) and implementors.

3. Tim Nicholas Ruhling, "Technical Standardization, China and the Future International Order: A European Perspective," Swedish Institute of International Affairs, Stockholm, February 2020, pp. 4-5, https://eu.boell.org/en/2020/03/03/technical-standardization-chinaand-future-international-order.
4. Lindsay Gorman, "The U.S. Needs to Get into the Standards Game—With Like-Minded Democracies," Law Fare, April 2, 2020, https://www.lawfareblog.com/us-needs-get-standardsgame—-minded-democracies.

Because there is no ETSI enforcement capability, the whole global apparatus depends (amazingly) on French contract law

- Implementers are a 3rd party beneficiaries to agreements (contracts) between patent owners/licensors and ETSI.
- Individual (national) jurisdictions play an important role in creating and sustaining a robust global mobile wireless innovation system.
- The "problem" is global; the enforcement jurisdictions are national (or regional) which creates unusual challenges.
  - Licensing is for global access to SEP portfolios.
  - Patents are not self enforcing… and the courts are important to the open standards/licensing model.

Consistent multijurisdictional adjudication is necessary for the global system to work well. Key elements include:

- Recognizing the reality of global licensing.
  - Almost all licensees need and want a global license as implementors want/need to sell globally.
  - Transaction costs are too great if licenses have to be monitored nationally.
  - It would be a chaotic and inefficient system were licensing to be other than at:
    - Portfolio level
    - Global level
  - Notwithstanding, licensees try to exploit the global fragmentation of patent enforcement… by seeking (in court) only a national license, thereby trying to force the patent owner to chase them in every jurisdiction around the world where they might have sales.
- Keeping antitrust at bay. This is the biggest challenge to the open innovation licensing model in mobile wireless. Antitrust creates uncertainty and risks robbing those that invest in R&D the fruits of their investment. Paradoxically, the alternative model is vertical integration and control by a few big players.

National laws are an imperfect instrument for upholding a robust global system of licensing mobile SEPs. Two landmark cases stand out for global relevance:

- Unwired Planet decision in the UK underscored that global portfolio licensing is industry standard and desirable, and that FRAND is a range and is a global rate.

- FTC v Qualcomm (9th circuit appeals) resoundingly supported Qualcomm's SEP licensing model and underscored that royalties are not a tax but a key enabler of the open innovation global distributed R&D model; and there is no duty to deal; and that antitrust is not the right lens through which to view licensing disputes.

Example: Injunctive Relief – USA

- The ability to obtain an injunction had been a major focus of believers in the "hold-up" theory of SEPs.
- The IEEE's 2015 Patent Policy was arguably the high-water mark for this movement to limit the availability of injunctive relief
  - At the time, the DOJ issued a Business Review Letter (BRL), which stated that the DOJ had no issues with IEEE's proposed new policy.
- Under Makan Delrahim's leadership, the DOJ issued a supplemental BRL which clarified and overwrote some aspects of the 2015 BRL; the DOJ stated:

> *"Implementers have a strong incentive to hold out from taking a license due to the high injunction bar for innovators that make FRAND commitments. It is a harmful arbitrage that should be discouraged."* [5]

- In May 2021, however, the DOJ under the new US administration reclassified the 2020 Supplemental Letter as "advocacy" rather than "guidance."

5. Makan Delrahim, The "New Madison" Approach to Antitrust and Intellectual Property Law, Keynote Address at University of Pennsylvania Law School, at 9 (Mar. 16, 2018), at p. 14.

Example: Injunctive Relief - EU

- The antitrust agencies have been sympathetic to the "hold up" view.
- However, Europe departed from the US by developing a distinctive legal framework for injunctive relief in the case of SEPs, separate from antitrust policy and antitrust law.
  - This framework was developed by the Court of Justice of the European Union (CJEU) in the context of a dispute between Huawei and ZTE. It has evolved into a distinctive evaluative framework, without much reference to competition law concepts.
- The Huawei-ZTE framework appears to have had the interesting effect of restoring some balance.
  - Requires reasonable behaviour on the part of both the SEP holder and the implementer.
  - Prevents implementers from being able to claim willingness on the basis of mere statements that they are willing to accept a license on FRAND terms.
  - Requires demonstration of willingness through meaningful counteroffers that facilitate further negotiations.
  - Requires Courts to evaluate other important features of conduct such as the length of time taken to respond or engage with the SEP holder.

Some European jurisdictions such as Germany and the Netherlands, as well as the UK, are now seen as more receptive venues for SEP holders to enforce their patent rights relative to the United States

Example: Injunctive Relief - China

Huawei v InterDigital (2013) gives a vista into China's antimonopoly law
the Guangdon Provincial High Peoples Court:

- Upheld lower courts that said InterDigital abused its dominant position by excessive pricing and improper tying of licenses of non-SEPs to SEPs.
- Determined that InterDigital had acted unlawfully in seeking injunctive relief.

Iwncomm v Sony (2018)
Beijing IP Court:

- Held that SEP holder may secure an injunction if the potential licensee negotiated in "bad faith."

There is always fear that Chinese and foreigner firms will get treated asymmetrically in China… the evidence is murky.

Example: SEP Damages – USA, UK

USA – Only damages are available

UK – In IPCOM v HTC, Justice Birss limited damages to the UK; but said that past damages for FRAND infringement might appropriately be global in scope. The reach of UK courts is very much limited by the small size of the UK market.

Observation: the weakening of injunctive relief in the USA encourages litigation elsewhere and retards the licensing process, greatly escalating transaction costs and lowering returns to R&D thereby hurting innovation.

Example: Stage of Industry Licensing

There seems to be a global convergence that patent owners are free to set their licensing model as they wish:

Europe:

- Intellectual property is an input and the input owner is free to choose the contours of its licensing model, (e.g., licensing of components, devices, subassemblies, etc.).
- This fits with economic principles that recognize that where value in use is observable, setting royalties based on value generated is less ambiguous/more transparent (e.g., Daimler v Nokia).

USA:

- FTC v Qualcomm – OK to license at device level.

Concluding Observations

- Antitrust has unnecessarily complicated SEP licensing and royalty receipt. It has provided a fig leaf for “hold out” by putative licenses.
- It all began with academic economists' misapplication of Nobel laureate Oliver Williamson’s (U.C. Berkeley) theories of “hold up” (which were formulated in the context of physical assets to which access could be denied to those that used but did not pay).
- Hold up theories went across the Atlantic, and then to Asia.
- The social cost has been considerable. The job is to minimize further damage… and the courts now seem to agree.
- IP and antitrust issues can converge, and converge globally, if antitrust is banished (as in FTC v Qualcomm); or in the alternative antitrust embraces dynamic competition.

The last word belongs to Makan Delrahim:

"With an eye to promoting dynamic competition, I humbly submit that competition law enforcers around the world must give careful consideration to the interests that drive innovation, including by allowing innovators to reap the full rewards of their investment in research and development."

See D.J. Teece "Pivoting Towards Schumpeter: Makan Delrahim and the Recasting of US Antitrust Towards Innovation, Competitiveness, and Growth" *Antitrust* (2018).