Prepared Statement

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Hearing on

Experts Needed: Options for Improved Science and Technology Advice for Congress

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Chairwoman Johnson, Ranking Member Lucas, and distinguished Members of the Committee, thank you for calling today's hearing on congressional Science and Technology (S&T) expertise and for the opportunity to testify. The views I express in this testimony are my own and should not be construed as representing any official position of the Belfer Center, Harvard Kennedy School, or Harvard University.

Congress's Role in Governing Emerging Technologies

We are at a pivotal moment in time. Emerging technologies are moving from research labs to store shelves faster than we've ever seen. In the past ten years, social media, smartphones, cloud computing, genetic editing, and other AI-fueled technologies have changed how humans live, work, eat, and interact with one another. Many of these technologies hold tremendous promise, but each has a downside, too. Protecting online privacy, combating climate change, and safeguarding elections from hacking are all examples of areas where science and technology expertise is needed by our policymakers to ensure society benefits from these new technologies while harms are minimized.

Driving much of this innovation are United States-based companies, scientists, and technologists. Eight of the ten largest tech companies in the world (including Apple, Microsoft, Alphabet, IBM, and Facebook) are American and out of the top 150 largest tech companies, the U.S. is home to

nearly half[1]. The U.S. is also a global leader in creating cellular therapies and other biotechnologies, according to Deloitte, and is in a race with China for 'biointelligence' supremacy by combining artificial intelligence and biotechnology capabilities.[2] And according to the World Intellectual Property Organization's ranking of innovative countries, in 2019 the U.S. ranked first in quality of innovation and market sophistication, with the most top science and technology innovation clusters in the world.[3]

Because of the country's position as a global innovation leader, the U.S. Congress, more than any other institution in the world, has the power to craft breakthrough legislation to help shape how our global society is impacted by emerging technologies. As the Congressional Research Service (CRS) wrote, "The federal government has played an important role in supporting R&D efforts which have led to scientific breakthroughs and new technologies, from jet aircraft and the internet to communications satellites and defenses against disease."[4]

From appropriating funding for basic and applied research--about $155 billion in FY2017, the most recent figure available[5]--to crafting smart regulations that promote fair competition and safe use, Congress plays a vital role in promoting and managing emerging technologies. Congress also acts as a key fail safe in managing emerging technologies that were ineffectively managed, and therefore pose societal risks. **By creating societal guardrails for technologies that have already become pervasive in society, like social media, Congress can promote public purpose in ways that other organizations cannot.**

Unfortunately, in recent years, Congress has missed opportunities to set the guiding principles and norms for many emerging technologies, ceding opportunities to other countries, states, or governments. For example, rather than make the U.S. a global leader in protecting user data privacy, the European Union set the standard with its General Data Protection Regulations (GDPR), with California's Consumer Privacy Act (CCPA) to soon follow. In the U.S., Congress has ceded the opportunity to set the norms and guidelines, leaving it up to individual states and localities to create a patchwork of data privacy and protection regulations--sometimes making it more difficult for consumers to understand how their data is used or secured. Other technologies with profound public impacts, like facial recognition, have been left to state and local governments to regulate.[6]

Aside from managing emerging technologies, Congress plays an important role in increasing American economic competitiveness. As Undersecretary of Commerce for Standards and

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[1] Panciano, Jonathan. "The Largest Technology Companies In 2019: Apple Reigns As Smartphones Slip And Cloud Services Thrive." *Forbes*. May 15th, 2019. https://www.forbes.com/sites/jonathanponciano/2019/05/15/worlds-largest-tech-companies-2019/#14b5b48e734f
[2] "2019 Global Life Sciences Outlook." *Deloitte*. Page 13. https://www2.deloitte.com/global/en/pages/life-sciences-and-healthcare/articles/global-life-sciences-sector-outlook.html
[3] "Global Innovation Index 2019: United States of America." *World Intellectual Property Organization*. July 2019. https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2019/us.pdf
[4] Gottron, Frank. "S&T Issues in the 116th Congress." Congressional Research Service. February 2019. Page 2. https://fas.org/sgp/crs/misc/R45491.pdf
[5] Ibid.
[6] "A Facial Recognition Ban is Coming to the US, says AI Policy Advisor." MIT Tech Review. September 2019. https://www.technologyreview.com/s/614362/a-facial-recognition-ban-is-coming-to-the-us-says-ai-policy-advisor/

Technology and NIST Director Walter G. Copan put it, "Removing roadblocks, enabling entrepreneurs, attracting private investment and getting inventions from the laboratory into the marketplace faster are essential to unleash American innovation and to strengthen U.S. economic competitiveness and national security."[7] Congress plays a role at each step.

Evaluating and Reframing the Dialogue on Congressional S&T Expertise

At the Technology and Public Purpose (TAPP) Project based at Harvard Kennedy School's Belfer Center for Science & International Affairs, we conduct research on how to ensure that emerging technologies are developed and managed in ways that serve the overall public good.

Given Congress's importance in this space, we wanted to better understand how equipped it is to reckon with emerging technologies. In interviews and much of the existing literature on Congress and its S&T expertise, we heard three consistent themes:

1. Congress does not have enough S&T experts on staff;

2. Congress is too slow to keep up with effectively governing new technologies; and

3. We need better institutions to address this problem: either refund the OTA or invest in support agencies' capabilities like GAO.

This is a simple story, and on its face, a correct one. However, the existing narrative left out vital foundational questions: what, specifically, do congressional personal offices and committees need science and technology information for (see Appendix 1, Figure 1)? Where do they get it from? What do they do with it? In other words: what causes members of Congress to demand S&T expertise, and where do they get their supply of it from? What gaps exist, and how can they be filled both internally and externally?

To make progress, we needed to reframe the dialogue around the lived experiences of members and their teams. **Without a more holistic understanding how congressional personal offices and committees identify S&T needs, find relevant sources, absorb the salient points, and use that information, improving S&T expertise by adding support capacity is likely to be ineffective.** Reframing the conversation around actual day-to-day use of S&T information provides a more accurate picture of the real gaps that members and their staff face and offers a clearer set of prescriptions to close those gaps.

Over the past 18 months, the TAPP Project consulted over 140 stakeholders––including current and former members of Congress, congressional staff, lobbyists, civil society experts, and academics––**to understand how Congress uses S&T expertise and how we bolster its capacity to ensure society benefits from advances in technology while harms are**

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[7] "NIST Releases Findings on Increasing the Innovation Impacts of Federally Funded R&D." National Institute of Standards and Technology, Department of Commerce. April 24th, 2019. https://www.nist.gov/news-events/news/2019/04/nist-releases-findings-increasing-innovation-impacts-federally-funded-rd

minimized. We found that an existing narrative presented a false choice between strengthening legislative support agencies and internal capacity building efforts leaving out important distinctions between different types of S&T needs. We believe a new framing is needed to truly build a 21st century Congress capable of addressing the pressing societal dilemmas of emerging technologies.

Existing S&T Needs & Available Resources

Given the broad spectrum of today's S&T information needs, a one-size fits all solution or a centralized expert S&T body alone to address capacity gaps will be insufficient to improve Congress's S&T expertise. Congressional S&T expertise requests vary from simple one-off time-sensitive requests to expansive reports on the technical, social, and economic dimensions of a nascent or emerging technology; the level of expertise, time to complete, and outputs vary considerably based on the need.[8]

As a result, congressional offices seek out the information they need from a variety of sources, including committee staff, legislative support agency staff, academics and think tank staff, and lobbyists (see Appendix 1, Figure 2). Each source has its benefits and drawbacks; lobbyists are well informed but working on behalf of a client with a specific goal and their own data, while academics are experts on specific topics but often not used to offering policy-oriented, actionable resources.

Despite the depth and breadth of S&T resources available to it, Congress remains unable to fully absorb and use them to understand emerging technologies and their implications; it needs an embedded workforce better suited to do so. As noted in our report, "Congress has simply not given itself the human capacity and funding necessary to efficiently and effectively absorb new information—particularly for complex S&T topics."[9] Members of Congress and their staff can get expert opinions and advice from a number of credible external sources. However, without basic in-house STEM expertise, many offices struggle to choose which expert to consult and how to weigh and assess opposing recommendations.

Recommended Approaches for Increasing Congressional S&T Expertise

As noted, our research showed that there is no one-size fits all solution to congressional S&T capacity issues. By understanding the lived experience of members of Congress and their staff, though, we believe that there are several steps that Congress can take on two levels: (1) Long-Term Congressional Workforce Improvements, and (2) Near-Term Actions to Address S&T Expertise Gap.

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[8] For more on this topic, see *Building a 21st Century Congress*, page 59.
[9] Ibid, page 60.

Some of the steps to improve S&T capacity require structural changes to how Congress funds itself and hires talent to work in personal offices and committees. These changes are politically difficult and will require sustained pressure over time to accomplish, both by internal champions and through external pressure. However, making the changes would significantly improve congressional S&T expertise and enable the legislative branch to more effectively craft legislation and conduct real-time oversight on emerging technology issues.

In the meantime, there are several immediate actions that Congress can take to both rapidly bolster its S&T expertise and simultaneously lay the groundwork for the structural improvements that will pay off later. **These actions will help Congress address some of the gaps but should not be expected to solve the broader S&T expertise gap.** Nevertheless, they are vital improvements that, with some effort, will have an immediate impact.

Long-Term Congressional Workforce Improvements

Based on our research, we believe that the S&T gap Congress faces is a product of structural forces that prevent Congress from absorbing the S&T information it needs to do its job effectively (see Appendix 1, Figure 3). Therefore, we recommend the following long-term approaches to improve in-house expertise:

1. **Increasing Congressional Resources to Create Staff Capacity**

   Congress does not give itself enough resources to do its job effectively, particularly on S&T issues. Congressional staffers are overworked and underpaid; Congress does not offer salaries on par with the executive branch[10] or the private sector.

   Congressional under-resourcing affects every issue area Congress is responsible for, of course, but makes the S&T capacity gap more acute, for two reasons. First, congressional staff often have liberal arts backgrounds, which makes S&T issues more difficult to immediately work on. Second, congressional staff is overstretched with extremely broad portfolios, which makes it more difficult to spend time learning about the S&T issues they may be responsible for covering. The result is a Congress that lacks S&T expertise and is unable to take the time to learn some of the basics relevant to S&T topics.

   The solution is, at a surface level, simple: "Congress should increase committee budgets to allow them to hire additional staff members and pay a more competitive salary, which will help them retain the staff they already have. Specific to the House of Representatives, Congress should raise members' personal office budgets, remove the cap on office personnel, and increase the staff pay ceiling."[11]

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[10] "Tech Unit Stretches Federal Pay System to Recruit Cyber Talent." Nextgov. October 2016.
https://www.nextgov.com/cybersecurity/2016/10/tech-unit-stretches-federal-pay-system-recruit-cyber-talent/132332/
[11] Ibid., 12

Politically, though, this is a heavy lift. There is bipartisan agreement that Congress should not appropriate itself additional funding, as it would be a politically difficult vote to justify to constituents.

2. **Hiring Scientists and Technologists to Increase Subject Matter Expertise**

   Relatedly, Congress does not hire enough scientists and technologists to serve on Capitol Hill. As our report notes, "There are structural challenges that make a S&T-focused career in Congress unusually difficult. Due to budget constraints and the nature of the role, staffers are usually generalists...Career progression in Congress also puts those with an S&T background— often with a PhD— at a disadvantage. As a current staffer noted, congressional offices often hire from within Congress; staffers typically start as interns who work their way up over time. In other words, the hiring process is not designed for subject matter experts with years of scientific training."[12]

   Because science and technology-relevant issues are a part of every member of Congress's portfolio, S&T expertise should not be centralized within a single entity or office on Capitol Hill--it should be suffused throughout personal offices and committees. From asking smart questions during hearings to conducting effective oversight and crafting responsive, valuable legislation, members increasingly need S&T expertise within their personal offices.

   Congress should hire more S&T talent, and to do so it will need to create pathways for individuals with S&T backgrounds to thrive on Capitol Hill.

A workforce development solution that increases funding and creates pathways for S&T talent will take time, effort, and political will; it is a long-term project that will need champions inside Congress.

Near-Term Actions to Address Congressional S&T Gap

In addition to long-term workforce improvements, we believe there are immediate opportunities for Congress to supplement its S&T expertise:

1. **Adding S&T expertise through a legislative support agency like the Government Accountability Office or a revamped Office of Technology Assessment.**

   A new or improved legislative support agency provides Congress with immediate benefits as they reevaluate their workforce. Given the time-sensitive nature of emerging

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[12] Ibid, 65-66.

technologies that need effective legislation now, supporting a new or improved S&T expertise body will help provide timely information for a variety of congressional needs, from one-off information requests to long-term interdisciplinary studies of the next generation of emerging technologies.

OTA's original function of providing timely, independent, and decisive research on complex S&T topics must be restored whether that's through GAO, a new version of OTA, or another entity. It's a necessary, but not fully sufficient approach to address the broader S&T expertise gap.

2. **Working with universities, foundations, and others to begin creating robust pathways for recruiting S&T talent to serve on Capitol Hill.**

Improving S&T expertise within the policymaking community is not Congress's responsibility alone. Many STEM students are not aware that they could be successful policy advisors on Capitol Hill, or even what the job would entail. Universities and colleges should educate STEM students on the policymaking process and roles within government and should more actively promote public service to these students. Non-profit organizations and foundations can help provide stipends or other funding for students, to help defray the cost of living in the expensive Washington, DC area, and to offer additional incentive for STEM students.

Conclusion

At the TAPP Project, our next research priority is to better understand current pathways for junior STEM talent to serve on Capitol Hill: which universities have created effective pathways, what strategies can scale to other universities, and what Congress needs to do to encourage more STEM talent to advise on and participate in emerging technology policy.

Reframing the debate about congressional S&T capacity away from narrow questions about the OTA or GAO and towards a more holistic understanding of congressional needs is an important step for this conversation to take, and we are pleased to see NAPA's recent study continuing this trend.

The United States will continue to lead in technology development and innovation; it should also lead in managing emerging technologies to best serve the public purpose. In order to do so, we need a Congress capable of engaging in the complex societal issues that emerging tech brings to the forefront. We are delighted that this committee is holding a hearing on this important topic, and we are excited to help build a 21st century Congress, together.

APPENDIX I: Referenced Figures

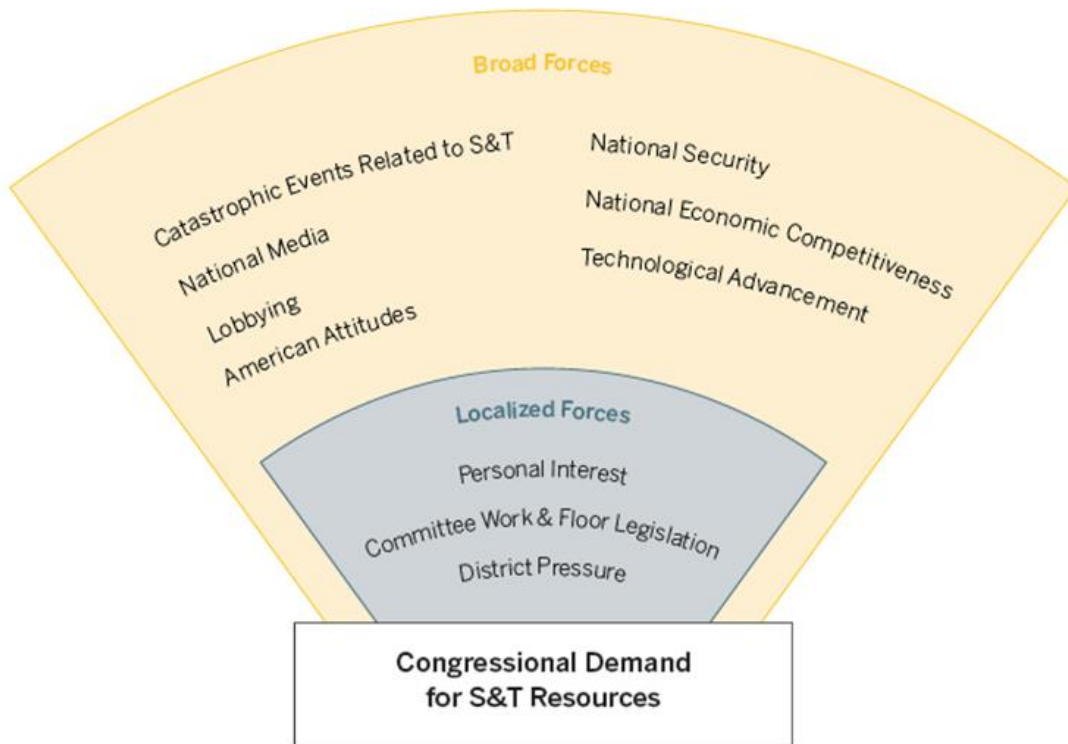## Figure 1: Congressional Demand for S&T Resources

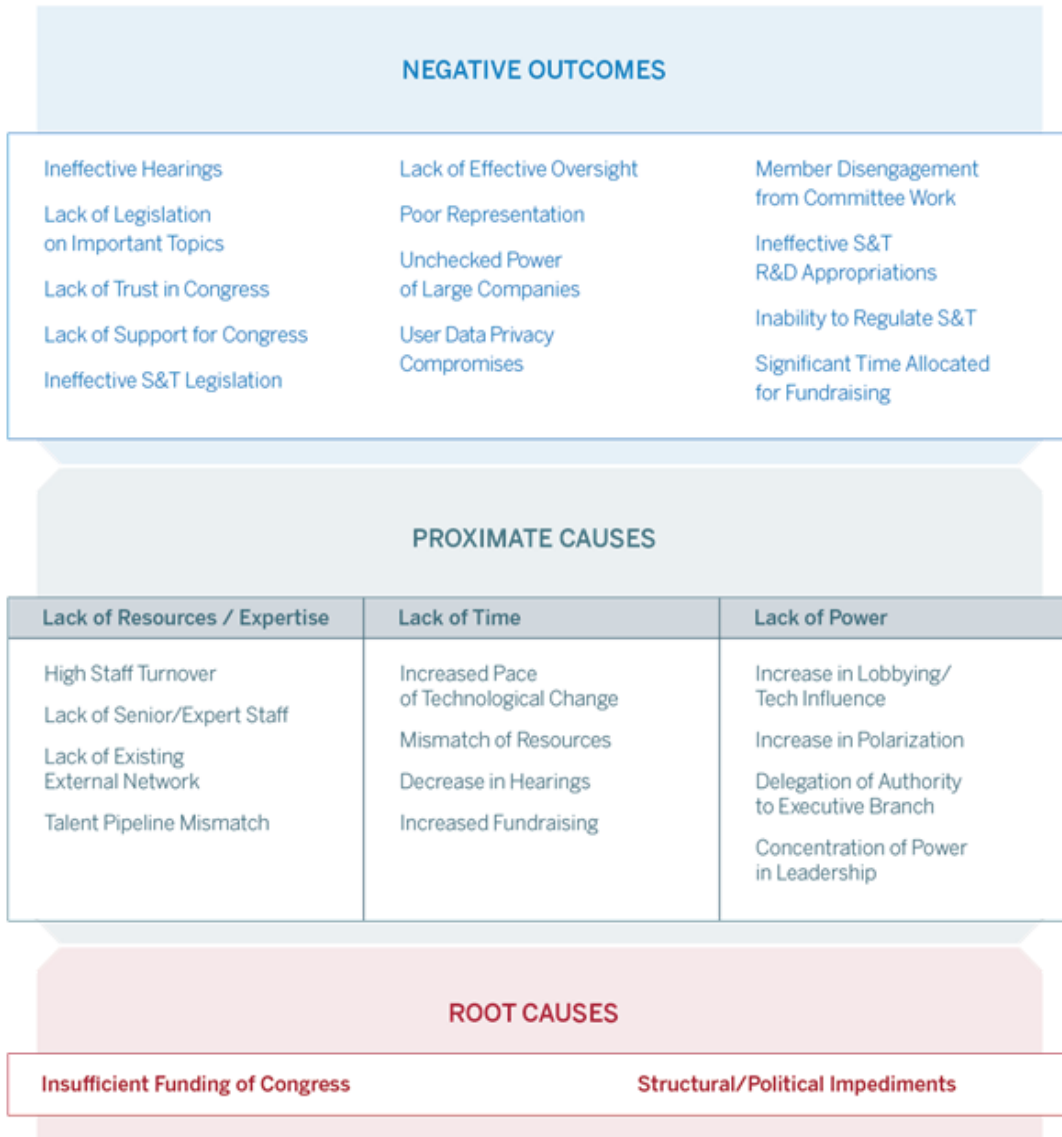**Figure 2: S&T Resources and Value–Add to Congressional Staff**

	TYPE OF RESOURCE	VALUE-ADD TO CONGRESSIONAL STAFF
INTERNAL RESOURCES	**Committee Staff**	**Evaluators** of technical information **Connectors** of expert networks **Decision-Makers** on legislation
	Congressional Research Service	**Compilers** of in-depth literature reviews **Historians** of past legislative efforts
	Government Accountability Office	**Collaborators** on research and audits
	Congressional Budget Office	**Estimators** of policy's budgetary effects
EXTERNAL RESOURCES	**Executive Branch Agencies**	**Experts** on S&T topics and government implementation efforts
	Think Tanks, Academia, and Non-Profit Organization	**Educators** of research on related S&T topics **Trainers** on S&T topics and policymaking process **Influencers** of legislation
	Industry Associations and Lobbyists	**Advocates** for industry or company viewpoints **Trainers** on S&T topics **Influencers** of legislation
	National Academies	**Authorities** on S&T topics
	National Laboratories	**Authorities** on S&T topics
HYBRID RESOURCES	**Fellowships and Detailees**	**Translators** of technical information **Reality Checkers** on received information **Educators** on S&T issues for internal staff
	Media/Internet Research	**Aggregators** of timely S&T news

Figure 3: Root Causes of a Lack of Congressional S&T Expertise

NEGATIVE OUTCOMES

Ineffective Hearings

Lack of Legislation
on Important Topics

Lack of Trust in Congress

Lack of Support for Congress

Ineffective S&T Legislation

Lack of Effective Oversight

Poor Representation

Unchecked Power
of Large Companies

User Data Privacy
Compromises

Member Disengagement
from Committee Work

Ineffective S&T
R&D Appropriations

Inability to Regulate S&T

Significant Time Allocated
for Fundraising

PROXIMATE CAUSES

Lack of Resources / Expertise	Lack of Time	Lack of Power
High Staff Turnover	Increased Pace of Technological Change	Increase in Lobbying/ Tech Influence
Lack of Senior/Expert Staff	Mismatch of Resources	Increase in Polarization
Lack of Existing External Network	Decrease in Hearings	Delegation of Authority to Executive Branch
Talent Pipeline Mismatch	Increased Fundraising	Concentration of Power in Leadership

ROOT CAUSES

Insufficient Funding of Congress   **Structural/Political Impediments**

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WITNESS BIOGRAPHY

Laura Manley is the inaugural Director of the Technology and Public Purpose Project at the Harvard Kennedy School Belfer Center for Science and International Affairs. Led by former U.S. Secretary of Defense Ash Carter, the project aims to steer rapid technology-driven change in directions that serve net, long-term public good. Laura is responsible for all project research and programs including societal due diligence assessments for tech investors, emerging tech briefing guides for policymakers, and strategies for increasing congressional S&T capacity.

Previously, Laura co-founded the Center for Open Data Enterprise (CODE) in Washington DC, which is a nonpartisan research organization that works with governments to leverage data for social and economic good. At CODE, she worked with over a dozen U.S. federal agencies on their data management strategies and with eight national governments on their digital economy policies and IT modernization efforts.

Laura is a Senior Consultant for the World Bank Group and the United Nations Department for Economic and Social Affairs. She also lectures at several institutions including NYU Wagner School of Public Policy, Columbia University School for Professional Studies, and Harvard University Extension School.