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Science, Technology, and Democracy:
Building a Modern Congressional Technology
Assessment Office

Zach Graves and Daniel Schuman

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ABBREVIATIONS

CBO: Congressional Budget Office

COT: Congressional Office of Technology. A proposed OTA-like office.

CRS: Congressional Research Service

CSTA: Center for Scientific and Technical Assessment. A proposed technology
assessment office inside GAO.

GAO: Government Accountability Office (until 2004, the General Accounting Office)

NAPA: National Academy of Public Administration

OCSTA: Office of the Congressional S&T Advisor. A new S&T support entity proposed
by NAPA.

OTA: Office of Technology Assessment

STAA: Science, Technology Assessment, and Analytics. A mission team inside GAO.

S&T: Science and technology

TA: Technology assessment. A type of multi-disciplinary, expert-reviewed research,
or the work-product study that results from such research.

TAB: Technology Assessment Board. The congressional governing board of OTA.

TAS: Technology Assessment Service. A proposed OTA successor.

EXECUTIVE SUMMARY

For over two decades, the Office of Technology Assessment (OTA) served Congress by providing authoritative, non-partisan advice on science and technology (S&T) issues. It advised Congress on how government can leverage technological innovations for its own operations, provided assessments of federal research and development spending, and addressed policymaking matters before Congress that had an underlying scientific or technological component. As a legislative branch agency, OTA provided advice to Congress from a legislative branch perspective, and its work was directed by Congress.

OTA was defunded in 1995 as part of a largely symbolic cost-savings effort, but Congress now appears ready to rebuild an advisory capacity inside the legislative branch. Yet, today's scientific and technological issues, like the broader political landscape, are far different from those of 1995, let alone when OTA was established in the 1970s.

Congress will have to address several challenges in rebuilding a technology assessment arm:

1. How to mitigate bias or the perception thereof and build political support for rigorous analysis in a climate of heightened political polarization and concerted attacks on science
2. How to structure and evaluate the products of a new technology assessment program without the expert networks or institutional norms of the original OTA, and do so in a resource-constrained environment
3. How to scale a successful technology assessment office, including identifying the appropriate amount and sources of funding
4. How to incorporate best practices developed in other countries that have comparable legislative advisory bodies

This paper offers recommendations and a road map for the future success of a restarted technology assessment office in Congress. We look at three potential approaches: (1) Building up the Government Accountability Office (GAO)'s OTA-like capacity in its newly created Science, Technology Assessment, and Analytics (STAA)

team, and giving it greater resources and structural autonomy; (2) Reviving OTA but updating its procedures and statutory authority; and (3) A hybrid approach wherein both GAO and a new OTA develop different capacities and specializations. (Spoiler: we favor the third approach.)

The next section of this paper reviews what OTA was and how it functioned. The third section discusses the history of and rationale for the defunding of OTA, other cuts to Congress's S&T capacity, and why this congressional capacity and expertise matter for democracy. The fourth section reviews efforts to revive OTA and other efforts to build new congressional S&T capacity. The fifth section discusses the political landscape for building S&T capacity, including the legislative branch appropriations process and the different political constituencies for S&T. The final section offers a detailed discussion of various structural recommendations for a new congressional technology assessment office, including an expanded STAA unit in GAO, and a new OTA.

Key Takeaways

- Congress must overcome political obstacles to invest in its own S&T capacity. This should include the creation of a new technology assessment capability modeled in part on OTA, as well as the creation of additional senior S&T policy positions on committees, in personal offices, and in legislative support agencies like the Congressional Research Service (CRS) and GAO.

- OTA was designed for Congress as it existed nearly 50 years ago. However, Congress is a very different institution today. A new technology assessment office needs to update the original structure to adapt to the needs of today's Congress.

- A new office should expand its scope to cover non-technical values such as ethics, adapt elements from participatory models developed by technology assessment offices abroad, improve the timeliness of its reports, make itself more accessible to rank-and-file members of Congress, adjust its oversight structure to empower its director, and put greater emphasis on economic analysis and market-oriented approaches, as well as other reforms.

- GAO's STAA unit has shown significant competence in building its technology assessment capacity. It should continue to take on a significant portion of

OTA's original mission. Congress should consider new authorizing legislation that gives STAA greater autonomy as well as increased resources to support its planned increase from 70 to 140 FTE staffers, and potentially beyond.

- An optimal strategy is for STAA to continue to take on the bulk of OTA's original mission but focus on issues primarily concerning federal programs and expenditures. A new, more narrowly focused version of OTA (which we call the Technology Assessment Service or TAS) should be created to complement STAA. This office could engage in more nimble (and long-term) proactive thinking and horizon scanning about emerging technologies and other S&T issues, while simultaneously side-stepping potential complications that could arise from GAO's bureaucracy and culture.

- Beyond technology assessment, Congress should expand its S&T expertise and capacity at CRS, in committees, and in personal offices. However, in a resource-scarce environment, building up technology assessment appears to have the greatest return on investment.

WHAT WAS THE OFFICE OF TECHNOLOGY ASSESSMENT?

The Office of Technology Assessment served as a think tank within Congress from 1974 to 1995, providing authoritative, non-partisan advice to policymakers on a broad range of science and technology issues. Unlike the Congressional Research Service, which focuses on responsive issue briefs and summaries that synthesize existing research and data, OTA focused on "technology assessments"—multi-disciplinary, expert-reviewed studies that informed the policymaking process at a deeper level.[1] This often included analysis of different policy approaches and their social, economic, and technical implications.[2] Unlike some think tanks, OTA did not make technocratic recommendations. Instead, it empowered policymakers by giving them the tools to make informed decisions about value trade-offs.

1   An archive of OTA reports is available from the Federation of American Scientists at: https://ota.fas.org/otareports/.
2   This is notably different from National Academies reports, which tend to seek consensus.

At its peak, OTA had a budget of $22 million[3]—about $37 million in 2019 dollars—and around 140 full-time employees.[4] As a legislative branch agency, OTA provided advice to Congress from a legislative branch perspective, and its work was directed by the bipartisan, bicameral Technology Assessment Board (TAB), which functioned like a joint congressional committee. At least as important as the reports it generated, OTA's "shared staff" model provided Congress with deep institutional knowledge and access to expert networks beyond the Capitol.

OTA's function was to "provide early indications of the probable beneficial and adverse impacts of the applications of technology and to develop other coordinate information which may assist the Congress."[5] This work covered assessments of federal research and development spending; evaluation of federal S&T acquisitions, programs, and expenditures, including public-private partnerships; advice on regulation of the private sector; and other legislative matters before Congress with an S&T component. The scope of OTA's work included a broad range of issues such as healthcare, education, defense, telecommunications, space, energy, and the environment. Like the Government Accountability Office,[6] its review of government S&T programs also helped produce taxpayer savings many times its own budget.[7]

OTA's core product, its technology assessments, were much more robust than a typical CRS report or think-tank white paper, bringing together expert staff, advisors, external reviewers, and stakeholders from multiple disciplines and backgrounds. These assessments took an average of 18 months to complete and could run to hundreds of pages.[8] While the reports were accessible to all members of Congress and the general public (unless classified), OTA was primarily designed to serve committees

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3   Public Law No: 103-283.

4   In its later years OTA had a legislative limit of 143 permanent staff. Including staff (primarily contractors) listed in its annual reports, it had a little over 200 employees. *Vital Statistics on Congress* (Brookings Institution, March 2019). https://www.brookings.edu/multi-chapter-report/vital-statistics-on-congress/; OTA's annual reports are available at: https://ota.fas.org/otareports/annual-reports/.

5   2 U.S.C. § 472.

6   GAO boasts an average savings of $171 for every dollar of its budget for the past five years. "Performance and Accountability Report Fiscal Year 2019," GAO, November 19, 2019. https://www.gao.gov/assets/710/702715.pdf.

7   See, e.g., M. Granger Morgan and Jon M. Peha, eds., *Science and Technology Advice for Congress* (Routledge, 2003), p. 69.

8   Peter D. Blair, *Congress's Own Think Tank* (Palgrave Macmillan, 2013), p. 51.

of relevant jurisdiction for S&T, as opposed to rank-and-file members of Congress. Only committee chairs, the OTA director, and the OTA board (TAB) could request studies.[9] Even with this restriction, OTA received many more requests than it could accommodate.[10]

As former TAB chairman Sen. Ted Kennedy (D-Mass.) put it in OTA's 1995 annual report: "For a relatively small sum, OTA arms Members of Congress with high-quality advice on issues of enormous magnitude and cost—it's a bargain in my book."[11] Sen. Chuck Grassley (R-Iowa), who was another TAB member, remarked on the Senate floor during the debate over OTA's defunding later in 1995: "OTA is one of the few truly neutral sources of information for the Congress. In a very real sense, OTA is our source of objective counsel when it comes to science and technology and its interaction with public policy decision making."[12]

In 1969, as Congress was considering the creation of a technology assessment office, a report by the National Academy of Sciences framed the issue as follows:[13]

> Between two extremes lies the view of those who recognize that benefit and injury alike may flow from technology, which, after all, is nothing more than a systematic way of altering the environment. They recognize that the quality of life has been greatly improved by technological advance and would deteriorate rapidly in a period of technological stagnation. . . . The choice, from this perspective, is not between the abandonment of technology as a tool of human aspiration and the uncontrolled pursuit of technology. . . . **The choice, rather, is between technological advance that proceeds without adequate consideration of its consequences and technological change that is influenced by a deeper concern for the interaction between man's tools and the human environment in which they do their work.**

9   2 U.S.C. § 472.

10   Blair, p. 52.

11   "Annual Report to the Congress: Fiscal Year 1994," Office of Technology Assessment. https://ota.fas.org/reports/9500.pdf.

12   "Legislative Branch Appropriations for Fiscal Year 1996," *Congressional Record*, Vol. 141, No. 118, July 20, 1995. https://www.congress.gov/104/crec/1995/07/20/modified/CREC-1995-07-20-pt1-PgS10373.htm.

13   This report was created for the House Committee on Science and Astronautics (now Science, Space, and Technology). See: "Technology: Processes of Assessment and Choice," National Academy of Sciences, July 1969. Emphasis added.

For those who hold this more balanced view, the expression "technology assessment" may acceptably describe what occurs when the likely consequences of a technological development are explored and evaluated.

THE LANDSCAPE FOR S&T EXPERTISE IN CONGRESS

A recent study by Harvard University's Belfer Center on congressional science and technology expertise observed that "Congress has not shown that it has the necessary capacity and expertise to fully exercise its constitutional duties."[14] In addition, Congress appears "unprepared to reckon with emerging technologies and their effects on society." This lack of capacity comes out of decades of institutional decline and pressure to shift staffing resources away from policy and towards political communications and constituent services.

Defunding OTA

OTA was defunded on November 19, 1995,[15] with the enactment of the fiscal year 1996 Legislative Branch Appropriations Act.[16] This came during the tumultuous politics of the 1995–1996 government shutdowns, where congressional Republicans faced off with President Bill Clinton over funding and policy priorities.

This showdown occurred in the context of Republicans regaining control of the House for the first time in 40 years under the banner of the "Contract with America"[17]— their 1994 campaign platform that focused on restoring accountability to Congress and cutting wasteful spending. The Contract included a pledge to "cut the number of

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14   Mike Miesen, Maeve Campbell, et al., "Building a 21st Century Congress: Improving Congress's Science and Technology Expertise," Belfer Center for Science and International Affairs, September 2019, p. 1. https://www .belfercenter.org/sites/default/files/2019-09/ST/Building21stCenturyCongress.pdf.

15   It was provided funds to conduct an orderly closure, and continued to exist into 1996.

16   "Technology assessment: Legislative activity," FutureCongress Wiki at GitHub. https://github.com/zachgraves /futurecongress/wiki/Technology-assessment:-Legislative-activity.

17   "Republican Contract with America," U.S. Congress, 1994. https://web.archive.org/web/20050204001622 /http://www.house.gov/house/Contract/CONTRACT.html.

House committees, and cut committee staff by one third."[18] Newt Gingrich (R-Ga.), the newly elected Speaker of the House, was looking for an agency to eliminate to give Republicans moral authority to make deeper cuts in the executive branch. At less than one percent of the legislative branch budget and with a limited internal constituency of committees (whose budgets were also on the chopping block under the Contract), OTA was the most politically vulnerable.

Nonetheless there were several bipartisan efforts in both chambers to save OTA from elimination.[19] One such effort, which was nearly successful, attempted to move its functions over to the Congressional Research Service.[20] This effort was vigorously (and successfully) opposed by then Librarian of Congress James Billington.[21]

The Republican leadership position on abolishing OTA was based on three rationales: (1) It was a symbolically useful cut to advance the fiscal conservative agenda of the Republican Revolution; (2) Congressional Republicans were resentful about the agency's work on several topics, particularly the Reagan Administration's Strategic Defense Initiative proposal in the 1980s;[22] and (3) OTA's staff and directors were perceived to have a left-leaning bias, particularly coming out of mismanagement in the 1970s.[23] While these latter two arguments were important factors, they were nowhere near as important as the first: a symbolic reduction in the legislative branch that presaged major cuts in the executive branch.

The key symbolic importance of eliminating OTA can be seen in testimony by the Heritage Foundation (a top conservative think tank) at an appropriations hearing in April 1995. In his testimony, Heritage representative David Mason described OTA as an agency that does "good work and useful work" that is "respected in the scientific and

....

18   Ibid.

19   Blair, pp. 66–70.

20   H.Amdt.451 to H.Amdt.450 (104th Congress). https://www.congress.gov/amendment/104th-congress
      /house-amendment/451.

21   Since CRS is housed in the Library of Congress, moving OTA there might have cut into the library's budget. See:
      M. Granger Morgan, "Death by Congressional Ignorance: How the Congressional Office of Technology Assess-
      ment—Small and Excellent—was Killed in the Frenzy of Government Downsizing," *Pittsburgh Post-Gazette*,
      August 2, 1995.

22   Adam Keiper, "Science and Congress," *New Atlantis* (Fall 2004/Winter 2005), p. 36. https://www
      .thenewatlantis.com/docLib/TNA07-Keiper.pdf.

23   Ibid., pp. 47–50.

technical community," but argued it should be abolished to give congressional Republicans moral authority to make significant cuts elsewhere in the federal government. Even as he called for its elimination he complimented the agency, noting that "I think [OTA] could be a model you could use in other agencies."[24]

The idea that Congress ought to defund OTA—while the information age was just getting started—was not universally embraced by Republicans. Sen. Ted Stevens (R-Alaska)[25] eloquently made this case as the debate over eliminating OTA moved to the Senate floor:[26]

> We are looking at technology. We are at the edge of a precipice, Mr. President. The precipice is one that we can fall down into a chasm or we can analyze the way to get across that chasm into a future that is so bright you can hardly imagine it. I was talking to some of my interns today. . . . I remarked to them about Mr. Houghton's company.[27] Who would have thought in the days gone by we would take grains of sand from a beach and turn it into the most capable means of conveyance of communications known to man.

Other Senate Republicans, including Chuck Grassley, joined in defending the agency. Grassley emphasized the agency's track record in saving the government money—arguing that eliminating it, despite the need for a symbolic cut, would not produce a net savings:[28]

> I have some examples of where OTA actually helped us save money. OTA's study of the Social Security Administration plan to purchase computers saved $368 million. OTA's cautions—a while back now, I might say—about the Synthetic Fuel Corporation helped to secure $60 billion of savings. . . . OTA's studies of

24 House Committee on Appropriations, "Downsizing government and setting priorities of federal programs," U.S. Congress, April 14, 1995, pp. 1126–36. https://ia802701.us.archive.org/15/items/downsizinggovern02unit /downsizinggovern02unit.pdf.

25 Sen. Stevens served on the TAB from 1974 to 1992.

26 "Legislative Branch Appropriations for Fiscal Year 1996," *Congressional Record*, Vol. 141, No. 118, July 20, 1995. https://www.congress.gov/104/crec/1995/07/20/modified/CREC-1995-07-20-pt1-PgS10373.htm.

27 Rep. Amory Houghton Jr. was former CEO and chairman of Corning Glass Works, now Corning Inc., a manufacturer of fiber-optic cable.

28 "Legislative Branch Appropriations for Fiscal Year 1996," *Congressional Record*.

preventive services for Medicare have assisted legislative decisions for the past 15 years. Studies of pneumonia vaccines and pap smears that showed Medicare would save money by paying for these medical services for the elderly, and Medicare patients would save money. Both proposals passed as legislation. OTA's work on nuclear power plants has played a central role in eliminating poorly conceived and burdensome regulations on the U.S. power industry. I urge you to look very closely at the amount of money that is being spent on OTA. . . . But I also urge you to look at the product of the OTA, and you will come to the same conclusions in 1995 that Congress came to when it was set up: that we need independent sources of information, particularly in science and technology, which we did not have and we will not have after this day if this is abolished.

Taking just the $60 billion in savings from the Synthetic Fuels Corporation, OTA paid for itself for several thousand years. To say nothing of other examples.[29]

Nonetheless, a number of prominent Democrats joined Republican critics in seeking its elimination for fiscal reasons. Democratic Senator Harry Reid (Nev.) was one of these opponents, remarking:[30]

[T]he Office of Technology Assessment is a luxury. It is something that would be nice to have if we had lots of money like we used to have. But we do not have the money that we used to have, and we have to look someplace to make cuts.

Today, nearly a quarter century later, Congress has a far diminished understanding of technology in a world where technology is ubiquitous.

Other Cuts to Congress

The elimination of OTA was not an isolated incident. The same appropriations bill that defunded it brought significant cuts to Congress in several other areas, including major reductions in the number of personal office, committee, and support agency

29 There are numerous other examples where OTA helped the government save money on S&T-related expenditures. See, e.g., M. Granger Morgan and Jon M. Peha, eds., *Science and Technology Advice for Congress* (Routledge, 2003), p. 69; OTA also helped lead to revenue-generating policies such as the adoption of spectrum auctions, which generated tens of billions in revenue for the Treasury.

30 "Legislative Branch Appropriations for Fiscal Year 1996," *Congressional Record*.

staff. Changes in House Rules also increased leadership influence over committee assignments and eliminated parallel structures for congressional policymaking, such as the Democratic Study Group.[31] These changes had the (likely intended) effect of strengthening the hand of congressional leadership over committees and building a stronger reliance of members of Congress on outside interests, especially think tanks and trade associations.[32]

The tale of the tape shows the cuts in capacity, looking at the numbers from just before the Republican Revolution to a few years into Republican control.[33] Between the 103rd Congress and the end of the 104th Congress, Congress walked off a cliff when it came to staff capacity. According to data from CRS,[34] in the House of Representatives, committee staff decreased from 1,947 staff in 1994 to 1,306 staff in 1996 (−32.9%). In the Senate, committee staff decreased from 1,094 in 1994 to 929 in 1996 (−15.1%). Personal office staff stayed relatively flat, going from 7,284 to 6,532 in the House (−10.3%) and from 3,826 to 3,773 in the Senate (−1.4%).[35] Support agency staff

31 Julian E. Zelizer, "When Liberals Were Organized," *The American Prospect,* January 22, 2015. https://prospect .org/article/when-liberals-were-organized ("When Republicans took control of the House of Representatives in 1994 for the first time in 40 years, one of Speaker Newt Gingrich's earliest moves was to end the public funding for the Democratic Study Group [DSG], a caucus of liberal Democrats that had been created in 1959. It was one of Gingrich's shrewdest maneuvers." "From its founding, the DSG lobbied the Democratic leadership to appoint liberals to serve on influential committees, to support procedural reforms that would weaken committee chairmen, and to back legislation to expand the role of the federal government. The DSG regularly assembled task forces to develop legislation on key issues. The leaders created their own whip system, with 12 Democrats assigned to check on promised votes. They produced and disseminated first-rate research for members and the press, exposing conservative tactics and offering weekly legislative updates on their key issues. In the committee era of Congress, this kind of information was both novel and crucial, since so much of the legislative process was secretive and committee chairs retained tight control over staff and data.")

32 Gingrich had some controversial ties to outside nonprofits. See, e.g., Glenn F. Bunting, "Gingrich's Politics Got Boost From Nonprofits," *Los Angeles Times*, June 25, 1996. https://www.latimes.com/archives/la-xpm-1996-06 -25-mn-18215-story.html.

33 See: "Senate Staff Levels in Member, Committee, Leadership, and Other Offices, 1977–2016," Congressional Research Service, September 13, 2016. https://www.everycrsreport.com/reports/R43946.html. See also: "House of Representatives Staff Levels in Member, Committee, Leadership, and Other Offices, 1977–2016," Congressional Research Service, September 13, 2016. https://www.everycrsreport.com/reports/R43947.html.

34 While they generally show the same trends, there are some conflicts between commonly used data sources about congressional staffing such as Brookings and CRS.

35 Senate staff numbers are calculated in large part based on state population, which masks trends in non-constit-uent support staff.

declined as well. As committees declined, the power vacuum was filled by congressional leadership. Between 1994 and 2016, the number of House leadership staff increased from 112 to 239 (+113.4%).

**House and Senate Committee Staff Levels, 1986–2016**
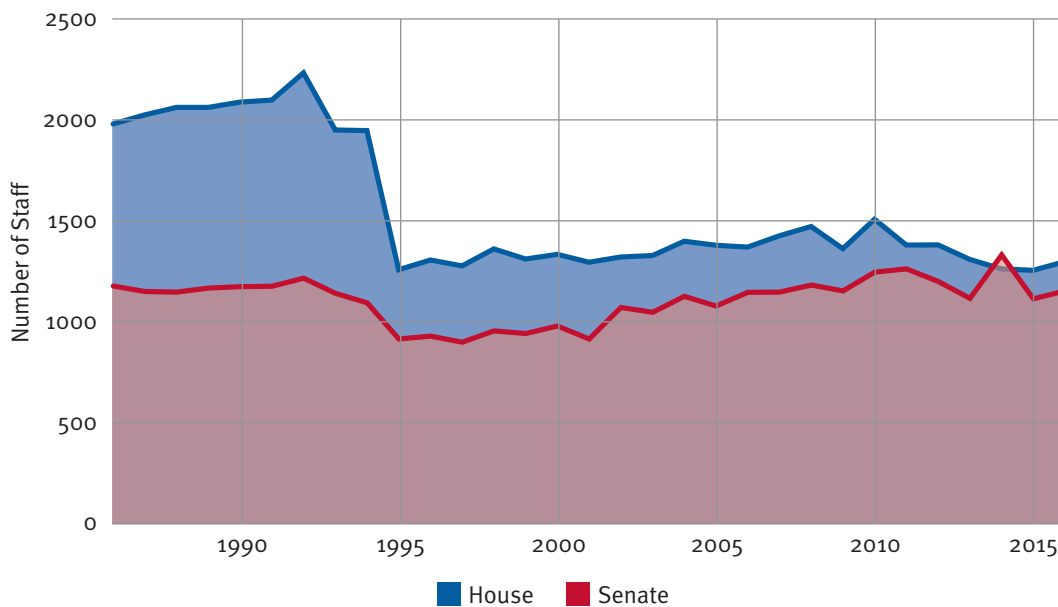
Data from the Congressional Research Service[36]

Congress also lost significant capacity in key committees of jurisdiction for S&T, including the House Science, Space, and Technology Committee, the House Energy and Commerce Committee, and the Senate Commerce, Science, and Transportation Committee. For instance, House Science went from 92 staff in 1994 to 51 staff in 2016 (−44.6%).

36   Chart does not include staff on joint committees.

**Staff Levels for Key Committees with S&T Jurisdiction, 1986–2016**
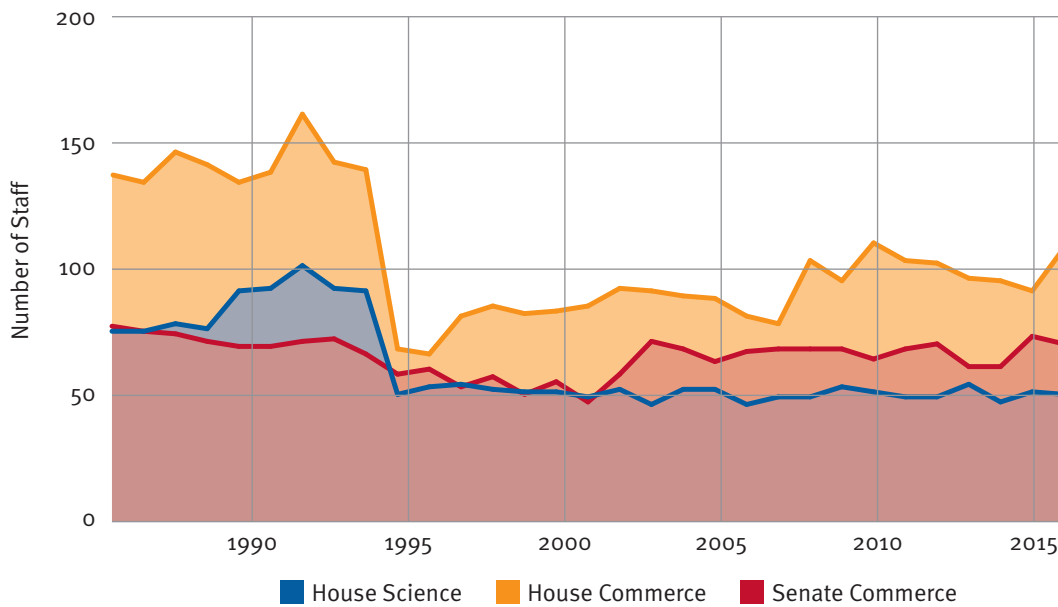
Data from the Congressional Research Service

Congressional support agencies would also face significant cuts. From 1994 to 1996, GAO staff went from 4,572 to 3,677 (–19.6%), and CRS staff went from 835 to 729 (–12.7%).[37] More importantly, the 1995 cuts set off a continued downward trend. From 1994 to 2015, GAO lost 1,583 FTE staff (–34.6%), and CRS lost 226 FTE staff (–27.1%). The Congressional Budget Office (CBO) stayed flat, going from 218 in 1994 to 235 staff in 2015. We do not know how many staff were analysts versus support staff, but the size of the reductions and anecdotal evidence strongly suggest that analytical capabilities were significantly diminished.

37   Brookings Institution *Vital Statistics on Congress*, Table 5–8.

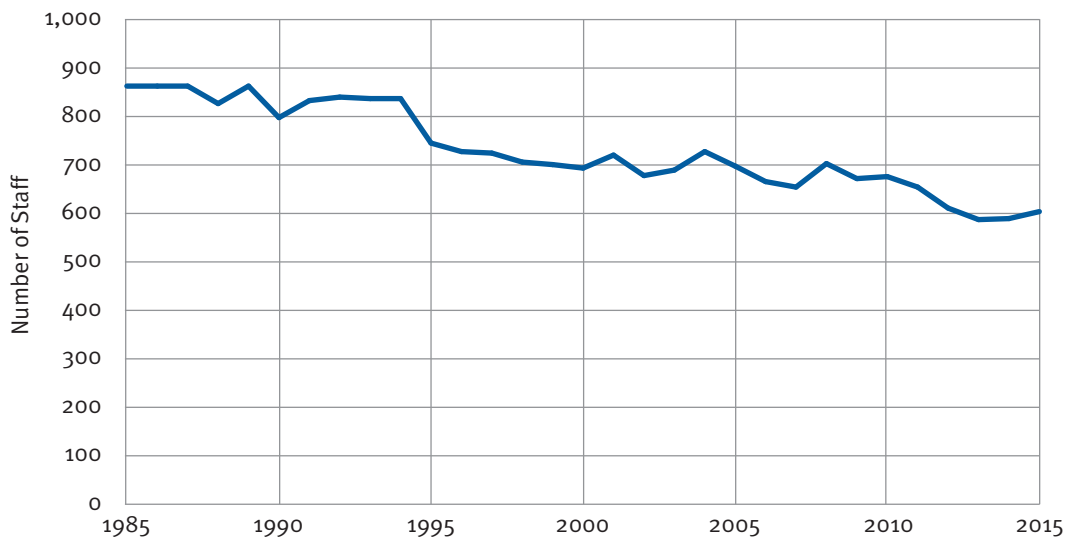## Government Accountability Office Staff Levels, 1985–2015
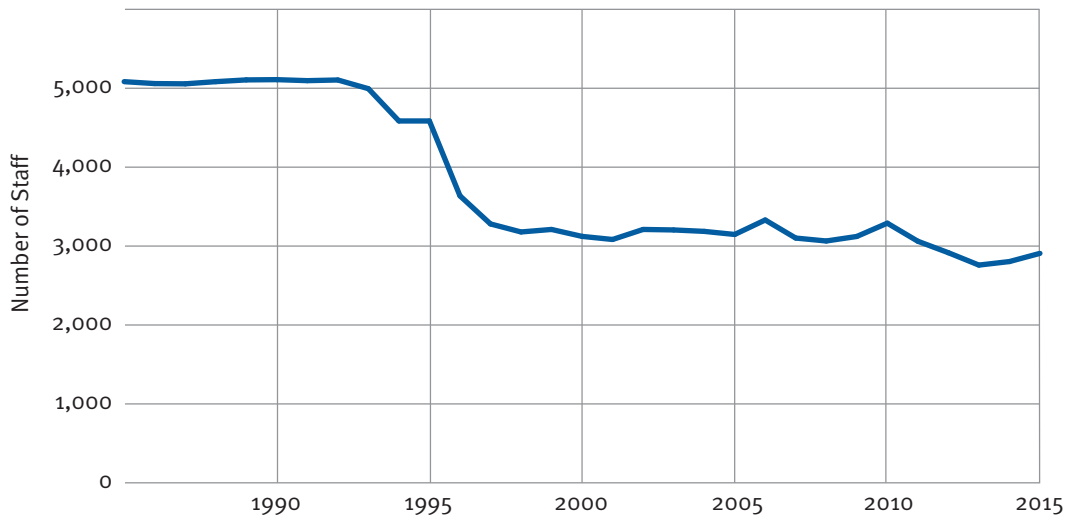
Data from Brookings Institution Vital Statistics on Congress, Table 5–8

Congressional Research Service Staff Levels, 1985–2015

Data from Brookings Institution Vital Statistics on Congress, Table 5–8

Shifting Priorities and Increased Demands

These numbers obscure a more significant trend of declining congressional capacity in the personal offices. While the overall personal office numbers are roughly flat, the data shows a shift in personnel from Washington, DC, to the district offices. Over time, personal offices shifted staff from policymaking to constituent support roles. In the House, in 1985 62% of staff were in Washington, DC, but that percentage declined to 49% in 2005.[38] In the Senate, in 1995 70% of staff were in Washington, but only 61% were there in 2005.[39]

There's also strong reason to believe that, of staff remaining in DC, significant resources were devoted to responding to constituent communications and press relations from the 1980s to the 2010s.[40] A 2005 Congressional Management Foundation study provides some data on constituent communications—a trend that has only accelerated.[41] In 2000, there were 105,873,615 communications to Congress by postal or electronic mail; by 2004 it had doubled to 200,388,993. According to CRS, more than 300 million external emails were received by Congress in 2011.[42] And, as CRS has noted, social media has fundamentally changed how people communicate with Congress, both in terms of volume of communications and in terms of the speed at which a response is expected.[43] There also is reason to believe that telephonic com-

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38   Daniel Schuman, "Keeping Congress Competent: Staff Pay, Turnover, And What It Means for Democracy," *First Branch Forecast*, Demand Progress Education Fund, December 21, 2010. https://firstbranchforecast.com/2010/12/21/keeping-congress-competent-staff-pay-turnover-and-what-it-means-for-democracy/.

39   Daniel Schuman, "Keeping Congress Competent: The Senate's Brain Drain," *First Branch Forecast*, Demand Progress Education Fund, November 30, 2012. https://firstbranchforecast.com/2012/11/30/keeping-congress-competent-the-senates-brain-drain/.

40   The increased burden of responding to constituent communications even spilled over onto some analysts at CRS. See: Kevin Kosar, "Why I Quit the Congressional Research Service," *Washington Monthly*, January-February 2015. https://washingtonmonthly.com/magazine/janfeb-2015/why-i-quit-the-congressional-research-service/.

41   Brad Fitch and Kathy Goldschmidt, "Communicating with Congress: How Capitol Hill is Coping with the Surge in Citizen Advocacy," Congressional Management Foundation, 2005. http://www.congressfoundation.org/storage/documents/CMF_Pubs/cwc_capitolhillcoping.pdf.

42   Jacob Straus and Matthew Glassman, "Social Media in Congress: The Impact of Electronic Media on Member Communications," Congressional Research Service, May 2016. https://www.everycrsreport.com/reports/R44509.html.

43   Ibid.

munications have increased, although there is not hard data on this.[44] Significant staff
resources have been devoted to addressing the onslaught of communications.

Why It Matters Today

A significant loss of congressional capacity resulted from the defunding of OTA, the cut-
ting of congressional support agencies, the weakening of congressional committees,
and the general increase in constituent engagement demands. A natural consequence
of this was making the legislative branch—the most democratically accountable of the
three branches of the federal government—weaker and less deliberative. It had fewer
resources available to oversee the executive branch, federal agencies, and rulemak-
ings; it was less able to understand industry and the forces reshaping the economy;
and it became less able to see into the future. As the information revolution blos-
somed, Congress's ability to understand the world around it withered even while the
internet, and a growing population, increased its workload.

By design, Congress is the most open and democratic branch of government.
Because of its lawmaking role, Congress regularly consults with and is sought out
by political stakeholders. Naturally, those stakeholders who possess strong motiva-
tions to influence Congress and the greatest financial resources to support congres-
sional advocacy have the loudest voices. Accordingly, this sounding out of popular
and special-interest sentiment must be leavened by an expert understanding of the
issues before the legislative branch. The loudest (and best-funded) voice does not
necessarily make the best policy. Even if Congress is one of the most advised bodies
in the world, it needs the tools and resources to separate facts from opinions—to sep-
arate argument from facts.

OTA was one of the few institutions that served Congress's informational needs
without staff needing to fear its being susceptible to influence or capture by external
forces. OTA was designed to be a creature of the legislative branch: to understand how
it processed information, to adapt to its rhythms, to provide information that could be

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44   See, e.g., David Pierce, "Congress' Phone System Is Broken—But It's Still Your Best Shot," *Wired*, February 3,
      2017, and Kathryn Schulz, "What Calling Congress Achieves," *New Yorker*, March 6, 2017. https://www.wired.
      com/2017/02/call-congress-phone-system-broken/ and https://www.newyorker.com/magazine/2017/03/06
      /what-calling-congress-achieves.

acted upon. This expert role, which is provided by Congress's other legislative agencies—CRS, GAO, CBO—is not intended to make decisions for the legislative branch, but to arm staff and members with the information they need to develop and advance their policy agendas. Whatever the policy decision might be, their role is to help members of Congress make it as good as it can be.

The absence of OTA, the defunding of the support agencies, and the cuts to committee staff have left Congress in the hands of overworked, under-experienced generalist staff that are straining under the weight of their responsibilities—and revolving-door lobbyists have stepped in to carry the load. Instead of merely providing a helping hand, wealthy special interests have the ability and incentive to shift the entire framework in their direction. Think tanks, which are often funded by industries and individuals with political agendas, have rushed in to buttress their arguments. While some produce high-quality research, others have also supported industry-backed disinformation campaigns and rent-seeking.[45] The entire democratic edifice, designed to house every voice, has become dominated by those who can pay for megaphones. The resulting cacophony has skewed the debate in favor of those with the greatest financial resources.

This is particularly pernicious in the science and technology realms. The development of new technologies and the discovery of new scientific truths can disrupt industries and shake the foundations for well-settled policies. But incumbents may react not by adapting to these new understandings, but instead by using their political power to preserve the status quo and destroy or co-opt the insurgents. As economists Daron Acemoglu and James Robinson observed in their book *Why Nations Fail*:[46]

> [S]ustained economic growth requires innovation, and innovation cannot be decoupled from creative destruction, which replaces the old with the new in the economic realm and also destabilizes established power relations in politics.

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45   See, e.g., Allan M. Brandt, "Inventing Conflicts of Interest: A History of Tobacco Industry Tactics," *American Journal of Public Health*, January 2012. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3490543/#.

46   Daron Acemoglu and James Robinson, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty* (Crown Business, 2013), p. 430.

Listening only to incumbents and activists is no way to make S&T policy. Congress needs non-partisan, expert advice to make judgments about whether to intervene and what steps might be appropriate.

Critics might also suggest that congressional dysfunction doesn't matter, since the private sector is the real driving force behind innovation—and our laws and institutions will catch up eventually. Yet, looking at today's Silicon Valley giants, one invariably finds federal government investments and research underlying their core products. Google's revolutionary search algorithm was developed out of funding from the National Science Foundation's Digital Library Initiative.[47] And, as economist Mariana Mazzucato documents, most of what makes our smartphones "smart" was supported by government research initiatives:[48]

> The iPhone depends on the Internet; the progenitor of the Internet was ARPANET, a program funded in the 1960s by the Defense Advanced Research Projects Agency (DARPA), which is part of the Defense Department. The Global Positioning System (GPS) began as a 1970s US military program called NAVSTAR. The iPhone's touchscreen technology was created by the company FingerWorks, which was founded by a professor at the publicly funded University of Delaware and one of his doctoral candidates, who received grants from the National Science Foundation and the CIA. Even SIRI, the iPhone's cheery, voice-recognizing personal assistant, can trace its lineage to the US government: it is a spinoff of a DARPA artificial-intelligence project.

Beyond federal programs and expenditures, emerging technologies often raise ambiguities in old legal frameworks, negative externalities, national security threats, ethical dilemmas, and other issues that warrant scrutiny and examination by policymakers. In addition, our expansive federal government spends hundreds of billions of dollars each year on S&T-related programs and expenditures, including defense acquisitions, IT infrastructure, and entitlement spending. This includes nearly $150 billion

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47   "On the Origins of Google," National Science Foundation. https://www.nsf.gov/discoveries/disc_summ
     .jsp?cntn_id=100660.

48   Mariana Mazzucato, *The Entrepreneurial State: Debunking Public vs. Private Sector Myths* (Perseus Books,
     2015), p. 16.

annually in federal research and development spending alone.[49] Pretending that the federal government doesn't have a significant role to play in science and technology is unrealistic and self-defeating. Accepting this role for the state as a historical fact, it is essential that policymakers be appropriately empowered to make informed decisions on behalf of the people they represent.

EFFORTS TO RESTORE CONGRESSIONAL S&T CAPACITY

Efforts to re-create a congressional technology assessment office started a few years after OTA was defunded. Since then, members of Congress have championed reviving OTA in various forms, with little success until recently.[50]

Because OTA was merely defunded—its authorizing statute remains in effect—one approach has been to restore funding through the legislative branch appropriations process. Another approach has been to create a similar, OTA-like entity either based on the OTA statute or as an entirely new entity.

Early champions for rebuilding OTA included the aforementioned Rep. Amo Houghton (R-N.Y.), who was in office from 1987 to 2005,[51] and Rep. Rush Holt (D-N.J.), a Ph.D. physicist who was in office from 1999 to 2015.[52] More recent champions have included former Rep. Jason Chaffetz (R-Utah); Reps. Bill Foster (D-Ill.), Sean Casten (D-Ill.), and Mark Takano (D-Calif.); Sens. Thom Tillis (R-N.C.) and Mazie Hirono (D-Hawaii); and the members of the House Select Committee on the Modernization of Congress, chaired by Reps. Tom Graves (R-Ga.) and Derek Kilmer (D-Wash.).

49   "Historical Trends in Federal R&D," data on Defense, Nondefense, and Total R&D, 1976–2018, American Association for the Advancement of Science. https://www.aaas.org/programs/r-d-budget-and-policy/historical-trends-federal-rd.

50   "Technology assessment: Legislative activity," FutureCongress Wiki at GitHub. https://github.com/zachgraves/futurecongress/wiki/Technology-assessment:-Legislative-activity.

51   https://history.house.gov/People/Detail?id=15290.

52   https://history.house.gov/People/Listing/H/HOLT,-Rush-(H001032)/.

An OTA inside GAO

Recognizing GAO as the best suited of the legislative branch agencies to take on a technology assessment function,[53] a compromise approach to build a new OTA in GAO got off the ground in 2001. This resulted in the provisioning of $500,000 in funding for a pilot in the fiscal year 2002 legislative branch appropriations bill.[54]

The pilot office's first study, "Using Biometrics for Border Security," was released in November 2002.[55] An external evaluation reviewed the report favorably, concluding that GAO "did a very good job" on its inaugural assessment, but raised concerns the nascent program would face significant challenges to build its own culture and scale its capabilities.[56] They noted, "the culture of the GAO is that of an audit organization. This is quite different from the culture required in an effective technology assessment organization."[57] In the next couple of years, funding for the pilot was expanded, facilitating the production of a few reports a year.[58]

An effort came together to build on the GAO pilot's success. In 2004, Reps. Rush Holt and Amo Houghton introduced legislation (with a bipartisan group of cosponsors) to elevate the GAO pilot to a formal technology assessment office in GAO called the "Center for Scientific and Technical Assessment" (CSTA).[59] This entity would have adapted major structural features from the defunct OTA, such as its bipartisan, bicameral Technology Assessment Board. The CSTA proposal went through several incarnations after a review process that incorporated feedback from civil society experts, as well as the office of then Comptroller General David M. Walker.[60] Later drafts reduced

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53 GAO had been undertaking S&T analysis for many years as part of its performance audits, and TA-like studies going back to the 1990s. See: "GAO Science, Technology Assessment, and Analytics Team: Initial Plan and Considerations Moving Forward," Government Accountability Office, April 10, 2019, p. 5. https://www.gao.gov/pdfs/about/GAOScienceTechPlan-2019-04-10.pdf.

54 H. Rept. 107-259, 107th Congress. https://www.congress.gov/congressional-report/107th-congress/house-report/259/1.

55 "Using Biometrics for Border Security," Government Accountability Office, November 2002. https://www.gao.gov/new.items/d03174.pdf.

56 Morgan and Peha, pp. 208–227.

57 Ibid., p. 224.

58 "Technology and Science," Government Accountability Office. https://www.gao.gov/technology_and_science#t=1.

59 H.R. 4670, 108th Congress. https://www.congress.gov/bill/108th-congress/house-bill/4670.

60 "Proposed GAO revisions to H.R. 4670," Office of Rep. Rush Holt, September 15, 2004. https://github.com/zachgraves/futurecongress/blob/master/CSTA%20GAO%20revision%202004%20w:0%20markup.pdf.

the TAB to a more advisory role, placing final authority on most decisions with the Comptroller General.[61] While the proposal was favorably received and had bipartisan support, it failed to move forward, perhaps due to its large budget requirements. Even though the effort was not successful, it showed that such a proposal passed muster with S&T experts and bureaucrats, and could attract bipartisan support.

GAO's pilot continued producing a few reports each year, and was made a permanent function as part of the fiscal year 2008 legislative branch appropriations bill.[62] Over a decade later, in 2018, Senate appropriators included report language to elevate and expand this program within GAO. This resulted in the creation of the Science, Technology Assessment, and Analytics unit, GAO's fifteenth mission team.

The announcement for STAA's launch came in January 2019,[63] and its initial strategic plan was released in April 2019.[64] According to these documents, STAA set out to "combine and enhance our technology assessment functions and our science and technology evaluation into a single, more prominent office to better meet Congress's growing need for information on these important issues." STAA's work has four major areas of focus:

1. Technology assessments and technical services for the Congress;
2. Auditing federal science and technology programs;
3. Compiling and utilizing best practices in the engineering sciences, including cost, schedule, and technology readiness assessment; and
4. Establishing an audit innovation lab to explore, pilot, and deploy new advanced analytic capabilities, information assurance auditing, and emerging technologies that are expected to greatly impact auditing practices.

61   "Holt Technology Assessment Bill (Draft)," Office of Rep. Rush Holt, June 27, 2005. https://github.com/zachgraves /futurecongress/blob/master/CSTA%20draft%202005.pdf.

62   Public Law 110-161. https://www.govinfo.gov/content/pkg/PLAW-110publ161/pdf/PLAW-110publ161.pdf.

63   "Our New Science, Technology Assessment, and Analytics Team," Government Accountability Office, January 29, 2019. https://blog.gao.gov/2019/01/29/our-new-science-technology-assessment-and-analytics-team/.

64   "GAO Science, Technology Assessment, and Analytics Team: Initial Plan and Considerations Moving Forward," Government Accountability Office, April 10, 2019. https://www.gao.gov/pdfs/about/GAOScienceTechPlan -2019-04-10.pdf.

According to its strategic plan, STAA launched with 49 FTE staff, which will have increased to 70 FTE staff by the end of fiscal year 2019. It estimates the fiscal year 2020 cost for staff at $15 million and anticipates it may need to grow to as many as 140 FTE staff in the future to meet demand.[65] In late September 2019, Senate appropriators commended STAA's progress in their report for the fiscal year 2020 legislative branch appropriations bill, writing that:[66]

> The Committee applauds the efforts of GAO's STAA team and encourages STAA to continue providing Congress with unbiased explanatory data while also exploring new areas for independent science and technology guidance, relevant to Congress.

In the Fall of 2019, GAO organized an experts' forum on "Designing Technology Assessments,"[67] which helped inform the new technology assessment design handbook they went on to publish in December 2019.[68] They have indicated this may be formalized into a non-FACA expert advisory group for STAA.

Importantly, STAA isn't identical to OTA. STAA's mission focus is somewhat different, and a little less than half of its resources are dedicated to technology assessments. In later sections we explore the overlap and differences between OTA and STAA in greater detail.

A Revived OTA

Over the years, different members have led the efforts to restore funding to OTA. While these have often been bipartisan, they typically have stronger support among Democrats than Republicans.[69] These efforts have occurred mainly through the appropriations process in the House, either in the original bill or through a floor amendment. It's worth remembering that OTA was not de-authorized in 1995, but rather its funding

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65   Ibid., p. 16.

66   S. Rept. 116-124, "Legislative Branch Appropriations Act, 2020," 116th Congress. https://www.congress.gov/congressional-report/116th-congress/senate-report/124/.

67   One of the authors of this paper, Zach Graves, participated in this forum.

68   "Technology Assessment Design Handbook," Government Accountability Office, December 4, 2019. https://www.gao.gov/mobile/products/GAO-20-246G.

69   "Technology assessment: Legislative activity," FutureCongress Wiki at GitHub. https://github.com/zachgraves/futurecongress/wiki/Technology-assessment:-Legislative-activity.

was cut, so in theory restoring funding to the agency would allow it to operate again. In practice, the office's operations would have to be changed to function in the modern political environment.

In recent years, right-leaning think tanks[70] and congressional Republicans have become more supportive of restoring some version of OTA.[71] This has been prompted by the obvious need for improving S&T capacity, the changeover in personnel from the Gingrich years, and the shift in power from the legislative to the executive branch of government. One common argument is: How can Congress oversee the regulatory process when it lacks the ability to understand the regulations?[72] This has led to several new bipartisan efforts to augment S&T capacity and expertise. The fiscal year 2019 appropriations bill, led by then subcommittee chairman Kevin Yoder (R-Kan.), initiated a study on technology assessment conducted by the National Academy of Public Administration (NAPA; the study is discussed below). As discussed above, the Senate version of the bill also included language to create the STAA unit in GAO.

Another effort to restore a congressional technology assessment office was made in the House Select Committee on the Modernization of Congress, which issued a unanimous, bipartisan recommendation to revive and modernize OTA on July 25, 2019.

On September 19, 2019, bipartisan, bicameral legislation was introduced by Reps. Takano and Foster, and Sens. Tillis and Hirono, to amend OTA's authorizing statute.[73] This legislation would rename OTA the "Congressional Office of Technology" (COT) and provide several modifications responding to different issues raised by

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70 See, e.g., this bipartisan coalition letter (organized by the authors of this paper) supporting OTA signed by center-right civil society groups including FreedomWorks, TechFreedom, American Principles Project, R Street Institute, et al., "Re: Strengthening Legislative Branch Capacity on Science and Technology," May 9, 2019. https://lincolnpolicy.org/2019/05/09/re-strengthening-legislative-branch-capacity-on-science-and-technology/. See also this op-ed from the American Enterprise Institute: James Pethokoukis, "Congress should revive the Office of Technology Assessment," *The Week*, December 6, 2018. http://www.aei.org/publication/congress-should-revive-the-office-of-technology-assessment/.

71 This can be seen in some recent votes in the House. See: "Technology assessment: Legislative activity," FutureCongress Wiki at GitHub. https://github.com/zachgraves/futurecongress/wiki/Technology-assessment:-Legislative-activity.

72 See, e.g., Berin Szoka, "Technical Expertise Is Just the Tip of the Iceberg," *Cato Unbound*, June 21, 2019. https://www.cato-unbound.org/2019/06/21/berin-szoka/technical-expertise-just-tip-iceberg.

73 Office of Technology Assessment Improvement and Enhancement Act (H.R. 4426), available at https://www.congress.gov/bill/116th-congress/house-bill/4426; Office of Technology Assessment Improvement and Enhancement Act (S. 2509), available at https://www.congress.gov/bill/116th-congress/senate-bill/2509/.

members. In particular, this legislation modifies the OTA model to be more responsive to requests from rank-and-file members and to produce a broader range of products with an emphasis on shorter, faster-turnaround studies.

As part of the fiscal year 2020 legislative branch appropriations bill,[74] the House of Representatives included an appropriation of $6 million to restart OTA. However, this was not matched in the Senate bill—which instead showed support for STAA's progress and indicated their intent to wait to review recommendations in the NAPA report. As of this writing, the matter was not resolved.

NAPA Report

In 2018, Rep. Kevin Yoder took the initiative, encouraged by congressional and civil society requests,[75] to include legislative language in the committee report accompanying the legislative branch appropriations bill to commission a study conducted by the National Academy of Public Administration. Language was included in the fiscal year 2019 legislative branch appropriations reports in both the House and Senate, and finalized in the conference version's joint explanatory statement:[76]

> *Technology Assessment Study:* The Committees have heard testimony on, and received dozens of requests advocating for restoring funding to the Office of Technology Assessment, and more generally on how Congress equips itself with the deep technical advice necessary to understand and tackle the growing number of science and technology policy challenges facing our country. The conferees direct the Congressional Research Service (CRS) to engage with the National Academy of Public Administration or a similar external entity to produce a report detailing the current resources available to Members of Congress within the Legislative Branch regarding science and technology policy, including the GAO. This study should also assess the potential need within the Legislative Branch

74   H.R. 2779, "Legislative Branch Appropriations Act, 2020," 116th Congress. https://www.congress.gov /bill/116th-congress/house-bill/2779.

75   See testimony of Zach Graves, the R Street Institute. https://www.rstreet.org/2018/04/17/zach-graves-testimony -before-the-u-s-house-of-representatives-committee-on-appropriations-legislative-branch-subcommittee/.

76   Joint Explanatory Statement for H.R. 5895, 115th Congress. https://www.appropriations.senate.gov/imo /media/doc/Joint%20Explanatory%20Statement%20H.R.%205895.pdf.

to create a separate entity charged with the mission of providing nonpartisan advice on issues of science and technology. Furthermore, the study should also address if the creation of such entity duplicates services already available to Members of Congress. CRS should work with the Committees in developing the parameters of the study and once complete, the study should be made available to relevant oversight Committees.

As a result, CRS engaged NAPA to produce a wide-ranging study on S&T capacity and technology assessment. The report was received by Congress at the end of October 2019 and made publicly available on November 14, 2019.[77] Its top-line recommendations were as follows:[78]

1. ***CRS enhances and expands its quick-turnaround and consultative services*** in S&T-related policy issues.
2. ***GAO further develops the capability of its Science, Technology Assessment, and Analytics (STAA) mission team*** to meet some of the supply gaps identified in [the NAPA] report (i.e., Technology Assessments, short-to-medium term reports, and networking) and make appropriate changes in its organization and operating policies to accommodate the distinctive features of technology assessments and other foresight products.
3. ***Congress creates an Office of the Congressional S&T Advisor*** (OCSTA), which would focus on efforts to build the absorptive capacity of Congress, to include supporting the recruitment and hiring of S&T advisors for House and Senate committees with major S&T oversight responsibilities. OCSTA would also be responsible for horizon scanning.
4. ***Congress creates a Coordinating Council to be led by the Advisor*** and includes representatives from GAO's STAA, CRS, and a NASEM [National Academies of Sciences, Engineering, and Medicine] ex officio member with the objective to limit duplication and coordinate available resources to most benefit the Congress.

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77   "Science and Technology Policy Assessment: A Congressionally Directed Review," National Academy of Public Administration, October 31, 2019. https://www.napawash.org/uploads/Academy_Studies/NAPA_FinalReport_forCRS_110119.pdf.

78   This list is taken directly from pp. x–xi of the NAPA report.

The NAPA report, while providing insight into the sources of congressional dysfunction, left open significant questions in the debate over where to build Congress's technology assessment function and how to structure it.[79] Notably, NAPA's report presumed STAA would be the primary vehicle for the technology assessment function, advocated for the creation of OCSTA as an additional support entity, lacked rigor in its analysis of CRS's strengths and deficiencies, and did not address the allocation of resources. One thing settled by the NAPA report is that there are a number of gaps in Congress's S&T resources.

Other Efforts

As the Belfer Center report discussed in detail, the root causes of Congress's S&T capacity gap are (1) Insufficient funding, which produces a lack of expert staff and staff bandwidth; and (2) Structural impediments such as concentration of power in leadership, delegation to the executive branch, and increased polarization.[80]

It is important to understand that bringing back OTA, or a similar entity, is not a panacea for addressing these root causes. A new OTA may also not be as effective as it was in 1995. Even if Congress imported all of the institutional knowledge, expert staff, and governance norms that OTA had before it was defunded, congressional committees are far weaker than they were a quarter century ago, as are personal offices. This means there are fewer staff, and fewer senior staff, with less ability to specialize and absorb or utilize technology assessment reports. Even if they were able to absorb and pursue them, many more policy decisions are now made by congressional leadership,[81] rather than through deliberation in committees or as member-led initiatives.[82]

Bringing back a congressional technology assessment office should thus be viewed as a necessary but not sufficient step in bridging Congress's S&T gap. To fix the

79   For an in-depth analysis of the NAPA report, see: Zach Graves and Daniel Schuman, "Evaluating the 2019 NAPA Report on S&T Policy Assessment and Resources for Congress," Lincoln Network, December 3, 2019. https://lincolnpolicy.org/wp-content/uploads/2019/12/Evaluating-the-NAPA-Report.pdf.

80   Mike Miesen, Maeve Campbell, et al., pp. 83–94.

81   See, e.g., Kathy Goldschmidt, "State of the Congress: Staff Perspectives on Institutional Capacity in the House and Senate," Congressional Management Foundation, 2017. http://congressfoundation.org/storage/documents/CMF_Pubs/cmf-state-of-the-congress.pdf .

82   Brookings Institution *Vital Statistics on Congress*, Tables 6-1 and 6-2.

root problems, more capacity will need to be added in personal offices, committees, and support agencies like CRS and GAO. This will mean that the legislative branch will have to receive significantly more funding. The structural and political problems may be even more difficult to overcome.

There are some reasons for optimism. The House Select Committee on the Modernization of Congress has been successful in building a bipartisan base of support for congressional capacity and reform. The House Science Committee also recently held a hearing on technology assessment and S&T capacity and expertise.[83] Additionally, there have been growing recognition and interest in this issue among public interest groups, charitable foundations, and academic centers.

BUILDING A POLITICAL FOUNDATION FOR S&T CAPACITY

Republican Opposition to OTA: Then versus Now

To review some of the points made earlier, OTA was defunded in 1995 for three overlapping reasons. First, Speaker Gingrich had pledged to significantly reduce the size of Congress—partly a guise for centralizing power in the hands of leadership—and OTA, as the smallest agency and one with a narrow base of support, was the easiest to smother. (It primarily served the needs of committee chairs, who had just turned over as part of the Republican Revolution.) Second, OTA released several reports that went against Republican orthodoxy, most notably a series of negative appraisals of the Strategic Defense Initiative (Star Wars) in the mid-80s.[84] And third, OTA had a reputation among some Republicans as being a Democratically aligned institution, with some allegations that its board was dominated by Sen. Kennedy in the 1970s.[85]

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83 "Experts Needed: Options for Improved Science and Technology Advice for Congress," House Committee on Science, Space, & Technology, December 5, 2019. https://science.house.gov/hearings/experts-needed-options-for-improved-science-and-technology-advice-for-congress.

84 Jathan Sadowki, "The Much-Needed and Sane Congressional Office That Gingrich Killed Off and We Need Back," *Atlantic*, October 26, 2012. https://www.theatlantic.com/technology/archive/2012/10/the-much-needed-and-sane-congressional-office-that-gingrich-killed-off-and-we-need-back/264160/.

85 Barton Reppert, "OTA Emerges as Nonpartisan Player: Surviving a Rocky Start, Science Agency Wins Over Most Skeptics," *Washington Post*, January 5, 1988. https://www.princeton.edu/~ota/ns20/ota88_f.html.

The most important of these reasons was short-term political value as a symbolic cut to advance the budget-cutting agenda of the Republican Revolution. Today this rationale no longer applies. However, Republican anxiety about reviving OTA still exists. This encompasses several different objections, including a baseline opposition to spending money on any new agency, fear that a new S&T agency could be captured and weaponized by political opponents, and other factors.[86] A key challenge of a successful effort to build new S&T capacity will be navigating Republican opposition and taking special care to address their concerns.

The Legislative Branch Funding Landscape

Congress still lives in a funding landscape defined by the politics of the Republican Revolution. Since 1995, as we discussed earlier, there has been a significant decline of congressional staffing and policy expertise. This includes sharp decreases in the number of full-time standing committee staff; staff at support agencies like CRS, GAO, and OTA; and personal office staff. Additionally, a significant number of staff have shifted from policy to constituent services and communications-related duties.

To understand the mechanics of Congress's institutional decline, it's important to look at how Congress sets its funding priorities, which are determined through an appropriations allocation process.[87] Federal spending is generally divided into two categories: mandatory spending (money it must spend, like Medicare and Social Security) and discretionary spending (money it chooses how to spend, like education and defense). This top line of discretionary spending, known as the 302(a) allocation, is determined by a budget resolution passed by the House and Senate.

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86   For a deeper discussion of conservative objections to OTA, see: Zach Graves, "Rebuilding a Technology Assessment Office in Congress," R Street Institute, September 2018. https://www.rstreet.org/wp-content/uploads/2018/09/No.-152.pdf See also: Adam Keiper, "Science and Congress," *The New Atlantis* (Fall 2004/Winter 2005). https://www.thenewatlantis.com/docLib/TNA07-Keiper.pdf

87   For general background on the appropriations process, see: James V. Saturno, Bill Heniff Jr., and Megan S. Lynch, "The Congressional Appropriations Process: An Introduction," Congressional Research Service, November 30, 2016. https://www.everycrsreport.com/files/20161130_R42388_bb055582808c21e04885d0597961815c4d64e38.pdf

From the 302(a) allocation, discretionary spending is further divided into 12 buckets that mirror the 12 appropriations subcommittees.[88] The maximum amount that can be spent for each of the appropriations subcommittees is determined by the full appropriations committee—in reality, the chairs of the committee in the House and Senate in consultation with leadership—and this determination is known as the 302(b) suballocation. Spending on the legislative branch, which is determined by the legislative branch appropriations subcommittee, is one of the twelve buckets.

Despite its being the "first branch," spending on the legislative branch is minuscule.[89] For FY 2019, $1.244 trillion was allocated to the 12 appropriations committees, of which $4.8 billion (or 0.38%) went to the legislative branch.

For reasons that beggar the imagination, Congress likes to further confuse the matter by distinguishing between defense and non-defense non-mandatory appropriations. In other words, it doesn't just look at those 12 buckets, but it also distinguishes between money spent for defense purposes versus non-defense purposes.

No matter how you slice it, Congress has been cutting funds for itself even while increasing other non-defense spending.[90] Over the last eight years, the (inflation-adjusted) money available for non-defense appropriations grew by $37 billion while the money appropriated to the legislative branch decreased by $334 million.[91] Put another way, Congress cut the amount of non-defense discretionary appropriations for the legislative branch from 0.85% in 2012 to 0.81% in 2019 even while the amount of non-defense discretionary appropriations grew by 5.97% over the same time.[92]

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88   "302(a)" and "302(b)" are references to sections in the Congressional Budget and Impoundment Control Act of 1974. See: H.R. 7130, 93rd Congress. https://www.govtrack.us/congress/bills/93/hr7130.

89   Amelia Strauss and Daniel Schuman, "The Congress's Edifice Problem," *First Branch Forecast*, Demand Progress Education Fund, March 1, 2019. https://firstbranchforecast.com/2019/03/01/the-congress-edifice-problem/.

90   Daniel Schuman and Amelia Strauss, "Forecast for April 29, 2019. It's off to work we go," *First Branch Forecast*, Demand Progress Education Fund, April 29, 2019. https://firstbranchforecast.com/2019/04/29/2019-04-29/.

91   These numbers fluctuate significantly depending on political control of the White House and Congress.

92   Letter from 29 organizations to Chairman Shelby, Ranking Member Leahy, and Members of the Senate Appropriations Committee, "Re: FY 2020 302(b) Allocation for the Legislative Branch," September 9, 2019. https://s3.amazonaws.com/demandprogress/letters/2019-09-09_302b_Allocation_Letter.pdf.

The size of the pie for Congress-related functions is shrinking. This is a choice and it's not one that is forced by circumstances.[93] The House and Senate agreed to increase non-mandatory non-defense spending for FY 2020 by $24.5 billion,[94] but the House Appropriations Committee voted to increase legislative branch funding by 3.6% and the Senate Appropriations Committee voted to increase legislative branch funding by 5.29%, which is nowhere near enough to make up for the decades of funding shortfalls.[95] The House could easily have voted to increase the legislative branch's budget by 10%, or $480 million in total, which would have been a drop in the bucket relative to the increase in non-defense spending, and yet made a world of difference with respect to legislative branch capacity.

On the other hand, Congress's disinvestment in the legislative branch, and growth of other major cost centers, such as the US Capitol Police,[96] means that there's less money to go around. It is possible that Congress could redress the funding shortfall for the legislative branch, but it has a long way to go to get back to parity with pre-1995 norms.

The Political Landscape

Congressional science and technology constituencies can be broken out as follows: party leadership, relevant committee leadership, relevant committee members, the rank and file, and the public interest (as reflected by the press and constituents). Accordingly, each should have political buy-in for an S&T assessment capacity to persist.

Congress's other legislative support agencies—GAO, CRS, and CBO—use various mechanisms to decide where to devote analytic resources. GAO, for example,

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93   Letter from 49 people to Chairman Shelby, Ranking Member Leahy, and Members of the Senate Appropriations Committee, "Re: FY 2020 302(b) Allocation for the Legislative Branch," March 25, 2019. https://s3.amazonaws.com/demandprogress/letters/2019-03-25_Senate_Increase_Leg_Branch_302b_Allocation.pdf.

94   Bipartisan Budget Act of 2019 (P.L. 116-37, 116th Congress). https://www.congress.gov/bill/116th-congress/house-bill/3877/text.

95   "Appropriators Should Provide Adequate Funding to Congress," Demand Progress Education Fund, October 31, 2019. https://firstbranchforecast.com/2019/10/31/appropriators-should-provide-adequate-funding-to-congress/.

96   Daniel Schuman and Amelia Strauss, "A Look at the US Capitol Police," *First Branch Forecast*, Demand Progress Education Fund, March 11, 2019. https://firstbranchforecast.com/2019/03/11/uscp-in-review/.

prioritizes first congressional mandates, then senior leader and committee requests, and then individual member requests, with the practical effect that individual member requests are not usually considered.[97] CRS, by contrast, leaves significant discretion to its analysts concerning which general distribution reports to create, although it does look at frequent requests from members of Congress.

The House of Representatives has focused on restoring the Office of Technology Assessment or the creation of a similar office. The Senate has focused on growing STAA inside GAO. To some extent, these visions are compatible should an arrangement be reached to coordinate and deconflict their work—and should sufficient funds be available. But the long-term success of both entities depends on political support from Congress. This, in turn, depends on the issues that OTA studies, what its products look like—and political buy-in from the various stakeholders.

STRUCTURAL CONSIDERATIONS FOR A NEW TA OFFICE

There are a number of important institutional design questions for a new congressional technology assessment (TA) office (whether it is STAA, COT, OCSTA, or something else). What to call it? How is it led? How is its leadership appointed? How is its work insulated from political pressure? Does its analysis offer policy options or recommendations? How does it incorporate input from the expert community or the public? What are the boundaries of its scope?

Before we can answer these, it is important to understand the current landscape. There are four options before Congress when it comes to building TA capacity: (1) Do nothing; (2) Support STAA as the replacement for OTA; (3) Revive and modernize OTA or authorize a similar entity; and (4) A hybrid approach wherein STAA takes some portion of OTA's mission, but is complemented by a modernized version of OTA.

We see it as improbable and undesirable for GAO to stop doing TA work. While GAO has some structural limitations and room for improvement, it has proven its basic competence in TA work. STAA's progress to date has been commendable, it

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97   "GAO's Congressional Protocols," Government Accountability Office, July 17, 2017. https://www.gao.gov/assets/690/685901.pdf.

has strong support in the Senate, and the NAPA study bolstered this political position. Rather than starting from a blank slate, we must think about building TA in Congress from the position that a new OTA would likely have to be in addition to, rather than an alternative to, work being done at GAO. This raises several questions that proposals like COT or refunding OTA don't directly deal with: Is an additional TA office justified? How would you avoid duplication of work? Why can't GAO fully take on OTA's mission?

While STAA's recent success is a favorable trend, there is a significant risk it could be hampered by GAO's large, audit-focused internal bureaucracy. We must remember that GAO did little to develop its TA function for many years. GAO is at its core an audit institution—and has a very different culture from OTA. Other internal fiefdoms may not look well upon this new unit if it pushes too many boundaries. While STAA currently enjoys strong backing from the Comptroller General, it's unclear if this will be enough to give STAA the resources and independence it needs over the long term.

Given the importance of S&T to American prosperity, welfare, and security, we believe diversification is justified. Our recommendation is to create a smaller, emerging-technologies-focused version of OTA which we call the Technology Assessment Service (TAS), to complement the work being done at STAA.

The original OTA's work can be separated into two broad mission areas: (1) Assessments of federal R&D spending and federal S&T acquisitions, programs, and expenditures; and (2) Advice on regulation of the private sector (including updating outdated legal frameworks) concerning emerging technologies. STAA is best suited to (1), since its work blends into performance audits and other traditional GAO report types, and GAO has both the expertise and authority to work effectively with federal agencies. Meanwhile, TAS should focus on (2), since GAO may be insufficiently flexible[98] to fully assess emerging S&T issues (particularly in the realm of non-technical values and analysis).[99] Of course, there are issues that will not fit neatly within this rubric.

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98   As suggested in Morgan and Peha, Appendix 3, and by other critics.

99   GAO's culture reflects a Joe Friday-style "just the facts, ma'am" approach. This serves them well in the auditing arena. However, there are many occasions when TA may require more subjective, participatory, or non-empirical approaches—for instance, discussing the bioethical implications of gene editing, or the effects of social media on our democracy.

In such cases, the directors of TAS, CRS, and GAO should work with the requesters to determine how best to handle requests.

Structural Considerations: GAO's STAA

The key challenge facing STAA is figuring out how to structure a nimble, semi-independent, and forward-looking research unit within another large agency, while mitigating potential conflicts in mission, function, and process. Since much of its approach to TA is still in flux, we may have to withhold additional analysis until a future date.[100]

Many of the following suggested improvements can be done without legislative action from Congress. However, Congress should consider (and explore in new hearings) new authorizing legislation for an enhanced version of STAA to give it greater autonomy within GAO.

Independence

GAO's internal bureaucracy and culture are a chief concern for STAA's critics. This could be addressed through new authorizing legislation that gives STAA greater autonomy. This might include giving it a separate appropriations line item and independent hiring authority.[101] It could be a disadvantage, however, to totally separate STAA staff from the rest of GAO, as GAO's wealth of staff expertise may be an asset on STAA projects. Additionally, STAA could be given greater autonomy by establishing a relationship like that of CRS to the Library of Congress. While it is under the Library, CRS's authorizing statute grants it "complete research independence and the maximum practicable administrative independence."[102] STAA may also benefit from having a separate subdomain on the GAO website (or perhaps its own website) to elevate its brand and make its work more discoverable.

Another key challenge for STAA, since it is relatively new, is building awareness within Congress that it is available as a resource (distinct from other GAO capabilities).

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100   See also: Zach Graves, "Written Testimony to Senate Appropriators on Improving S&T Expertise in Congress," May 31, 2019. https://lincolnpolicy.org/2019/05/31/written-testimony-to-senate-appropriators-on-st-expertise-in-congress.

101   STAA's talent acquisition might also benefit from setting a different compensation scale from GAO.

102   2 U.S.C. § 166.

Future strategic planning efforts for STAA should include a more robust plan for engaging with Congress.

Policy Options

A valuable feature of OTA reports—which was noticeably absent from GAO's pre-STAA TA reports—was providing policymakers with authoritative, multi-disciplinary analysis of the trade-offs of different policy options. Yet, OTA's options methodology was not always internally consistent, and had considerable room for improvement. A 1993 OTA self-assessment suggested its options methodology warranted a "more rigorous" approach.[103] The same report also suggested its options may have skewed towards "increased Federal intervention rather than market solutions."[104]

Following the recent "Designing Technology Assessments" forum organized by GAO,[105] STAA published a new technology assessment design handbook that incorporates policy options.[106] While this raises both political and methodological challenges, we believe it is a worthwhile and necessary effort. As part of developing its formal TA methodology, we also advise STAA to adopt an approach that prioritizes the inclusion of economic analysis and gives consideration to potential solutions from the states or private sector. It may also benefit from more intensive expert review on its longer-form reports.

Congressional Protocols

STAA currently follows the GAO Congressional Protocols for its report request and approval process. This gives priority to congressional leadership and to the chairs and minority ranking members of committees and subcommittees.[107] With increased interest in making TA accessible to rank-and-file members, policymakers may wish to investigate changing the request process for STAA to make it more accessible—such

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103   "Policy Analysis at OTA: A Staff Assessment," Office of Technology Assessment, May 1993, p. 10. https://ota .fas.org/reports/PAatOTA.pdf.

104   Ibid., p. 7.

105   Attended by Zach Graves.

106   "Technology Assessment Design Handbook," Government Accountability Office, December 4, 2019. https:// www.gao.gov/mobile/products/GAO-20-246G.

107   "GAO's Congressional Protocols," Government Accountability Office, July 17, 2017. https://www.gao.gov /assets/690/685901.pdf.

as discussed in the subsequent section. It may also wish to formalize consultations with committees of jurisdiction in both chambers as part of its request process, which would also require developing new procedures. For shorter-form products, STAA could also make its services available to rank-and-file members.

External Advisory Board

STAA has indicated it will likely create a new S&T advisory board composed of experts from civil society. This may be invaluable in providing advice to the Comptroller General and STAA directors on matters such as research design, external review, and related issues. It is important, however, that this advisory board inform congressional policymakers (particularly House and Senate appropriators) as well as GAO personnel. This board should be encouraged to produce periodic analysis and recommendations oriented to congressional stakeholders regarding the continued evolution and resource requirements of STAA.

Congressional Buy-in

One potential disadvantage of STAA is that few members of Congress would feel strong ownership over the team. Policymakers may wish to pursue a hybrid approach with OTA's TAB, and borrow from the Holt-Houghton CSTA model (particularly the 2005 draft version). If implemented poorly, creating a TAB for STAA could introduce new problems and political dysfunction. If implemented well, it could help GAO's TA work achieve greater independence from its parent agency and recruit new champions to support its work in Congress (noting that OTA's strongest Republican proponents were TAB members).

Other S&T Capabilities

In addition to STAA, there are several other dedicated S&T capabilities at GAO (in addition to S&T analysis coming up in the course of its normal reports and audits). For instance, the Information Technology and Cybersecurity mission team helps Congress assess and plan the federal government's IT investments and security. Another S&T-related program at GAO is the recently announced "Center for Strategic

Foresight."[108] In building out S&T capacity holistically, congressional policymakers may wish to invest in specialized functions (such as horizon scanning) in these and other programs.

Structural Considerations: OTA 2.0

Different political and structural considerations arise for STAA versus a refunded (and modified) OTA. In this section, we will address concerns related to an office that is substantially built on the old OTA statute, such as our TAS proposal. The first challenge to establishing a new version of OTA is one of finding resources in a zero-sum appropriations environment and overcoming historical brand baggage with conservatives. Once this is overcome, the next challenge is adapting a quarter-century-old model to our current political and institutional environment, while taking advantage of lessons learned elsewhere.

A new OTA could be initiated through appropriations alone, and its original statute may be sufficiently flexible to accommodate some changes in the short term. However, our view is that some statutory changes will ultimately be needed. While we make some specific suggestions below for statutory changes, these should not be taken as complete.

What's in a Name

Many religions hold that the act of naming something is the act of creation. So what should this new science and technology assessment office be called?[109] For political reasons, calling it the Office of Technology Assessment is a mixed bag. On one hand, people are familiar with the name and the concept, and there's a movement around its re-creation. On the other hand, there are still lingering concerns over the nature of OTA's past work and confusion around how it operated. Additionally, changing the name (and tweaking the statute a bit) is an easy excuse for members who are on the record against it to switch positions.

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108   "Deep Space & Deep Fakes: New 'Center for Strategic Foresight' Launched," Government Accountability Office, September 10, 2019. https://www.gao.gov/about/press-center/press-releases/center-for-strategic-foresight.htm.

109   Zach Graves, "Should we rename the Office of Technology Assessment?," *Six Four Six Nine*, Lincoln Network, July 30, 2019. https://medium.com/six-four-six-nine/should-we-rename-the-office-of-technology-assessment-d32c53d4e4e5.

As discussed earlier in this section, our recommendation is to call it the congressional Technology Assessment Service (TAS). This is reminiscent of OTA, but replaces "Office" with "Service" to reinforce that it serves at the discretion of Congress, rather than as an independent bureaucracy. It keeps with the general aesthetic of legislative branch agencies with short acronyms and avoids introducing new words that could be controversial, or doing away with "technology assessment," which is a term of art that can keep it mission focused.

The Role of the TAB

With increasing congressional dysfunction and polarization, the bipartisan congeniality[110] of the former TAB may be much less functional in our current political environment. This could create problems with slowing down the approval and release of reports if TAB members fail to meet regularly. Additionally, it could politicize reports if TAB members use their position to censor politically sensitive or controversial subjects.[111] Congress may wish to follow the path of the 2005 version of the Holt-Houghton CSTA bill[112] and shift the TAB to a more advisory role, empowering the TA office director with greater decision-making authority.

Shifting the TAB to a less formal (and more advisory) role could take several forms. Under the current statute, the TAB has two responsibilities worth focusing on: (1) Hiring the OTA director and deputy director; and (2) Requesting, initiating, and approving reports. We discuss (1) at greater length later in this section. On (2), this is a key vulnerability for TAS. Report approval could be changed into an advisory function with final selection up to the director, or the TAB could be given veto power within a certain time window. The potential downside of making TAB weaker is members would feel their input is less necessary, and thereby weaken their sense of ownership, and thus have less incentive to promote the office or engage in its management.

110   Blair, pp. 28–32.

111   CRS is, by some accounts, much more risk averse than it used to be. See: Kevin Kosar, "Why I Quit the Congressional Research Service," *Washington Monthly*, January–February 2015. https://washingtonmonthly.com /magazine/janfeb-2015/why-i-quit-the-congressional-research-service/. See also: Arianna Skibell, "Move to open CRS reports spotlights agency's climate debate," E&E News, March 27, 2018. https://www.eenews.net /stories/1060077529.

112   "Holt Technology Assessment Bill (Draft)," Office of Rep. Rush Holt, June 27, 2005. https://github.com /zachgraves/futurecongress/blob/master/CSTA%20draft%202005.pdf.

The TAB selection process is also vulnerable to gamesmanship. The Technology Assessment Act of 1972 provides[113] that six TAB members are appointed by the President pro tempore of the Senate, and six are appointed by the Speaker of the House. While they must be evenly divided by party, this potentially allows the majority party to pick moderates or mavericks. For instance, Republicans, who control the Senate as of this writing, could stock the TAB with moderate Democrats[114] like Joe Donnelly (D-Ind.) or Joe Manchin (D-W.Va.). A preferable arrangement may be to require bipartisan consensus in each chamber on TAB appointments, requiring the Speaker and Minority Leader to agree in the House, and the Minority Leader and Majority Leader (or President pro tempore) to agree in the Senate.

TAS may also wish to consider automatic inclusion of the chair and ranking member for key committees of jurisdiction for S&T, or those committees that are most likely to utilize TAS's services.[115] In the House, this might include the Committee on Science, Space, and Technology and the Committee on Energy and Commerce. In the Senate, it might include the Committee on Commerce, Science, and Transportation. This may require expanding the number of TAB seats. Additionally, to facilitate greater collaboration between TAS and STAA, the Comptroller General could be added to the TAB as a non-voting member.

This approach may help avoid problems with leadership failing to nominate TAB members in a timely manner (particularly as the office is getting started), get broader institutional buy-in to support the office, and provide a backup if some members don't show up consistently. Making the TAB too big could make it less functional, so the number of committees automatically included in the TAB should be considered carefully.

To accommodate some of the reforms discussed in this section, Section (a) of 2 U.S.C. § 473 could be amended as follows:

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113   2 U.S.C. § 473.

114   "2018 Report Cards: All Senators / Ideology Score," Govtrack.us. https://www.govtrack.us/congress/members/report-cards/2018/senate/ideology.

115   Blair, p. 52.

a. **Membership** The Board shall consist of ~~thirteen~~ fourteen members as follows:

1. ~~six~~ four Members of the Senate, appointed by the ~~President pro tempore~~ Majority Leader and Minority Leader of the Senate, ~~three~~ two from the majority party and ~~three~~ two from the minority party;

2. the chair and ranking minority member of the Senate Committee on Commerce, Science, and Transportation, or their designees who serve on the same committee;

3. ~~six~~ two Members of the House of Representatives appointed by the Speaker and the Minority Leader of the House of Representatives, ~~three~~ one from the majority party and ~~three~~ one from the minority party;

4. the chair and ranking minority members of the House Committee on Science, Space, and Technology; the House Committee on Energy and Commerce; or their designees who serve on the same committee; and

5. the Director and the Comptroller General, who shall not be a voting members.

Accepting Gifts

Policymakers may wish to allow the new TAS to accept gifts to augment its budget—particularly considering the challenging politics of the legislative branch appropriations process (discussed earlier). This would not be unprecedented. The Congressional Research Service, and its parent agency the Library of Congress, both allow outside gifts when certain conditions are met.[116] For instance, CRS recently accepted $400,000[117] from a private foundation. A key to accepting outside gifts is to enact strict safeguards to prevent them from influencing the agency's work (or giving the impression that they might). One approach would be to accept non-programmatic support only from charitable foundations, banning such contributions from corporations (or foundations that are too closely tied to corporations). While we do not recommend this approach, it could also be addressed by moving TAS under the Library of Congress, while giving it clear statutory independence in its research. This would allow it to share administrative resources as well.

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116   "Support the Library," Library of Congress. https://www.loc.gov/philanthropy/index.php.

117   https://www.democracyfund.org/portfolio/entry/library-of-congress-the-congressional-research-service. Note: Demand Progress and the Lincoln Network have received grants from Democracy Fund.

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SCIENCE, TECHNOLOGY, AND DEMOCRACY: Building a Modern Congressional Technology
Assessment Office

Participatory Approaches, Ethics, and the Inclusion of Non-Technical Values
Congressional technology assessment should not be about creating a technocracy
where policy decisions are delegated.[118] Rather than delegating decisions to experts,
a well-functioning TA office should empower democratically elected representatives
with information to help them make decisions that are responsive to the value prefer-
ences of their constituents and that advance the good of the nation.

The key value proposition of TA is informing policymakers to help them see value
trade-offs more clearly, and thus more efficiently hash out competing value prefer-
ences (for instance, the trade-offs between privacy and security in the encryption
debate). Technical information and analysis—from scientists, economists, technolo-
gists, and engineers—is necessary but not sufficient to understand the full dimensions
of technology's impact on society, or the consequences of different policy choices.
Beyond technical information, politicians need information about constituents' values
and concerns.

Starting in the early 1980s, a number of technology assessment offices emerged
in other countries—starting in Europe.[119] While these drew upon the OTA model, they
also departed from it in important ways, exploring participatory approaches that only
began to take hold in OTA in its later years. These participatory technology assess-
ment (pTA) methods engaged everyday citizens who are otherwise under-represented
in conversations about setting S&T policy, creating another layer of information.[120]

As Richard Sclove observed, "OTA reports were not consistently successful in elu-
cidating the ethical and social implications of new technologies," sometimes present-
ing value-informed analysis (e.g., maximizing economic growth) as objective.[121] Yet,
values-informed analysis is hard to avoid in the course of technology policy debates,
or assessing technologies' impacts.

This avoidance could be a significant deficiency. According to Sclove, OTA rarely
considered "any given technology's potential bearing on the structural conditions of

. . . .

118   Zach Graves and Tony Mills, "Reviving Expertise in a Populist Age," *New Atlantis*, Fall 2019.

119   Morgan and Peha, p. 90.

120   For a deeper exploration of pTA, see: Richard Sclove, "Reinventing Technology Assessment: A 21st Century
       Model," Wilson Center. http://www.loka.org/Documents/ReinventingTechnologyAssessment1.pdf.

121   Richard Sclove, "Reinventing Technology Assessment," *Issues in Science and Technology*, Fall 2010.

democracy." With the rise of issues such as deep fakes, fake news, and other digital disinformation efforts, TAS needs to be ready for—not averse to—tackling issues related to strengthening democracy.

Beyond social media, biomedical technologies like CRISPR raise significant bioethical questions. In China, for instance, a researcher recently announced he had genetically edited two babies to make them (and their offspring, since it was germline editing) resistant to HIV.[122] In the US, you can buy do-it-yourself biohacking kits with the same technology.[123] It's highly likely that ethical issues and public values, rather than technical issues, are likely to dominate the debates over these technologies as they make their way into the policy arena.

While pTA isn't appropriate for many issues coming before a new OTA, it may be a useful tool in its toolbox. Additionally, analysis of ethics and non-technical values should be given explicit consideration in the new office's TA methodology.[124]

To emphasize the inclusion of ethics, the finding of purpose, Section (d) of 2 U.S.C. § 471, could be amended as follows:

(d) Accordingly, it is necessary for the Congress to—

(1) equip itself with new and effective means for securing competent, unbiased information concerning the physical, biological, ethical, bioethical, economic, social, and political effects of such applications; and

Mitigating Ideological Bias

As touched on earlier, a 1993 OTA self-assessment suggested its analysis may have skewed towards "increased Federal intervention rather than market solutions or greater delegation of responsibility to state and local governments."[125] Considering

122   Rob Stein, "Chinese Scientist Says He's Created First Genetically Modified Babies," NPR, November 26, 2018. https://www.npr.org/2018/11/26/670991254/chinese-scientist-says-hes-created-first-genetically-modified-babies.

123   Meghan McDonough, "Biohacker Josiah Zayner wants to teach everyone DIY genetic engineering," *Quartz*, January 30, 2019. https://qz.com/1533778/biohacker-josiah-zayner-wants-to-teach-everyone-diy-genetic-engineering/.

124   Robert Cook-Deegan and Zach Graves, "Incorporating Ethics into Technology Assessment," *Issues in Science and Technology*, Fall 2019. https://lincolnpolicy.org/wp-content/uploads/2019/09/IssuesFall2019.pdf.

125   "Policy Analysis at OTA: A Staff Assessment," Office of Technology Assessment, May 1993, p. 10. https://ota.fas.org/reports/PAatOTA.pdf.

the lingering anxiety among some conservatives about OTA's legacy, TAS may wish to take steps to mitigate these concerns.

To put greater emphasis on the inclusion of economic analysis and the exploration of market-oriented solutions, Section (c) of 2 U.S.C. § 472 could be amended as follows:

(c) Functions and duties—The basic function of the Office shall be to provide early indications of the probable beneficial and adverse impacts of the applications of technology and to develop other coordinate information which may assist the Congress. In carrying out such function, the Office shall:

(1) identify existing or probable impacts of technology or technological programs;

(2) where possible, ascertain cause-and-effect relationships;

(3) identify alternative technological methods of implementing specific programs;

(4) identify alternative programs for achieving requisite goals;

(5) make estimates and comparisons of the impacts of alternative methods and programs;

(6) identify light-touch policy approaches and explore market-based solutions;

(7) present findings of completed analyses to the appropriate legislative authorities;

(8) identify areas where additional research or data collection is required to provide adequate support for the assessments and estimates described in paragraph (1) through (5) of this subsection; and

(9) undertake such additional associated activities as the appropriate authorities specified under subsection (d) may direct.

Future-Oriented Thinking

While the theory of OTA was that it would do forward-looking, horizon-scanning work to alert Congress to emerging issues, its member request model often made it more focused on the short term. To address this, TAS might give flexibility to its director to engage in a percentage of reports that look 10, 20, or more years into the future, as

well as on topics the director sees as likely to be of interest to Congress in the near future.[126] One place where STAA and TAS could learn from CRS is in making updates to major reports on the same topic. Thus, rather than producing a one-off report on a topic such as artificial intelligence or quantum computing, they may wish to designate a handful of topics of ongoing congressional interest that receive periodic updates.

The Director

The legislative branch itself does not have a universal approach to how it chooses agency heads. It's worth a brief survey of the appointment methods to outline possible options for TAS.

The Librarian of Congress is appointed by the President of the United States and confirmed by the Senate for a 10-year term, with eligibility for reappointment.[127] The term limit is a recent addition.[128] The Senate confirmation is also somewhat new, as for many years the Librarian was simply appointed by the President. Presidential appointment does not sit well with separation-of-powers concerns. Having sole confirmation by the Senate does not always take into account House of Representatives equities. It is unclear how removal would work. The Librarian appoints subordinate heads, such as the heads of the Congressional Research Service and the Copyright Office.

The Comptroller General, i.e., the head of the Government Accountability Office, is appointed for a 15-year, non-renewable term. A commission recommends at least 3 names to the President; this commission is made up of the "Speaker of the House, the President pro tempore of the Senate, the majority and minority leaders of the House and Senate, the chairs and ranking minority Members of the Senate Committee on Homeland Security and Governmental Affairs and the House Committee on Oversight and Government Reform." The Comptroller can be impeached or removed by a joint resolution of Congress (for limited reasons).[129]

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126   As noted earlier, GAO also recently launched a new "Center for Strategic Foresight."

127   "Legislative Branch Agency Appointments: History, Processes, and Recent Actions," *Congressional Research Service*, January 28, 2019. https://www.everycrsreport.com/reports/R42072.html.

128   Term limits were imposed in the wake of an increasingly out-of-touch former Librarian of Congress. See, e.g., Michael D. Shear, "Library of Congress Chief Retires Under Fire," *New York Times*, June 10, 2015. https://www.nytimes.com/2015/06/11/us/library-of-congress-chief-james-hadley-billington-leaving-after-nearly-3-decades.html.

129   "Legislative Branch Agency Appointments: History, Processes, and Recent Actions," CRS.

The Congressional Budget Office Director is appointed to a 4-year term, subject to renewal, by the Speaker of the House and the President pro tempore after receiving recommendations from the House and Senate Budget committees.[130] In practice, the House and Senate Budget Committee chairs take turns in appointing the CBO director, alternating between the chambers, and inform the leadership of their choice by letter.[131] The CBO director may be removed by either house by a resolution.

The Architect of the Capitol serves a 10-year renewable term. A congressional commission provides recommendations to the President, who nominates the Architect subject to Senate confirmation. Historically, the Architect was chosen by the President, and in recent years there have been efforts to remove the President from the process entirely. The whole process is viewed as complex; the commission is composed of "the Speaker of the House of Representatives, the President pro tempore of the Senate, the majority and minority leaders of the House of Representatives and the Senate, and the chairs and ranking minority Members of the Committee on House Administration and the Senate Committee on Rules and Administration," plus "chairs and ranking minority Members of the House and Senate Appropriations Committees."[132]

There are some commonalities. The agency head serves a discrete, potentially renewable term. Congress is involved in the appointment process—perhaps too many people inside Congress are involved—and there is an effort to insulate the appointment from the President, who can be slow to nominate. There is much institutional inertia and a reluctance to remove under-performing leaders.

Per the Technology Assessment Act of 1972, the OTA director was appointed by the TAB for a term of 6 years.[133] This term is long enough to get work done but short enough that a timely change can be made if needed. However, instead of serving at the sole discretion of the TAB, we recommend that the TAS director be given greater independence once appointed, such that they may be removed by either impeachment or a joint resolution of both chambers.

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130   Ibid.

131   "Congressional Budget Office: Appointment and Tenure of the Director and Deputy Director," Congressional Research Service, May 20, 2015. https://www.everycrsreport.com/reports/RL31880.html.

132   "Legislative Branch Agency Appointments: History, Processes, and Recent Actions," CRS.

133   2 U.S.C. § 474.

It is possible to come up with a clever name for the head of TAS. The Comptroller General, after all, heads GAO; the Public Printer used to head the GPO when it was called the Government Printing Office. However, we think it makes sense to simply have the "TAS director."

In parallel with the process for naming the TAS director, the same process should be used for naming the TAS deputy director, who should act in the place of the TAS director should the position become vacant for any reason.

OTA could not produce major reports without the approval of its board. We believe that the independence in GAO's model suggests that TAS would benefit from leaving discretion regarding which reports to move forward in the hands of TAS management.

The Study Request Process

The question of what TAS should study is inherently fraught. Congress is awash in analyses of varying levels of competence and comprehensiveness. It does not make sense to duplicate what is already being done well, but rather to elevate it. So what should TAS do?

Fortunately, this question does not need to be answered in a vacuum. OTA inspired the creation of OTA-like entities around the world, and we can look to the kinds of issues that they study—and the formats in which they release their work—to get a sense of what other legislatures have determined is useful. We can also look to techniques that are used in other countries to assess whether their versions of OTA are effective and meeting the needs of their parliaments. The UK, for example, looks regularly at how often its science and technology reports are cited in debate and committee reports.

In addition, questions arise on how to divide up staff time. How OTA chose the topics it would study was prescribed by statute: a request had to come from a committee chair; the OTA board (TAB); or the OTA director, in consultation with the board. As discussed above, it makes sense for TAS to expand what may prompt a report.

Analysts at CRS have a statutory obligation to take the initiative to issue reports on topics that committees should study and to analyze and make available information that is of use to members of Congress in conducting their legislative and oversight

functions.[134] It seems reasonable that some percentage of TAS staff time should be devoted to identifying issues of congressional and public interest and generating appropriate shorter reports and briefings on those topics. A few in-depth analyses could also come from this process and perhaps be used as fodder to create derivative shorter-form reports.

These shorter-form reports likely would be relevant to rank-and-file members as well as members of committees that have jurisdiction over a matter under review. Accordingly, some percentage of staff time for TAS reports should be responsive to these requests. We must be cautious to strike the right balance. Too few reports made at the request of the rank and file will leave members of Congress feeling underserved. Too many such reports could prove to be quite expensive and not provide as large a return on investment.

For long resource-intensive studies, TAS needs a system of prioritization to approximate interest and relevance to Congress. Similar to GAO, it might prioritize requests as follows: (1) Legislative mandates; (2) Requests by senior congressional leadership or full committee leaders; (3) Requests by subcommittee leaders; and (4) Requests by individual members. Yet, while a member of Congress's position inside Congress is one way to represent the interests of members of the chamber, it is not the only one. It is not uncommon for some issues to be ripe for consideration but a committee chair will not request an evaluation. Accordingly, a small number of requests for in-depth TAS analysis that are signed by a significant number of members of the chamber (say 10 percent) could also be given equal weight to (2) or (3).

Some priority might also be given to the majority over the minority. But as power can change hands quickly, it is important to satisfy the priority needs of both the majority and minority. Prioritization might also factor consultation or sign-off from committees of jurisdiction on a given topic before proceeding with a study. One could imagine that the bipartisan nature of a request could also be considered as a plus-factor to help prioritize it. It may be instructive to look to how executive branch agencies decide what reports are worth the expenditure of time.

Rather than doing this ad hoc, it would be advisable for TAS leadership to create its own version of GAO's Congressional Protocols to formalize this process.

134   2 U.S.C. § 166.

Post-Release Constituency Engagement

The process should not end with the release of a report. The analyses should be made publicly available, of course, and, as appropriate, TAS should host staff-only and member-only briefings and break longer reports into digestible pieces. In addition, it should write blog posts and use social media to help disseminate the contents, and perhaps have a podcast as another way for staff and members to consume the contents. This is common practice for other parliamentary research institutions, such as in the European Parliament and the British Parliament, and it makes sense to bring it to TAS. In addition, TAS may wish to consider more unconventional techniques, such as bringing on a Wikipedian in residence to encourage third parties to add the agency's findings to the world's most frequently used online encyclopedia. It may also look at search queries on its website, and the websites of sister agencies, to identify potential topics of congressional interest. Like GAO, TAS staff could also be made available for temporary assignment as detailees to committees on a specific project.

A House-Only Approach

As we discussed in the section on the political landscape, the House and Senate may be unable to reconcile their different approaches to addressing the science and technology assessment gap in the short term. In those circumstances, the House may choose to proceed with creating a House-only S&T assessment entity. There is precedent for doing this.

The House and Senate have a number of differences with respect to their internal structures. For example, the House has an independent ethics agency, the Office of Congressional Ethics, which has its own board, director, and staff.[135] The OCE exists by House resolution and is funded under the House portion of the legislative branch appropriations bill. Other unicameral entities include the House Democracy Partnership[136] and the Office of the Whistleblower Ombudsman.

By a simple resolution, the House of Representatives could create a House-only Technology Assessment Service and could fund that entity through the legislative branch appropriations bill. The advantage of this arrangement is that it would allow

135 For information on the Office of Congressional Ethics, see: https://oce.house.gov/about.
136 For information on the House Democracy Partnership, see: https://hdp.house.gov/about.

the House to move forward quickly to establish such an entity and modify it as necessary without the need for extended negotiations with the Senate. There's a long history of each chamber deferring to the other regarding its internal funding priorities.

There are several disadvantages to this approach. The funds would come from the House of Representatives' line item in the appropriations bill, which may concentrate the costs on the House (and may require cuts elsewhere). Because the service would be created by a House resolution, it would lack permanence and need to be re-created every Congress, absent the enactment of legislation. In addition, should political control of the House chamber flip, the service would need to enjoy strong bipartisan support, and it would be easier for it to be eliminated.

These are not insurmountable hurdles. In addition, it is not unprecedented for one chamber to start a program or project that the other eventually comes to support. This could be an avenue to move forward quickly.

Office Space

OTA was unusual among congressional support agencies in that it rented its offices, located at 600 Pennsylvania Avenue SE. An important question for TAS is where it should house its staff. One option is to house all of its staff in the Washington, DC area, ideally near the Capitol complex. The House of Representatives recently took over control of the O'Neill building,[137] and the Government Publishing Office has leased out approximately 100,000 square feet of office space and may have more to offer,[138] which suggests there may be readily available options under the control of the legislative branch. Another option is co-location inside the Government Accountability Office.

TAS may wish to consider satellite or field offices. It is not unusual for legislative branch agencies to have this arrangement. For example, GAO has 11 field locations: Atlanta, Boston, Chicago, Dallas, Dayton, Denver, Huntsville, Los Angeles, Norfolk, Oakland, and Seattle.[139] The Library of Congress has 6 overseas offices, in Cairo, Islamabad,

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137 Pub. L. 114–254, div. A, § 101(3), Dec. 10, 2016. https://uscode.house.gov/statviewer.htm?volume=130&page=1012.

138 See "Questions for the Record," Committee on House Administration, February 27, 2017. https://www.gpo.gov/docs/default-source/congressional-relations-pdf-files/testimonies/qfr-cha-feb-2017.pdf.

139 GAO Phonebook, available at: https://www.gao.gov/about.gao/phonebook/orgphonebook.pdf.

Jakarta, Nairobi, New Delhi, and Rio.[140] Given TAS's focus on S&T, it may be worth considering satellite offices in Silicon Valley, Cambridge, or other centers of expertise.

Practical Considerations on Making Technology Assessment Work for Congress
Coordination between Support Agencies

> The Office of Technology Assessment did 50 major reports last year, 50 major reports for $22 million. . . . I just do not think it is right that we have an entity that did 50 reports last year—CRS did 11,000, the General Accounting Office did hundreds and hundreds of reports.
>
> —Sen. Harry Reid (D-Nev.), July 1995[141, 142]

The kind of products created by legislative support agencies vary considerably in length, production time, subject matter, and methodology. GAO usually produces lengthy, analytical reports that examine waste, fraud, and abuse inside federal agencies; it solicits feedback from the agencies subject to its oversight; and it issues recommendations. CRS, by contrast, currently focuses on quick-response summaries and syntheses of existing research; it avoids reaching conclusions or issuing recommendations; and it strongly discourages communications external to the agency. The former OTA was more like GAO in that it produced in-depth, analytical pieces that took a long time to research and were the result of wide consultation.

There is a continuum between shorter-form (and faster-turnaround) analyses and longer-form (and slower) analyses. Clustering reports at the ends of the shorter/longer axis could help satisfy the needs of the varying constituencies while

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140   Library of Congress Overseas Offices, available at: https://www.loc.gov/acq/ovop/.

141   "Legislative Branch Appropriations For Fiscal Year 1996," *Congressional Record*, Vol. 141, No. 118, July 20, 1995. https://www.congress.gov/104/crec/1995/07/20/modified/CREC-1995-07-20-pt1-PgS10373.htm.

142   The 11,000 reports figure appears to be a gross overstatement. According to CRS's annual report for 1995, it produced 1,291 general distribution products, including reports, audio/video programs, issue briefs, and other materials. Notably, CRS also had over five times the number of FTE staff and produced much shorter reports than OTA. See: "Annual Report of the Congressional Research Service of the Library of Congress for Fiscal Year 1995," CRS, March 12, 1996. https://s3.amazonaws.com/demandprogress/documents/CRS_Annual_Report_FY_1995.pdf.

conserving limited resources. A new S&T office should focus a portion of its resources on shorter, faster studies. It's important to think through how to do this without losing touch with what technology assessment is—namely, authoritative, multi-disciplinary, expert-reviewed products that offer analysis of policy options to help policymakers make more informed decisions. If you go too far towards short form, you get duplication with CRS and lose authoritativeness and accuracy. You also miss a key secondary feature of long-form TAs: building a bench of expert staff who can engage in informal consultations and briefings. This may require some freedom for experimentation to get the balance right.

It may be worthwhile taking a page out of NAPA's recommendation concerning OCSTA and have an initial point of contact for non-congressional technologists and scientists who wish to share information with Congress, such as an official Science and Technology Advisor. This role could also serve as a hub for helping congressional staff to access both internal and external resources. There may also be occasions when multiple congressional research agencies, like GAO and CRS, have conducted an analysis on the same or a related topic, or there are other analytical pieces from parliamentary research services around the world. In those cases, TAS or STAA could monitor and perhaps partner with these other entities to provide their work as a combined briefing package so that interested staff can view the topic through multiple lenses. Certainly, related content should be packaged together in finding aids, and TAS or STAA may wish to consider proactive outreach efforts like topical newsletters.

As discussed previously, we see two viable paths forward for building TA capacity in Congress: (1) STAA is the primary vehicle, but gets greater autonomy and resourcing, and adapts some structural features from OTA; and (2) An OTA-like entity, which we call TAS, is created to complement STAA, and each is left to specialize in its institutional strengths. In our view, (1) is the more conservative approach, and (2) is riskier but offers greater potential payoff.

Under scenario (2), serious attention will need to be given to avoiding duplication. Our answer is for requests to be sorted according to their subject matter. STAA would handle requests on matters primarily concerning federal government programs and expenditures, while TAS would handle requests on matters primarily concerning the private sector. Where ambiguous cases or capacity limitations in one office arise,

the Comptroller General and the TAS director would be empowered to make determinations about sorting requests, and perhaps could even engage in joint studies.

Rebuilding Congress's technology assessment capability and core S&T expertise would be a boon for taxpayers and the US economy. Under our preferred model, STAA can directly help reduce wasteful government spending, as the old OTA did, and promote long-term growth through oversight of R&D spending. Meanwhile, TAS can pay for itself by advancing policies that promote economic growth in the near term. Since innovation is a key driver of growth, and tech companies can be valued in the trillions, work that produces a slightly less harmful law (or a good law enacted sooner) could have a relatively big effect. To show its value, TAS's impact would only have to generate about 0.0002% of additional GDP growth[143]—contrast this with the 0.02% decrease resulting from this year's government shutdown.[144]

The very nature of Congress is in flux in these unsettled political times. A rare opportunity for institution-building is at hand, and the revival of a technology assessment capacity inside the legislative branch can help set the tone for the next quarter century and beyond.

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143   Based on OTA's $37 million budget.

144   "The Effects of the Partial Shutdown Ending in January 2019," Congressional Budget Office, January 2019. https://www.cbo.gov/system/files?file=2019-01/54937-PartialShutdownEffects.pdf.