

Congress Needs the Office of Technology Assessment to Keep up with Science and Technology

ENERGY, AUGUST 2019

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Congress currently lacks the necessary expertise to thoroughly analyze scientific and technological issues and determine a non-partisan, evidence-based, and scientifically informed resolution.

In April 2019, President Donald Trump declared, “The race to 5G is a race America must win.” The 5G standard is a much faster, more reliable, and more secure cellular network than the current 4G standard, and the president has pledged that 5G technology will be deployed this year in 92 markets throughout the country.¹ However, the Federal Communications Commission (FCC), the agency responsible for implementing the standard, has met opposition to its plan from fellow government agencies. The National Oceanic and Atmospheric Administration (NOAA) warned the House Science Committee that the planned 5G deployment could weaken U.S. weather forecasting capabilities by 30 percent and set its accuracy rates back to levels not seen since the early 1980s. That’s because the frequency spectrum that the FCC is auctioning (24 GHz) is similar to the one that remote sensors operate on to measure microwave emissions (23.8 GHz) for creating weather forecasts, and NOAA is concerned that the proximity of these frequencies will cause them to interfere with each other.² NASA and the Navy have expressed similar fears.³ Other 5G concerns include uncertainty about the security of systems and radiation emissions.^{4,5}

In a more perfect world, Congress could step in to balance these conflicting interests, but due to decades of budget trimming, the institution is foundering and putting American competitiveness at risk. Unlike many issues in Washington, intense partisanship is not what is stalling Congress on this issue. In fact, Democrats and Republicans are interested in balancing 5G deployment with its uncertain effects.⁶ Rural legislators are particularly interested in expanding effective 5G services into their districts so that health care organizations can use tele-health-care and remote patient monitoring to better access their patients.^{7,8}

The problem is that Congress currently lacks the necessary expertise to thoroughly analyze these issues and determine an evidence-based and scientifically informed resolution. This hasn't always been the case. Congress once received unfiltered and ongoing access to non-partisan science and technology expert advice in the form of the Office of Technology Assessment (OTA), long before 5G was critical to Americans for instant access to texting, tweeting, and streaming information.

Revitalizing and rebuilding congressional capability through OTA will be beneficial to Congress and its constituents since it will enhance technical support, congressional oversight, policy development, and fiscal savings.

The History of OTA

In 1962, the White House established the Office of Science and Technology to better advise the executive branch on scientific and technological matters amid an environmental awakening and nascent research into anti-ballistic missiles and supersonic transportation.⁹ Consequently, Congress desired access to similar scientific expertise and acted.¹⁰ In 1972, the Office of Technology Assessment Act passed in the House by a vote of 256 to 118 (82 percent of Democrats and 49 percent of Republicans voted yes) and in the Senate by a voice vote.¹¹ On October 13, 1972, President Richard Nixon signed the bill into law and the Office of Technology Assessment (OTA) was established in the legislative branch.¹²

OTA provided Congress with “new and effective means for securing competent, unbiased information concerning the physical, biological, economic, social, and political effects” of changing and expanding technologies. OTA was the congressional technical counterpart to the White House’s Office of Science and Technology Policy (OSTP) similar to how the Congressional Budget Office (CBO) counterbalances the Office of Management and Budget (OMB) on fiscal matters.

In terms of its structure and governance, the Technology Assessment Board (TAB), which comprised six Democrats and six Republicans in Congress, oversaw OTA. The speaker of the House selected three Democratic and three Republican representatives, and the Senate president pro tempore chose three Democratic and three Republican senators. TAB elected an OTA director to a six-year term and appointed 10 non-governmental scientific or technical experts from both academia and industry to four-year terms on the Technology Assessment Advisory Council (TAAC). The Comptroller General (the director of the U.S. Government Accountability Office (GAO)) and the director of the Congressional Research Service (CRS) also served on TAAC.¹³

Between 1972 and 1995, OTA produced 750 studies on a broad set of pressing topics, including agricultural, biological, computer, defense, information, medical, and space technologies, as well as issues regarding education, energy resources, environmental protection, health science, labor automation, and transportation.^{14,15,16,17,18,19,20,21,22,23,24,25,26} OTA reports rarely offered policy recommendations, but instead outlined unbiased assessments of alternative policy options and their anticipated impacts.²⁷ Additionally, OTA clearly indicated where scientific consensus existed or explained why a consensus could not be met.²⁸ OTA staff also served as witnesses at congressional hearings and provided answers to follow-up congressional questions, offering their expertise throughout the policymaking process.²⁹

The Congressional Scientific Dark Age

Unfortunately, as part of the Contract with America to decrease the national budget, Congress shut down OTA in 1995 by dis-appropriating it.³⁰ At the time that it closed, OTA had a budget of \$22 million and a staff of 143 experts.³¹ During its final six years, OTA produced 285 publications, nearly 40 percent of all the reports it produced throughout its existence.³² Topics that OTA studied from its earliest days to its final days included agricultural technology, business and industry, cancer, communications, defense technology, energy technology, environmental protection, health and health technology, information technology, international relations and technology transfer, law and law enforcement technology, pharmaceuticals, research and development, science and technology, and transportation.^{33,34,35,36,37,38,39} Some of the final emerging issues that OTA advised Congress on included climate change, medical malpractice, osteoporosis, and telecommunications.^{40,41,42,43}

Table 1. OTA in the 1990s

YEAR	NUMBER OF PUBLICATIONS	MOST COMMON TOPICS
1990	45	<ul style="list-style-type: none"> • Biological Research & Technology • Defense Technology • Cancer • Health & Health Technology • Space
1991	43	<ul style="list-style-type: none"> • Defense Technology • Biological Research & Technology • Children's Health • Transportation
1992	42	<ul style="list-style-type: none"> • Defense Technology • Biological Research & Technology • Business & Industry • Environmental Protection • Health & Health Technology
1993	50	<ul style="list-style-type: none"> • Health & Health Technology • Defense Technology • Business & Industry • Energy Efficiency • Remote Sensing
1994	41	<ul style="list-style-type: none"> • Health & Health Technology • Defense Technology
1995	64	<ul style="list-style-type: none"> • Defense Technology • Education • Health & Health Technology • Environmental Protection • Fishing Industry • Research & Development • Space

Source: Compiled using data from Office of Technology Assessment Archive.⁴⁴

Most of the critical scientific and technical issues that OTA studied have significantly evolved since 1995, and many new challenges have emerged that impact Americans' daily lives. When OTA closed its doors, no one could have imagined the new opportunities and challenges that advanced manufacturing, autonomous vehicles, cyber warfare, encryption, and the internet would present to society and thus present to policymakers to respond to them.

Here are three examples to consider:

1. The intelligence agencies have concluded that during the 2016 presidential election campaign the United States suffered an unprecedented attack through social media disinformation campaigns.⁴⁵ However, recent congressional hearings have made it clear that Congress cannot meaningfully act to protect the country if members are unfamiliar with the technological underpinnings of social media.^{46,47}
2. More complex topics, like quantum computing and cryptocurrency, also leave members of Congress bewildered.^{48,49} While these hearings provide great fodder for late-night TV, they reiterate how vulnerable the United States is to threats from technology.
3. Both artificial (augmented) intelligence and the “internet of medical things” stand to revolutionize nearly every aspect of health care administration, care delivery, and research and financing.^{50,51} Before they do, however, Congress must first address major data issues, cybersecurity, and related patient-safety concerns.⁵²

Unlike the U.S. Congress, the European Parliament still receives in-house advice on scientific and technical issues, including assessments on social media disinformation campaigns, from its Panel for the Future of Science and Technology.^{53,54} In fact, as technological innovations expanded, so did the number of countries adopting offices modeled on OTA.^{55,56,57,58} Today, over a dozen countries have successful technical advisory offices modeled after OTA.^{59,60}

While critics of OTA considered the office to be “redundant and irrelevant” at the time, the loss of OTA has left a gaping hole in Congress’s ability to consider and incorporate the perspectives of science and technology issues, including its benefits for oversight and fiscal savings.⁶¹

In some cases, Congress was able to have technical assessments carried out through the National Research Council, an arm of the National Academies of Science, Engineering, and Medicine. The challenge was that Congress had to fund each project separately through an individual government agency, and OTA studies often took around 18 months to complete.⁶²

Over the last 24 years, three other congressional support agencies, CBO, CRS, and GAO, have filled in some gaps, but they have thus far been unable to fulfill elements of OTA’s mission—even as it becomes clearer that a major void exists. Whereas OTA evaluated a host of policy implications, CBO is primarily concerned with the economic impact of proposed policies.⁶³ CRS may be thought of as the congressional think tank, but its staff has

a limited STEM background, due to its broader mandate.^{64,65} When OTA closed, CRS had a staff of 746, but today its staff has been reduced by around 20 percent to about 600.^{66,67} This has further diminished CRS's science and technology resources. Additionally, GAO's workforce has fallen by 35 percent from 4,572 in 1995 to 2,989 in 2015. Conversely, CBO bucked the trend and grew by 9 percent between 1995 and 2015 from 215 employees to 235 employees.⁶⁸

Table 2. Congressional Support Agencies and Their Mission Statements

CONGRESSIONAL SUPPORT AGENCIES	MISSION STATEMENT
OTA	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.
CRS	Serve the Congress throughout the legislative process by providing comprehensive and reliable legislative research and analysis that are timely, objective, authoritative, and confidential, thereby contributing to an informed national legislature.
GAO	Support the Congress in meeting its constitutional responsibilities and to help improve the performance and ensure the accountability of the federal government for the benefit of the American people.
CBO	Help the Congress make effective budget and economic policy.

Source: Congress of the United States,⁶⁹ CRS,⁷⁰ GAO,⁷¹ and CBO.⁷²

Table 3. Funding for Congressional Support Agencies

1985		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$16 million (0.002%)	143
CRS	\$40 million (0.004%)	860
GAO	\$300 million (0.03%)	5,042
CBO	\$18 million (0.002%)	222

1990		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$19 million (0.002%)	143
CRS	\$47 million (0.004%)	797
GAO	\$365 million (0.03%)	5,056
CBO	\$20 million (0.002%)	222

1995		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$22 million (0.001%)	143
CRS	\$60 million (0.004%)	746
GAO	\$449 million (0.03%)	4,572
CBO	\$23 million (0.002%)	214

2000		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$0 (0%)	0
CRS	\$71 million (0.004%)	696
GAO	\$378 million (0.02%)	3,192
CBO	\$26 million (0.001%)	223

2005		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$0 (0%)	0
CRS	\$96 million (0.004%)	700
GAO	\$467 million (0.02%)	3,215
CBO	\$34 million (0.001%)	235

2010		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$0 (0%)	0
CRS	\$112 million (0.003%)	679
GAO	\$557 million (0.02%)	3,350
CBO	\$45 million (0.001%)	254

2015		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
OTA	\$0 (0%)	0
CRS	\$107 million (0.003%)	609
GAO	\$522 million (0.01%)	2,989
CBO	\$46 million (0.001%)	235

Source: Compiled using data from Brookings⁷³ and the Office of Management and Budget.⁷⁴

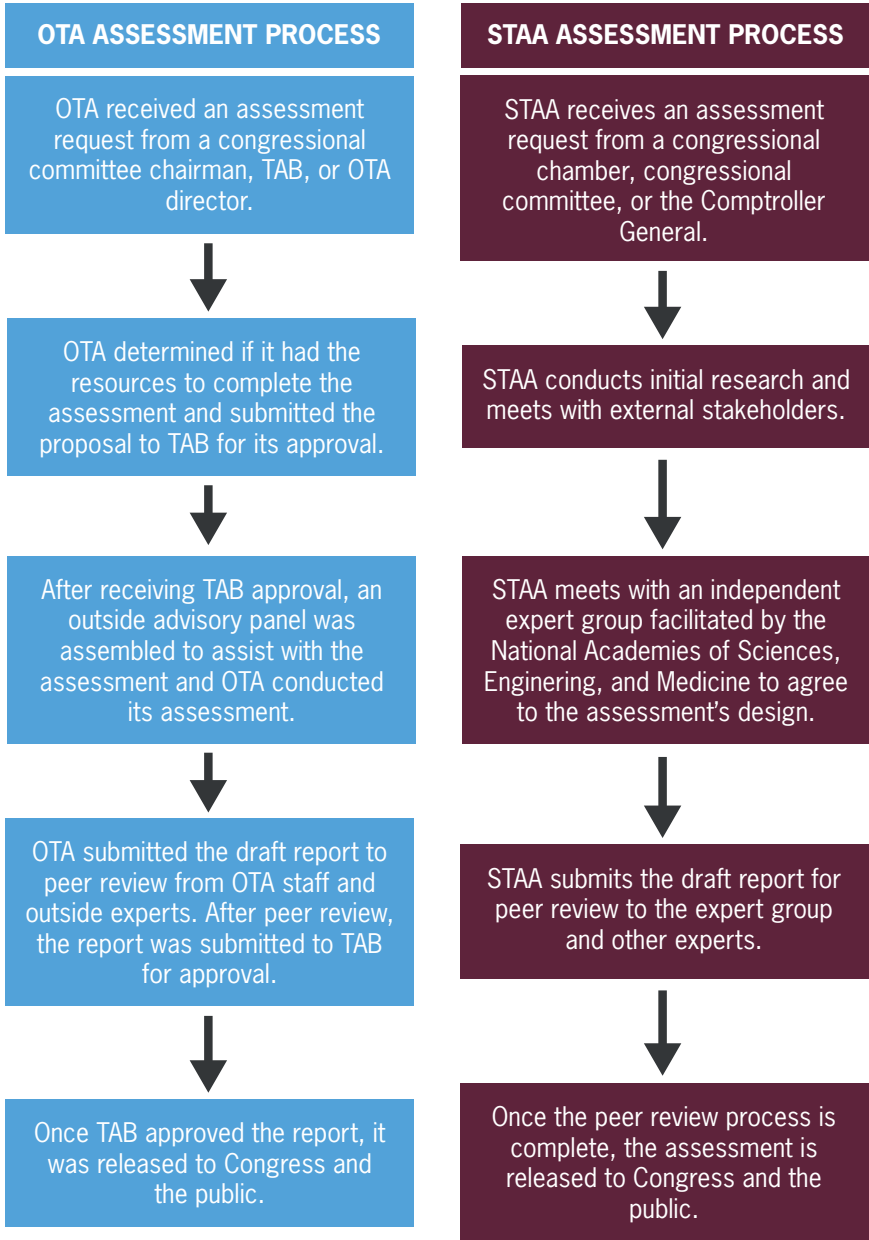
Seven years after OTA closed, GAO started conducting technology assessments for Congress.⁷⁵ Between 2002 and 2018, GAO published 157 “science and technology reports” on topics such as defense technology, energy, quantum computing, artificial intelligence, STEM education, manufacturing, medical devices, facial-recognition technology, genetically engineered crops, GPS, nanotechnology, cybersecurity, aviation, and weather forecasting.^{76,77,78,79,80,81,82,83,84,85,86,87,88,89,90} While GAO expanded its science and technology output this decade, it was not one of GAO’s top commitments since it had a limited staff and lacked a dedicated office.

Moving Toward Enlightenment: How Can We Fix It?

Born out of bipartisan support in Congress, GAO unveiled the Science, Technology, Assessment, and Analytics (STAA) Team, its 15th mission team and the first new one in 20 years, earlier this year.^{91,92,93,94} This team of mostly existing GAO staff assesses technologies, offers Congress technical assistance, uses best practices to audit federal science and technology programs, and is creating an audit innovation lab. Unlike prior

GAO technical assessments, the STAA team will include policy options for Congress, when relevant, in its technical assessments.⁹⁵ Through non-partisan and fact-based analysis, the assessments will highlight the strengths and weaknesses of each policy option. Currently, the team is focusing on artificial intelligence and automation, brain/augmented reality, cryptocurrencies and blockchain, genome editing, and quantum information science.⁹⁶ Looking ahead, the STAA team is considering assessing many other technologies including autonomous vehicles, border protection technologies, opioid-addiction vaccine development, and regenerative medicine. GAO also plans to establish a science and technology advisory board of policy experts from academia, industry, non-profits, and government (prior officials).⁹⁷

Figure 1. Comparing OTA and STAA Assessment Processes



Source: Compiled using information from the Congress of the United States⁹⁸ and GAO.⁹⁹

While OTA's doors have been closed since 1995, Congress only defunded it and did not deauthorize the organization. Therefore, providing appropriations for the office is all that is needed to unlock the doors and resume the assessments. At the direction of Congress, CRS and the National Academy of Public Administration are preparing a report that will evaluate congressional access to resources for developing science and technology policy and to determine whether reinstating OTA is necessary or if it would replicate existing functions.¹⁰⁰

Ahead of this report's release, two congressional bodies endorsed reviving OTA. In April 2019, the House Appropriations Committee took the first steps toward reopening OTA when it included funding of \$6 million in the Fiscal Year (FY) 2020 Legislative Branch Appropriations Bill to restart the office.^{101,102} In July, the bipartisan Select Committee on the Modernization of Congress unanimously recommended "reestablishing and restructuring an improved Office of Technology Assessment."¹⁰³ The committee has recommended naming this new office the "Congressional Technology and Innovation Lab."¹⁰⁴ Unlocking the doors to OTA and providing Congress access to scientific and technological expertise has also received support from right-leaning and left-leaning think tanks and from a group of over 40 bipartisan organizations advocating for a "future Congress."^{105,106,107,108}

Reviving OTA will strengthen congressional commitment to evidence-based policymaking.¹⁰⁹ In January 2019, the Foundations for Evidence-Based Policymaking Act of 2018 was signed into law with great bipartisan support.¹¹⁰ The new act requires government agencies to appoint chief data and evaluation officers, provide greater public access to non-sensitive information, and leverage data as an asset.¹¹¹ If Congress does revive OTA, it will provide the legislative branch equal footing with the executive branch's OSTP. Polling also show that constituents, nearly 80 percent of them, want scientific research rather than personal views to guide their congressmembers' policy decisions.¹¹² Since Congress recognizes that policymaking is most effective when it is based on high-quality data and evidence, it is time that it revives OTA and allows evidence-based scientific and technical assessments to guide its policymaking.

The world's leading legislative body deserves the best advice on science and technology as Americans continue to advance into a society driven by technology and ever-evolving scientific knowledge.

Table 4. Current Funding for Legislative Branch Agencies

FY 2020 REQUEST		
OFFICE	FUNDING (% OF TOTAL FEDERAL BUDGET)	STAFF
Proposed OTA (FY 2020 House Request)	\$6 million (0.0001%)	
STAA	\$15 million (0.0003%)	70*
CRS	\$126 million (0.003%)	563**
GAO	\$590 million (0.01%)	3,015**
CBO	\$51 million (0.001%)	237***

Source: Compiled using data from the House Committee on Appropriations,¹¹³ GAO,^{114,115,116} CRS,¹¹⁷ the Library of Congress,¹¹⁸ and the Office of Management and Budget.¹¹⁹

* based on FY 2020 estimate

**based on FY 2018

***based on FY 2017

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