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Office of Science and Technology Policy (OSTP): History and Overview

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Summary

Congress established the Office of Science and Technology Policy (OSTP) through the National Science and Technology Policy, Organization, and Priorities Act of 1976 (P.L. 94-282). The act states, "The primary function of the OSTP Director is to provide, within the Executive Office of the President [EOP], advice on the scientific, engineering, and technological aspects of issues that require attention at the highest level of Government." Further, "The Office shall serve as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government."

The President nominates the OSTP Director, who is subject to confirmation by the Senate. In some Administrations, the President has concurrently appointed the OSTP Director to the position of Assistant to the President for Science and Technology (APST), a position which allows for the provision of confidential advice to the President on matters of science and technology. The APST manages the National Science and Technology Council (NSTC), an interagency body established by Executive Order 12881 that coordinates science and technology (S&T) policy across the federal government. The APST also co-chairs the President's Council of Advisors on Science and Technology (PCAST), a council of external advisors established on October 25, 2021, by Executive Order 13895 for a period of two years from the date of the order, unless extended by the President. In January 2019, the Senate confirmed President Trump's nominee for OSTP Director, Kelvin Droegemeier. While Dr. Droegemeier does not hold the APST title, according to OSTP he manages the NSTC and serves as co-chair of PCAST.

Congress has appropriated approximately $5.5 million for OSTP for fiscal years 2014 through 2020 in annual Commerce, Justice, Science and Related Agencies appropriations acts. The President is requesting $5.0 million for FY2021. Two federal agencies also provide support for OSTP activities. The National Science Foundation provides funding for the Science and Technology Policy Institute (STPI), a federally-funded research and development center that supports OSTP. NSF STPI funding for FY2020 is $4.7 million. The Department of Energy provides funding for support of the President's Council of Advisors on Science and Technology (PCAST) which is administered by OSTP. DOE PCAST funding for FY2020 is $812,000.

Several recurrent OSTP issues face Congress: the need for science advice within the EOP; the title, rank, and responsibilities of the OSTP Director; the policy areas for OSTP focus; the funding and staffing for OSTP; the roles and functions of OSTP and NSTC in setting federal science and technology policy; and the status and influence of PCAST. Some in the S&T community support raising the OSTP Director to Cabinet rank, contending that this would imbue the position with greater influence within the EOP. Others have proposed that the OSTP Director play a greater role in federal agency coordination, priority setting, and budget allocation. Both the Administration and Congress have identified areas of policy focus for OSTP staff, raising questions of prioritization and oversight. Some experts say NSTC has insufficient authority over federal agencies engaged in science and technology activities and that PCAST has insufficient influence on S&T policy; they question the overall coordination of federal science and technology activities. Finally, some in the scientific community support increasing the authority of the OSTP Director in the budget process to bring greater science and technology expertise to federal investment decisionmaking.

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Historically, advice to the President was provided through advisors and boards without statutory authorities. Congress moved in 1976 to codify a formal mechanism for presidential science advice. The National Science and Technology Policy, Organization, and Priorities Act of 1976 (P.L. 94-282) established the Office of Science and Technology Policy (OSTP), including the position of its Director, within the Executive Office of the President (EOP) to provide scientific and technological analysis and advice to the President. This act codified and institutionalized a presidential science advice function that previously existed at each President's discretion.

This report provides an overview of the history of science and technology (S&T) advice to the President and discusses selected recurrent issues for Congress regarding OSTP's Director, OSTP management and operations, the President's Council of Advisors on Science and Technology (PCAST), and the National Science and Technology Council (NSTC). For a discussion of certain OSTP policy issues, see also CRS Report R43923, *The White House Office of Science and Technology Policy: Issues for the 114th Congress*, by Dana A. Shea and John F. Sargent Jr.

History of Science and Technology Advice to the President

Science and technology policy issues tend to reach the presidential level if they involve multiple agencies; have substantial budgetary, economic, national security, or foreign policy dimensions; are highly controversial (especially when science and technology intersect with values, ethics, and morality); or are highly visible to the public. When these matters reach the Oval Office, Presidents generally seek information and advice from trusted sources as to the options available and their implications.

Throughout U.S. history, Presidents have obtained S&T advice from federal scientists and engineers and informal personal contacts.[1] Starting in the early 1930s, Presidents attempted to expand their sources of S&T advice through advisory boards and committees. Lacking a statutory foundation, these boards and committees tended to lack permanency, as subsequent Presidents often disbanded them. When again faced with the need for S&T advice, Presidents would form new advisory boards or committees, sometimes reconstituted from previously disbanded ones.

In the years leading up to World War II, the importance of research and development (R&D) to the nation's economic and military strength became increasingly evident. As a result, President Franklin D. Roosevelt established the Office of Scientific Research and Development (OSRD) in 1941.[2] The federal R&D enterprise is widely credited with contributing substantially to the Allied victory in World War II, as well as to the development of subsequent U.S. industrial strength.[3] In November 1944, President Roosevelt wrote a letter to OSRD Director Vannevar Bush[4] seeking

[1] For a history of OSTP, see Genevieve J. Knezo, "Science and Technology," Chapter 6 in Harold C. Relyea (ed.), *The Executive Office of the President: A Historical, Biographical, and Bibliographical Guide* (Westport, Connecticut: Greenwood Press, 1997).

[2] President Roosevelt established OSRD within the Office for Emergency Management of the Executive Office of the President. Executive Order 8807, "Establishing the Office of Scientific Research and Development," June 28, 1941, http://www.presidency.ucsb.edu/ws/?pid=16137.

[3] See, for example, William A. Blanpied, "Science Policy in the Early New Deal and Its Impacts in the 1940s," *Federal History online*, January 2009, pp. 9-24, and John Brooks Slaughter, "National Science Foundation," in *Encyclopedia of Education Economics and Finance* (SAGE Publications, 2014), p. 477.

[4] OSRD Director Bush reported directly to President Roosevelt.

recommendations on how research and the research infrastructure established to support America's war effort could be "profitably employed in times of peace."[5] Bush's response, *Science: The Endless Frontier*,[6] laid out a framework that asserted the essential role of scientific progress in meeting the nation's economic, national security, and social needs. Experts widely view the Bush report as foundational to today's U.S. science and technology policy.

Subsequent Presidents used a variety of mechanisms to obtain S&T advice within the EOP, to enhance interagency coordination, and to receive counsel from outside advisors. The primary provision of advice to the President on science and technology issues continued through advisors and assistants to the President who continued to perform this function without statutory authorities. Organizations within the EOP included the Office of the Special Assistant to the President for Science and Technology (Eisenhower) and the Office of Science and Technology (OST; Kennedy, Johnson). Organizations focused on interagency coordination included the President's Scientific Research Board (Truman), the Federal Council for Science and Technology (FCST; Eisenhower, Kennedy, Johnson, Nixon), and the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET; Ford, Carter, Reagan, George H. W. Bush). External advisory committees included the Science Advisory Committee (Truman, Eisenhower), and the President's Science Advisory Committee (PSAC; Eisenhower, Kennedy, Johnson, Nixon).

In 1973, President Nixon abolished the Office of Science and Technology. The National Science Foundation (NSF) assumed its civilian functions and the National Security Council (NSC) its security functions.[7] In addition, President Nixon opted not to appoint new members to PSAC after accepting the pro forma resignation of its members.[8] With this backdrop, President Ford chose to establish OSTP through legislation, rather than executive order.[9] The National Science and Technology Policy, Organization, and Priorities Act of 1976 (P.L. 94-282) established OSTP and the position of OSTP Director. President Ford signed it into law on May 11, 1976.

The creation of OSTP provided a new structure for the provision of science and technology policy advice to the President, but did not end Presidents' authority to appoint advisors in parallel. The OSTP director is a statutory position; the authority to appoint others to assist the President exists solely with the President. Thus, a President may opt to appoint the OSTP director to also serve as an assistant to the President, may concurrently appoint another individual to serve as Assistant to the President for Science and Technology (APST), or may appoint no one to serve as APST. This also raised new and continuing questions with respect to coordination of advice.

Appendix A provides a historical compilation of presidential S&T policy advisors with their titles, EOP S&T agencies/offices, interagency coordination organizations, and advisory

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[5] Letter from President Franklin D. Roosevelt to Vannevar Bush, Director, Office of Scientific Research and Development, November 17, 1944, http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm#letter.

[6] Vannevar Bush, *Science The Endless Frontier: A Report to the President by Vannevar Bush, Director of the Office of Scientific Research and Development*, Office of Scientific Research and Development, EOP, Washington, DC, July 5, 1945, http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm#ch1.

[7] David Z. Beckler, "The Precarious Life of Science in the White House," *Daedalus*, vol. 103, no. 3 (Summer 1974), p. 115, http://www.jstor.org/stable/20024223.

[8] Ibid.

[9] Jeffrey K. Stine, *A History of Science Policy in the United States, 1940-1985*, Report for the House Committee on Science and Technology Task Force on Science Policy, 99th Cong., 2nd sess., Committee Print (Washington, DC: GPO, 1986), http://ia341018.us.archive.org/2/items/historyofscience00unit/historyofscience00unit.pdf. See also Roger Pielke, and Roberta A. Klein (Editors), *Presidential Science Advisors Perspectives and Reflections on Science, Policy and Politics*, (New York: Springer, 2010).

committees. As illustrated in **Table A-1**, the Presidents subsequent to President Ford continued to adapt OSTP and related organizations to suit their needs.

Overview of OSTP, NSTC, and PCAST

The White House contains several science and technology policy entities, including OSTP, the National Science and Technology Council (NSTC), and the President's Council of Advisors on Science and Technology (PCAST). This section describes the structure, roles and responsibilities, current structure, and budget of each entity. The role and influence of OSTP, NSTC, PCAST, and their predecessor organizations have varied among Administrations, depending on the President, the individual serving as OSTP Director, and the rapport between them.[10]

Office of Science and Technology Policy

Overview

Congress established the Office of Science and Technology Policy as an office within the EOP to, among other things, "serve as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government."[11] OSTP describes its functions as

- Advise the President and Executive Office of the President on the scientific and technological aspects of national policy;
- Advise the President on and assist the Office of Management and Budget (OMB) in the development of the Federal research and development (R&D) budget;
- Coordinate the R&D programs and policies of the Federal Government;
- Evaluate the scale, quality, and effectiveness of Federal science and technology (S&T) efforts; and
- Consult on S&T matters with nonfederal sectors and communities, including State and local officials, foreign and international entities and organizations, professional groups, universities, and industry.[12]

Major OSTP responsibilities include

- Providing scientifically rigorous advice and information to the President and other senior White House officials on the scientific and technical aspects of the work of the executive branch and national policy;
- Coordinating Federal R&D programs to ensure that R&D efforts are properly leveraged and focused on research in areas that will advance national priorities such as ensuring American leadership in the Industries of the Future, improving healthcare, enhancing national economic competitiveness, and protecting homeland security. A primary mechanism by which OSTP accomplishes this is the Cabinet-level National Science and Technology Council (NSTC);

[10] For a discussion of the varying influence of science advisors, listen to National Public Radio, *The Evolving Role of the Presidential Science Advisor*, Talk of the Nation, November 16, 2007, http://www.npr.org/templates/story/story.php?storyId=16343713.

[11] P.L. 94-282.

[12] The White House, EOP, *Congressional Budget Submission: Fiscal Year 2020*, 2019, p. OSTP-3, https://www.whitehouse.gov/wp-content/uploads/2019/03/EOP_FY20_Congressional_Budget_Submission.pdf.

- Participating in the formulation of the President's budget request in areas related to science and technology;
- Chairing the President's Council of Advisors on Science and Technology (PCAST). PCAST directly advises the President on the most critical and highly visible scientific and technical issues of the day;
- Providing support for the Federal Government's National/Homeland Security and Emergency Preparedness communications in times of national crisis.[13]

The OSTP also has several roles not articulated in these formal statements. These include serving as a sounding board and conduit of information for agency executives seeking to understand, clarify, and shape science and technology-related policy objectives and priorities; helping agencies coordinate and integrate their S&T strategies and activities; and helping resolve interagency conflicts over areas of S&T responsibility and leadership.

OSTP Structure/Roles of the OSTP Director, APST, and Associate Directors

Past Presidents appointed Assistants to the President for Science and Technology (or their equivalents) to coordinate presidential advice. Congress codified a specific science and technology advisory function when it created OSTP. P.L. 94-282 establishes the position of OSTP Director, whose primary function is

> to provide, within the Executive Office of the President, advice on the scientific, engineering, and technological aspects of issues that require attention at the highest level of Government.

In addition, the statute, as amended,[14] directs the OSTP Director to

> advise the President of scientific and technological considerations involved in areas of national concern including, but not limited to, the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources;
>
> evaluate the scale, quality, and effectiveness of the federal effort in science and technology and advise on appropriate actions;
>
> advise the President on scientific and technological considerations with regard to federal budgets, assist the Office of Management and Budget (OMB) with an annual review and analysis of funding proposed for research and development in budgets of all federal agencies, and aid [OMB] and the agencies throughout the budget development process; and
>
> assist the President in providing general leadership and coordination of the research and development programs of the Federal Government.

By statute, the President appoints the OSTP Director, who is sometimes referred to colloquially as the President's science advisor.[15] The OSTP Director is subject to Senate confirmation and receives compensation at the rate provided for level II of the Executive Schedule. The OSTP Director has never been a member of the President's Cabinet or a Cabinet-level official. The

[13] Ibid., p. OSTP-3.

[14] Section 1712(1) of P.L. 107-296 inserted "homeland security" after "national security" in the list of areas of national concern.

[15] Although there is no statutory EOP title or position of "Science Advisor" or "Presidential Science Advisor," this term is often used to describe the individual serving as the primary advisor to the President on science and technology issues. Executive Order 13539 ("President's Council of Advisors on Science and Technology," April 21, 2010) identifies the Assistant to the President for Science and Technology (APST) as the "Science Advisor" and states that the APST shall serve as a co-chair of PCAST; the position of PCAST co-chair is currently vacant.

statute does not require, nor may Congress compel, that the President appoint the OSTP Director to serve as an assistant to the President (or, more specifically, as APST).

In addition to establishing the position of OSTP Director, P.L. 94-282 authorizes the President to appoint not more than four OSTP Associate Directors, subject to Senate confirmation, who are compensated at a rate not to exceed that provided for level III of the Executive Schedule. In the Trump Administration, there are three divisions: science, technology, and national security. In April 2019, President Trump nominated Michael Kratsios for the position of OSTP Associate Director for Technology and named him as the U.S. Chief Technology Officer; he was confirmed by the Senate in August 2019.[16] Within OSTP, three Principal Assistant Director (PAD) positions have also been established, two for science and one for national security. See **Figure 1**.[17]

The science PADs have unique areas of responsibility—one is focused on oceans and environment and the other on physical sciences and engineering. The PAD for oceans and environment provides

> scientific and technical expertise, and interagency/NSTC coordination in projects and initiatives related to oceans and environmental topics, such as the June 19, 2018, Executive Order [13840] … "Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States"; and NSTC reports on earth observations, space weather, and harmful algal blooms, to name a few.[18]

The PAD for physical sciences and engineering

> manages the OSTP teams running policy and science/technical aspects of projects related to topics such as nanotechnology, advanced manufacturing, semiconductors, high energy physics, and high performance computing. The physical sciences and engineering team also supports the Administration's work on identifying and protecting America's supply of critical minerals.[19]

The number of Associate Director positions has varied under different Presidents. For example, under President Trump, there is one Associate Director. Under President Obama there were four Associate Director positions with discrete areas of responsibility: science; technology and innovation; national security and international affairs; and environment and energy. Under President George W. Bush there were two Associate Directors—one focused on science and the other on technology—each with a Deputy Director.[20] During the Clinton Administration, four Associate Directors focused on science; technology; environment; and national security and international affairs. The section "Number and Policy Foci of OSTP Associate Directors" provides a more detailed discussion of the role of OSTP Associate Directors.

Presidential Appointment Status and Congress

The formal positions held by a President's science advisor may affect his or her degree of access to the President and other EOP decisionmakers. Although Presidents have differed in their management of EOP staff, Cabinet members and assistants to the President generally have greater

[16] Email communication from OSTP to CRS, May 2, 2019; Congress.gov, https://www.congress.gov/nomination/116th-congress/563?s=7&r=530.

[17] Email communication from OSTP to CRS, May 2, 2019.

[18] Email communication from OSTP to CRS, May 24, 2019.

[19] Ibid.

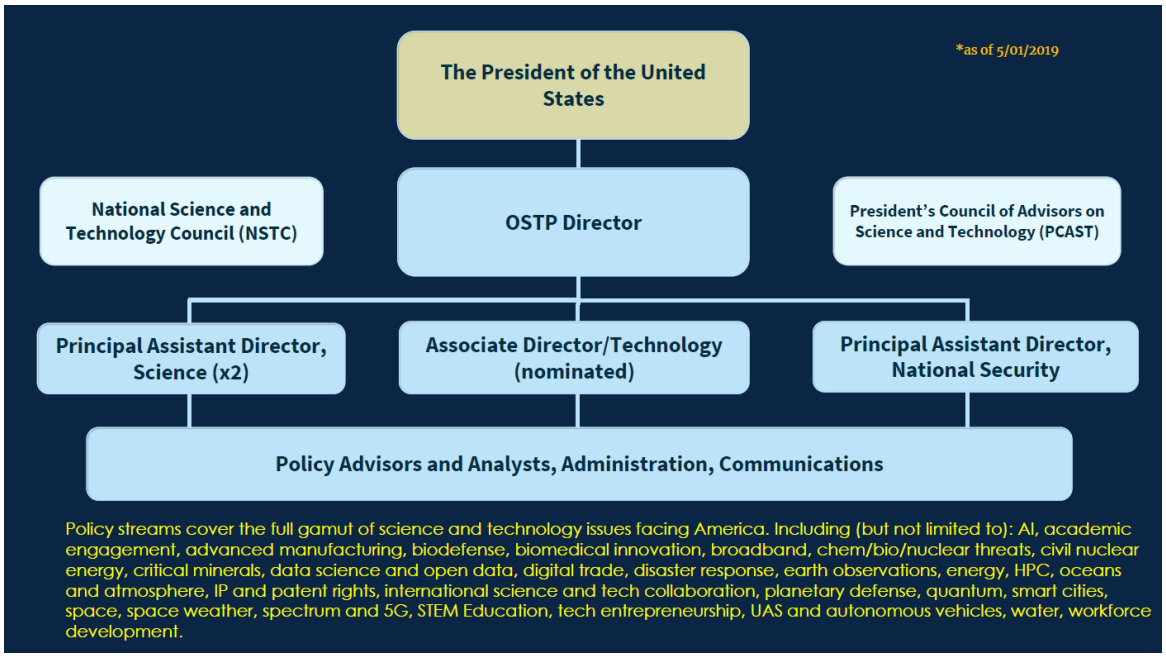
[20] CRS discussions with Stanley Sokul, Chief of Staff, Bush Administration OSTP, August 14, 2008.

access to the President than other White House staff.[21] The OSTP Director is not a Cabinet-level official.

Some Presidents have appointed their science advisors not only to the Senate-confirmed position of OSTP Director, but also as Assistant to the President for Science and Technology (APST). The APST position does not require Senate confirmation and may confer additional status and access to the President. Kelvin Droegemeier serves as President Trump's OSTP Director, but does not hold the title of APST. Presidents Obama and Clinton appointed their OSTP Directors as APST; President George W. Bush did not appoint an APST.

The relationship between Congress and the individual serving as the President's science advisor may be depend, in part, on whether the individual serves as OSTP Director, APST, or both. The executive branch has previously asserted that close presidential advisors are immune from compelled congressional testimony. That position, however, has been rejected by various congressional committees and by the only court to directly address the question.[22]

Figure 1. Selected White House Science and Technology Policy Organizations as Organized Under President Trump



Source: Email communication from OSTP to CRS, May 2, 2019, and February 14, 2020.

Notes: AI = artificial intelligence; chem = chemical; bio = biological; HPC = high performance computing; IP = intellectual property; tech = technology; 5G = fifth generation; STEM = science, technology, engineering, and mathematics; UAS = unmanned aircraft system.

Roles and Responsibilities

The OSTP Director advises the President on policy formulation; presidential appointments; S&T-related budget issues, including budgets for R&D; the policy significance of scientific and technical developments; and science, technology, engineering, and mathematics (STEM)

[21] Information on the President's Cabinet is available at http://www.whitehouse.gov/government/cabinet.html.

[22] CRS Legal Sidebar LSB10301, *Legislative Purpose and Adviser Immunity in Congressional Investigations*, by Todd Garvey.

education. OSTP Directors historically have also served as communication conduits between the EOP and the federal and nonfederal S&T community. Some OSTP Directors have emphasized communicating the views of the S&T community to the EOP, while others have focused on communicating the views of the EOP to the S&T community.

The APST manages the National Science and Technology Council (NSTC), established by Executive Order 12881,[23] which is charged with coordinating S&T policy across the federal government, establishing national goals for federal S&T investments, and preparing coordinated R&D strategies. As NSTC manager, the APST can provide federal agency coordination, information, and guidance when special events occur, such as national emergencies, disasters, or S&T-related international negotiations.

In addition, the APST co-chairs the President's Council of Advisors on Science and Technology (PCAST), established in its current form under President Obama by Executive Order 13539.[24] As co-chair of PCAST, the APST can seek to ascertain the consensus of the S&T community on issues of interest to the Administration.

The OSTP Director performs special roles with respect to national security and emergency preparedness (NS/EP) communications policies, programs, and capabilities. Under Executive Order 13618,[25] the OSTP Director advises the President on the prioritization of radio spectrum and wired communications that support NS/EP communications functions, and provides selected evaluation of appropriate information related to the test, exercise, evaluation, and readiness of the capabilities of existing and planned NS/EP communications. In addition, the OSTP Director issues priorities on an approximately annual basis for NS/EP Executive Committee analyses, studies, research, and development regarding NS/EP communications.[26]

Relationship with the Office of Management and Budget

The OSTP Director does not have direct authority over federal agencies or the Office of Management and Budget (OMB). OSTP's participation with OMB in the budget process involves four steps: (1) overall priority setting by OSTP and OMB, (2) agency preparation of budget proposals to OMB, (3) agency negotiations with OMB, and (4) final budget decisions by the President and the OMB Director.

1. **Priority setting.** A key activity in the first step is OSTP's request to federal agencies for their recommendations on R&D priorities. In addition, interagency working groups meet to determine individual agency responsibilities for specific activities when multiple agencies share responsibility for broad issue areas. The OSTP and OMB use this information in their development of a joint memorandum that articulates the Administration's R&D priorities and R&D investment criteria.[27] Agencies are encouraged to use this memorandum as an aid in the second step, preparation of their budgets.

[23] Executive Order 12881, "Establishment of the National Science and Technology Council," November 23, 1993, http://www.archives.gov/federal-register/executive-orders/pdf/12881.pdf.

[24] Executive Order 13539, "President's Council of Advisors on Science and Technology," April 21, 2010, http://www.gpo.gov/fdsys/pkg/FR-2010-04-27/pdf/2010-9796.pdf.

[25] Executive Order 13618, "Assignment of National Security and Emergency Preparedness Communications Functions," July 11, 2012, http://www.gpo.gov/fdsys/pkg/FR-2012-07-11/pdf/2012-17022.pdf.

[26] Email communication from OSTP to CRS, May 24, 2019.

[27] On July 31, 2018, OMB and OSTP issued a joint memorandum on science and technology priorities for FY2020 (https://www.whitehouse.gov/wp-content/uploads/2018/07/M-18-22.pdf).

2. **Agency budget preparation.** In the second step, OSTP continually interacts with agencies as they develop their budgets, providing advice and working with them on their priorities. In general, OSTP provides more guidance to agencies with large R&D budgets and to programs that cross agency boundaries. Federal agencies submit their completed budget proposals to OMB. The OSTP does not review proposed agency budgets before they are sent to OMB.
3. **Agency negotiations with OMB.** In the third step, OSTP works with OMB to review proposed agency budgets to ensure they reflect Administration plans and priorities. The OSTP also participates in OMB budget examiner presentations to the OMB Director and provides advice on priorities at that time. In addition, OSTP provides direct feedback to agencies as they negotiate with OMB over funding levels and the programs on which that funding is to be spent.
4. **Final budget decisions.** OSTP's primary role in the fourth step of the budget process is to advise on the quality of the agency budget proposals and their alignment with the President's established priorities. The President, the OMB Director, and the Cabinet, however, make the ultimate choices.

Budget and Staffing

OSTP's budget and staffing affect the degree to which OSTP can provide advice to the President and respond to congressional direction and mandates. **Figure 2** shows OSTP's budget from FY1990 to FY2020, and **Figure 3** shows OSTP's staffing level from FY1990 to FY2020. The President's request for OSTP for FY2021 is $5.0 million, $544,000 (9.8%) below the FY2020 enacted level, and 30 FTE, an increase of seven FTE from the estimated FY2020 level.

In FY2012, Congress reduced funding for OSTP by $2.1 million (32.3%); contemporaneously, the Administration transferred responsibility for funding PCAST to the Department of Energy. Funding for support of PCAST, provided by the Department of Energy (DOE) beginning in FY2012, is included in **Figure 2**. PCAST funding has ranged from $217,000 in FY2013 to $812,000 in FY2020. PCAST funding supports salaries and benefits, committee member travel, meeting planning support, and related expenses, and is provided through the DOE Science account. For FY2021, the DOE request for PCAST would support two FTE.

The OSTP is also supported by a federally funded research and development center (FFRDC), the Science and Technology Policy Institute (STPI; see box below), which is staffed and funded through the National Science Foundation appropriation. STPI funding for FY2020 is $4.74 million. The President is requesting $4.55 million for STPI for FY2021.[28]

As illustrated in **Figure 2** and **Figure 3**, OSTP funding and staffing levels have varied considerably over time. In constant dollars, OSTP funding was at its highest in FY1993 and at its lowest in FY1989 (see **Figure B-1**, which illustrates OSTP funding since 1977).

As of February 14, 2020, OSTP had a total of 71 staff members covering OSTP's portfolio of work. This includes 4 political staff, 21 career staff (includes schedule As), 2 unpaid consultants, 1 paid consultant, 34 detailees, 4 IPAs, and 5 fellows.[29] Generally, political staff and career staff

[28] National Science Foundation, *National Science Foundation FY2021 Budget Request to Congress*, p. IA-1, February 10, 2020, https://www.nsf.gov/about/budget/fy2021/pdf/fy2021budget.pdf.

[29] Email communication from OSTP to CRS, May 2, 2019. A detail is an officially approved temporary assignment of a civil service employee (informally called a "detailee") to a different position in another federal agency; the employee's official title, series, grade, rate of compensation, and permanent employer do not change. The Office of Personnel Management's Intergovernmental Personnel Act Mobility Program provides for the temporary assignment of personnel

are funded by OSTP; detailees are funded by their home agencies; fellows are funded by a variety of organizations; and IPAs may be funded by OSTP, their home agencies/organizations, or a combination of the two.[30]

OSTP funds its political and career staff, and includes relevant information in its annual budget requests to Congress. Additionally, OSTP has relied heavily on detailees, fellows, and IPAs to support its activities for at least the last three presidential administrations. Detailees, fellows, and IPAs may be funded by OSTP, their home agencies/organizations, or a combination of the two. During the Obama Administration, OSTP began with approximately 30 and ended with approximately 70 detailees, IPAs, and fellows. During the G.W. Bush Administration, OSTP had approximately 30-40 detailees per year. Toward the end of the Clinton Administration, OSTP had approximately 60 detailees and fellows.[31]

Science and Technology Policy Institute

The Science and Technology Policy Institute (STPI) is a federally funded research and development center (FFRDC) that provides analytical support to the Office of Science and Technology Policy, the National Science Foundation (NSF), and the National Science Board. Congress created STPI through the National Defense Authorization Act for Fiscal Year 1991 (P.L. 101-510). This law established the Critical Technologies Institute (CTI), an FFRDC under the sponsorship of OSTP but supported by appropriations provided to the Department of Defense (DOD). The RAND Corporation initially managed CTI. In 1998, Congress enacted the National Science Foundation Authorization Act of 1998 (P.L. 105-207), which changed CTI's name to the Science and Technology Policy Institute, changed primary sponsorship to the National Science Foundation, and amended the institute's duties.

In 2003, the Institute for Defense Analyses (IDA) was selected to manage STPI. NSF appropriations provides funding for STPI, including $4.7 million in FY2020. The STPI has approximately 40 full-time employees.[a] The STPI may also contract for expertise as required for a particular project.[b] In addition, STPI has access to the expertise of IDA's approximately 800 other employees.

The duties of STPI include:

> (1) The assembly of timely and authoritative information regarding significant developments and trends in science and technology research and development in the United States and abroad.
>
> (2) Analysis and interpretation of the information referred to in paragraph (1) with particular attention to the scope and content of the federal science and technology research and development portfolio as it affects interagency and national issues.
>
> (3) Initiation of studies and analysis of alternatives available for ensuring the long-term strength of the United States in the development and application of science and technology, including appropriate roles for the federal government, state governments, private industry, and institutions of higher education in the development and application of science and technology.
>
> (4) Provision, upon the request of the Director of the Office of Science and Technology Policy, of technical support and assistance

(IPAs) between the federal government and state and local governments, colleges and universities, Indian tribal governments, federally funded research and development centers, and other eligible organizations. In the OSTP context, fellows are scientists and engineers who come to Washington, DC, to gain experience in public policy and provide science and technical advice to policymakers. Most are recent graduates of doctoral programs, but some are more experienced staff from industry or universities. Fellows generally come for one year, but that time can be extended.

[30] Office of Science and Technology Policy, personal communication, March 23, 2016. In an earlier email (January 24, 2012) to CRS, OSTP asserted that it may reimburse agencies for all or part of the personnel costs, but is not required to do so under the terms of 3 U.S.C. 112, the provisions of which apply only to the White House Office, the Executive Residence at the White House, the Office of the Vice President, the Domestic Policy Staff, and the Office of Administration.

[31] Email communication from OSTP to CRS, July 27, 2017.

(A) to the committees and panels of the President's Council of Advisors on Science and Technology that provide advice to the Executive Branch on science and technology policy; and

(B) to the interagency committees and panels of the federal government concerned with science and technology. [c]

In carrying out these duties, the statute directs STPI to consult widely with representatives from private industry, academia, and nonprofit institutions, and to incorporate their views in STPI's work to the maximum extent practicable. In addition, the statute requires STPI to submit an annual report to the President on its activities, in accordance with requirements prescribed by the President.

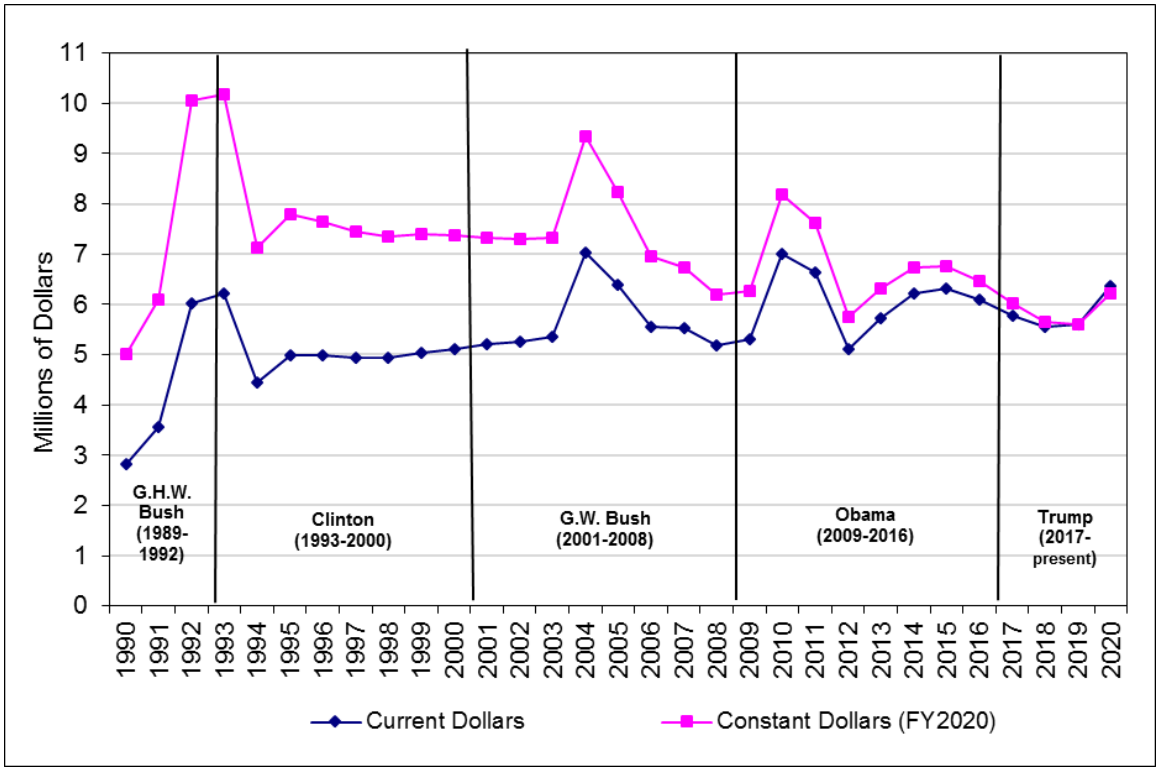
In addition to its primary customer, OSTP, and its sponsor, NSF, STPI has conducted work for other federal entities including: the National Institutes of Health; Department of Transportation; DOD; Department of Health and Human Services; National Science Board; Department of Commerce, including the National Institute of Standards and Technology; Department of Homeland Security; and Department of Energy.

a. Full-time employees are defined as those with approximately 80% or more of their work time devoted to STPI work.

b. Email communication from STPI Deputy Director Bill Brykczynski to CRS, March 2, 2020.

c. 42 U.S.C. 6686.

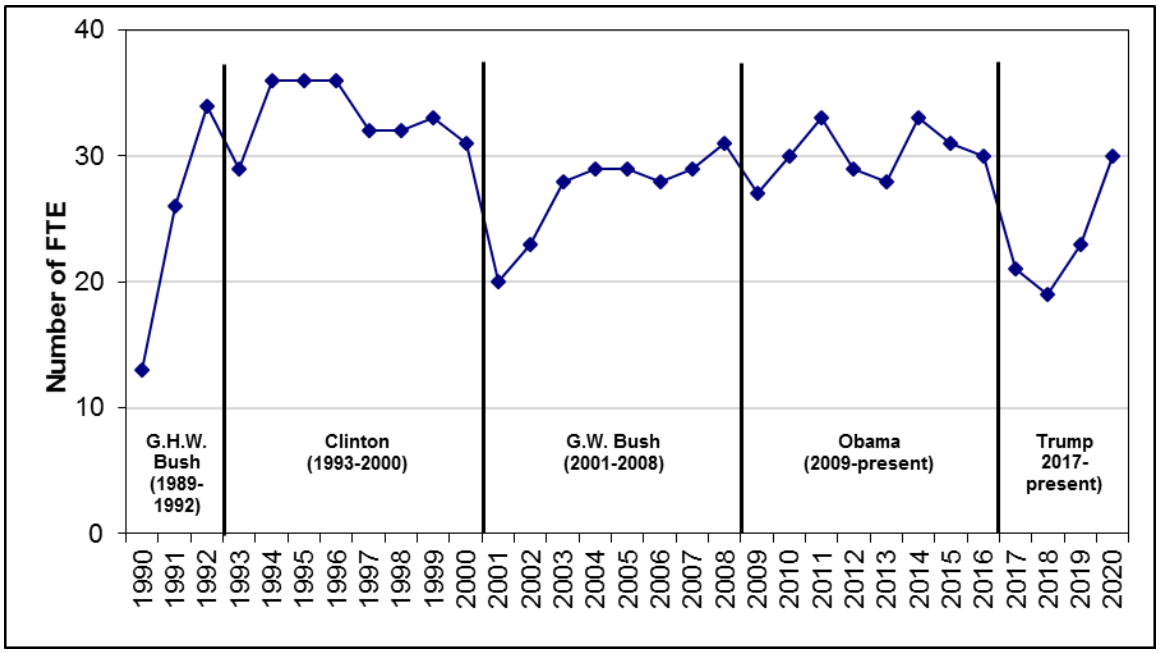
Figure 2. OSTP Funding, FY1990-FY2020



Sources: CRS analysis of data from OMB Public Budget Database, budget requests, and congressional appropriations acts and committee reports, FY1990-FY2021; PCAST funding data from the Department of Energy, emails from DOE to CRS and annual budget requests.

Notes: In FY2008, Congress directed NSF to transfer $2.240 million to OSTP for Science and Technology Policy Institute (STPI) (not shown). If the STPI funding were included, FY2008 funding for OSTP would be $7.424 million in current dollars. The data above includes funding for PCAST provided by DOE starting in FY2012.

Figure 3. OSTP Staffing, FY1990-FY2019 Actual, FY2020 Estimated



Sources: CRS analysis of data from OMB, *Budget of the United States Government*, Appendix, FY1992-FY2021. (Note that actual staffing numbers are provided two years later. For example, actual staffing for FY2018, comes from the FY2020 budget request.) The OMB did not provide this data for FY2001. CRS has estimated the number of FTEs for FY2001 based on information provided by OSTP. FY2020 figure is an estimated level.

Notes: Data reported are in full-time equivalents (FTE, the amount of effort from one full-time employee over one year) and may not equal number of staff. Data do not include staff or FTEs funded by agencies other than OSTP, such as detailees, IPAs, and fellows. Historical data includes full-time equivalent of holiday and overtime hours.

National Science and Technology Council

Overview and Structure

On November 23, 1993, President Clinton established the NSTC by Executive Order 12881.[32] The NSTC is composed of department and agency heads, as well as selected assistants and advisors to the President. Executive Order 12881 specifies that the APST is a member of the NSTC; the order does not include the OSTP Director in the NSTC membership. Nevertheless, OSTP has stated that Director Droegemeier exercises the NSTC management authority vested in the APST.[33]

The NSTC aims to coordinate science and technology policy across the federal government. According to the executive order, the NSTC has the following principal functions:

- coordinate the S&T policymaking process;
- ensure S&T policy decisions and programs are consistent with the President's stated goals;

[32] Executive Order 12881, "Establishment of the National Science and Technology Council," 58 *Federal Register* 62491-62492, November 23, 1993.

[33] Email communication from OSTP to CRS, May 24, 2019.

- help integrate the President's S&T policy agenda across the federal government;
- ensure science and technology are considered in development and implementation of federal policies and programs; and
- further international cooperation in science and technology.

In addition to these principal functions, the NSTC assists the OMB Director by recommending R&D budgets that reflect national goals and advising on agency R&D submissions.

The President chairs the NSTC; in the President's absence, the Vice President or the APST serves as chair.[34] In practice, the NSTC rarely meets with the President or Cabinet-level officials present. Rather, OSTP staff and detailees implement NSTC activities in conjunction with federal agency staff.

Under President Trump, the NSTC has six committees: Science; Technology; Science and Technology (S&T) Enterprise; Science, Technology, Engineering, and Math (STEM) Education; Homeland and National Security; and Environment. In addition, there is a Select Committee on Artificial Intelligence and a Joint Committee on Research Environment.[35] For a description of each, see **Table 1**. Each NSTC committee has subcommittees, interagency working groups, and/or taskforces focused on specialized topics. The members of these committees and subcommittees are generally not Cabinet officials, but instead lower-ranking staff.

In some cases, Congress has charged the NSTC with specific statutory responsibilities. Congress mandated the NSTC to coordinate federal activities on ocean acidification[36] and to develop an implementation plan for a coordinated national research program on the role of the oceans in human health and report annually on these activities.[37] Congress also directed the NSTC to oversee the planning, management, and coordination of the National Nanotechnology Program and report annually on these activities.[38] In addition, Congress directed the OSTP Director to establish an NSTC committee responsible for coordinating federal programs and activities in support of STEM education,[39] to establish a committee responsible for planning and coordinating federal programs and activities in advanced manufacturing research and development,[40] to establish a working group responsible for coordinating federal science agency research and policies related to the dissemination and long-term stewardship of the results of unclassified research,[41] and to use the NSTC to annually identify and prioritize deficiencies in federal research facilities and major instrumentation.[42]

In other cases, the NSTC may be assigned responsibilities to meet non-specific congressional mandates. For example, the America COMPETES Act (P.L. 110-69) directs the establishment of a President's Council on Innovation and Competitiveness (codified at 15 U.S.C. 3718). The act states that the council is to include the Secretary or head of a number of federal agencies, OSTP,

[34] According to OSTP, Dr. Droegemeier chairs the NSTC though he does not hold the APST position.

[35] Email communication from OSTP to CRS, May 2, 2019.

[36] P.L. 111-11, "The Omnibus Public Land Management Act of 2009," §12403.

[37] P.L. 108-447, Division B, Title IX, "Oceans and Human Health Act," §902.

[38] P.L. 108-153, §2, "21st Century Nanotechnology Research and Development Act." The act refers to a National Nanotechnology Program, but the broader effort is generally referred to in the executive branch as the National Nanotechnology Initiative or NNI.

[39] P.L. 111-358, "America COMPETES Reauthorization Act of 2010," §101.

[40] P.L. 111-358, "America COMPETES Reauthorization Act of 2010," §102.

[41] P.L. 111-358, "America COMPETES Reauthorization Act of 2010," §103.

[42] P.L. 110-69, "America COMPETES Act," §1007.

and OMB. Congress provided the President with the option of establishing a new organization to serve as the Council on Innovation and Competitiveness or to designate an existing council to carry out the requirement. Rather than establish a new, independent council, President George W. Bush assigned the role of the President's Council on Innovation and Competitiveness to the NSTC Committee on Technology (CoT).[43] According to OSTP, the NSTC CoT continues to serve in this capacity.[44]

Budget and Staffing

The NSTC receives no direct appropriations. Instead, the participating agencies provide funding that the NSTC uses to coordinate multi-agency programs. The amount provided varies and has ranged from approximately $12 million to $18 million from FY2010 to FY2018; funding was $17.1 million in FY2018. This interagency funding includes support for NSTC activities that benefit multiple federal entities, such as coordination offices, studies, advisory committees, and administrative costs, but excludes infrastructure contributions from OSTP and funding for NSTC activities that are solely within a single agency. Agency contributions to NSTC activities that did not require transfer of funds included:

- $8.1 million for the work of the Subcommittee on Global Change Research, for the "U.S. Global Change Research Program National Coordination Office; advice from the National Academies of Science, Engineering and Medicine, including review of Program documents; support for coordination for international research activities; support for U.S. scientist (non-Federal) participation in international science assessments; and minor costs to the National Aeronautics and Space Administration to administer the program";
- $3.9 million for National Coordination Office for Networking and Information Technology R&D activities, including "provision of technical expertise, planning, and coordination support to the NITRD Subcommittee and its interagency groups"; and
- $3.0 million for the staff and activities of the National Nanotechnology Coordination Office of the Nanoscale Science, Engineering, and Technology Subcommittee, which coordinates the federal government's multiagency nanoscale R&D programs associated with the National Nanotechnology Initiative (NNI).

In addition to the funding for the three subcommittees described above, member agencies spent approximately $1,890,000 for NSTC activities in FY2018, including costs for reports, workshops/conferences, and surveys conducted on behalf of the NSTC.

NSTC staff are assigned by their agencies. The number of NSTC assignees has varied from 5 to 21 in prior years, and was 17 in FY2018.[45]

[43] Memorandum of the President of the United States, "Designation of the Committee on Technology of the National Science and Technology Council to Carry Out Certain Requirements of the America COMPETES Act," 73 *Federal Register* 20523, April 10, 2008.

[44] Email communication from OSTP to CRS, September 18, 2019.

[45] OSTP, "FY2018 Interagency Funding for Activities of the National Science and Technology Council," provided by email from OSTP to CRS, February 14, 2020. This report is known informally as the "Pass the Hat" report.

Table 1. National Science and Technology Council Committees Under President Trump

Committee	Description
Committee on Science	The Committee on Science coordinates interagency work related to biological sciences, quantum information science, and physical sciences. Current focus areas include; coordinating high energy physics and fusion energy science research; cultivating a better understanding of low-dose radiation biology; ensuring that the results of federally funded research are accessible to the public, industry, and scientific community in a useful form; and advancing quantum information science. Subcommittees and Interagency Working Groups under this committee include: Open Science Subcommittee; Physical Sciences Subcommittee; Biological Sciences Subcommittee; and Quantum Information Science Subcommittee.
Committee on Technology	The Committee on Technology coordinates interagency work on national technology matters, including advanced manufacturing and materials, artificial intelligence, and nanotechnology. Current focus areas also include managing federal AI research, advancing U.S. leadership in nanotechnology, and expanding the advanced manufacturing domestic supply chain. Subcommittees and Interagency Working Groups under this committee include Advanced Manufacturing Subcommittee, Nanotechnology Subcommittee, Machine Learning and AI Subcommittee, and Materials Genome Initiative Subcommittee.
Committee on S&T Enterprise	The Committee on S&T Enterprise was formed in response to the charge of the OMB-OSTP FY2019 R&D Budget Priorities memorandum to increase efficiency across federal R&D efforts. Current focus areas include expanding technology transfer; strengthening contributions of federal scientific collections to areas of national interest like infectious diseases, biosecurity, and food security; and coordinating policies and strategy around R&D infrastructure investments to support the national innovation base. Subcommittees and Interagency Working Groups under this committee include Lab-to-Market Subcommittee, R&D Infrastructure Subcommittee, Scientific Collection IWG, Networking IT R&D (NITRD) Subcommittee, and International S&T.
Committee on STEM Education	The Committee on STEM Education coordinates interagency investments in STEM education and develops the strategic plan that sets national goals for STEM education efforts across the federal government. Current focus areas include: expanding school-business partnerships, work-based learning, and the skilled technical workforce, as well as increasing equity in STEM for underrepresented groups. Subcommittees and Interagency Working Groups under this committee include Federal Coordination in STEM Education Subcommittee, Strategic Partnerships IWG, Computation Thinking IWG, Convergence IWG, Diversity and Inclusion in STEM IWG, and Transparency and Accountability IWG.

Committee	Description
Committee on Homeland and National Security	The Committee on Homeland and National Security coordinates interagency work related to biological and nuclear defense R&D, critical infrastructure security and resilience, cybersecurity, and other areas. Current focus areas include supporting implementation of the Critical Minerals strategy in response to Executive Order 13817 on critical mineral supply chains, coordinating priorities/processes related to Earth-impacting NEOs, divestment and utilization of astronomical sensors/systems, and safety of space operations, and R&D to support U.S. resilience against natural and technology hazards. Subcommittees and Interagency Working Groups under this committee include Biodefense R&D Subcommittee; Nuclear Defense R&D Subcommittee; Special Cyber Ops Subcommittee; Resilience S&T Subcommittee; Critical Minerals Subcommittee; Economic Security Implications on Quantum Subcommittee; Space Weather, Security, and Hazards Subcommittee; and Space Weather IWG.
Committee on Environment	The Committee on Environment coordinates interagency work related to polar research, earth observations, ocean sciences, and other areas. Current focus areas include improving ocean mapping, coordinating R&D on harmful algal blooms and hypoxia, developing a national aquaculture strategy, and coordinating research operations and activities for civil earth observations. Subcommittees and Interagency Working Groups under this committee include: Interagency Arctic Research Policy Subcommittee, Aquaculture Subcommittee, U.S. Group on Earth Observations Subcommittee, Global Change Research Subcommittee, Ocean Science Subcommittee, Harmful Algal Blooms and Hypoxia IWG, Ocean Acidification IWG, Ocean Observations IWG, and Ocean and Coastal Mapping IWG.
Select Committee on Artificial Intelligence	The Select Committee on Artificial Intelligence (AI) coordinates federal R&D efforts related to AI and advises the White House on interagency AI R&D priorities to promote U.S. leadership AI. President Trump tasked the Select Committee on AI to coordinate portions of Executive Order 13859, Maintaining American Leadership in Artificial Intelligence. Current focus areas include prioritization and promotion of AI R&D, leveraging federal data and computing resources for the AI community, and training an AI-ready workforce.
Joint Committee on Research Environment	The Joint Committee on Research Environment brings together the NSTC Committee on Science and the Committee on S&T Enterprise to coordinate interagency work related to improving the safety, integrity, and productivity of research settings. Subcommittees and Interagency Working Groups under this committee include Reducing Administrative Burdens Subcommittee, Rigor and Integrity Subcommittee, Research Security Subcommittee, and Safe and Inclusive Research Environments Subcommittee.

Source: OSTP, "NSTC," https://www.whitehouse.gov/ostp/nstc/.

President's Council of Advisors on Science and Technology

Overview and Structure

President George H. W. Bush created the President's Council of Advisors on Science and Technology (PCAST) in 1990.[46] Presidents Clinton, George W. Bush, and Obama reestablished slightly different versions of PCAST during their Administrations.[47] President Trump reestablished PCAST with Executive Order 13895 on October 22, 2019, for a period of two years, unless extended by the President.[48]

PCAST is an advisory board composed of individuals and representatives from sectors outside the federal government with diverse perspectives and expertise. PCAST advises the President, on science, technology, education, and innovation policy. In addition, PCAST responds to requests for advice from the National Science and Technology Council. PCAST's members are to include the Director of OSTP and as many as 16 distinguished individuals from outside the federal government. Members are to have "diverse perspectives and expertise in science, technology, education, and innovation," and are typically drawn from industry, academia, and research institutions.[49] Under Executive Order 13895, the Director of OSTP chairs PCAST.[50]

Also on October 22, 2019, President Trump appointed seven members of PCAST.

Executive Order 13895 provides PCAST a broad remit:

> The PCAST shall advise the President on matters involving science, technology, education, and innovation policy. The Council shall also provide the President with scientific and technical information that is needed to inform public policy relating to the American economy, the American worker, national and homeland security, and other topics.[51]

Under the provisions of Executive Order 13895, PCAST also serves as two statutorily created advisory committees: the President's Innovation and Technology Advisory Committee (PITAC) created by the High Performance Computing Act of 1991 (P.L. 102-194 as amended)[52] and the

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[46] Executive Order 12700, "President's Council of Advisors on Science and Technology," 55 *Federal Register* 2219, January 23, 1990.

[47] Clinton Administration: Executive Order 12882, "President's Committee of Advisors on Science and Technology," 58 *Federal Register* 62492-62493, November 26, 2003; George W. Bush Administration: Executive Order 13226, "President's Council of Advisors on Science and Technology," 66 *Federal Register* 50523-50524, October 3, 2001; Obama Administration: Executive Order 13539, "President's Council of Advisors on Science and Technology," 75 *Federal Register* 21973-21975, April 27, 2010.

[48] Executive Order 13895, "President's Council of Advisors on Science and Technology," 84 *Federal Register* 57309, October 22, 2019, https://www.federalregister.gov/documents/2019/10/25/2019-23525/presidents-council-of-advisors-on-science-and-technology.

[49] Ibid.

[50] According to OSTP, Dr. Droegemeier co-chairs PCAST, though he does not hold the title of APST. (Email communication from OSTP to CRS, May 24, 2019.)

[51] Executive Order 13895, "President's Council of Advisors on Science and Technology," 84 Federal Register 57309, October 22, 2019.

[52] In October 2005, President Bush issued Executive Order 13385 designating PCAST to serve as the President's Information Technology Advisory Committee (PITAC) under subsections 101(b) and 103(b) of the High-Performance Computing Act of 1991 (P.L. 102-194), as amended (15 U.S.C. 5511(b) and 5513(b)). In April 2010, President Obama issued Executive Order 13539 which, among other things, changed the name of the advisory committee to the President's Innovation and Technology Advisory Committee (which also uses the acronym PITAC) and continues PCAST's role in fulfilling this statutory function.

National Nanotechnology Advisory Panel (NNAP) created by the 21st Century Nanotechnology Research and Development Act (P.L. 108-153).

Executive Order 13895 directs the Department of Energy to "provide such funding and administrative and technical support as the PCAST may require."[53] OSTP exercises policy and programmatic oversight of PCAST through the OSTP Director and PCAST's staff, whose physical office location remains at OSTP.[54]

Budget and Staffing

The PCAST receives no direct appropriations. The OSTP provided funding and support for PCAST through FY2011. In FY2012, the DOE Office of Science assumed this responsibility. According to DOE, it provides support for PCAST staff salary and benefits, travel by committee members, meeting planning support, and other related expenses. Annual funding requested by DOE for PCAST has been under $1 million and has supported up to two FTEs. In FY2020, DOE funding for PCAST is an estimated $812,000. **Table 2** provides information on DOE appropriations for PCAST for FY2012 through the FY2020 request.

Table 2. DOE Funding for PCAST

($ in millions)

Fiscal Year	Appropriated
2012	0.615
2013	0.217
2014	0.654
2015	0.751
2016	0.541
2017	0.230
2018	0.048
2019	0.048
2020 (estimated)	0.812

Source: Communication between CRS and Department of Energy Office of Congressional and Intergovernmental Affairs; Department of Energy budget justifications.

[53] Executive Order 13895, "President's Council of Advisors on Science and Technology," 84 Federal Register 57309, October 22, 2019.

[54] Email communication from OSTP to CRS, May 2, 2019.

Issues and Options for Congress

Certain recurring issues have raised interest among congressional policymakers regarding science and technology policy within the White House. These issues include the titles, roles, and responsibilities of the President's science advisor; the number and policy foci of OSTP Associate Directors; OSTP funding and staffing levels; the participation of OSTP and NSTC in federal agency coordination, priority-setting, and budget allocation; and the stature and influence of PCAST. The following sections address each of these issues.

Title, Rank, Roles, and Responsibilities

Under President Obama, John Holdren served as both OSTP Director and Assistant to the President for Science and Technology (APST). In contrast, under President Trump, Kelvin Droegemeier holds only the title of OSTP Director, as with John Marburger under President George W. Bush.[55] Some experts in the S&T community have proposed that the OSTP Director *always* be given the title of APST or be given Cabinet rank. A related issue is whether the roles and responsibilities of the OSTP Director should be undertaken by several appointees rather than one. To a large extent, the appointment of an advisor to a particular position or title arises from presidential discretion. This presidential discretion may limit the ability of Congress to require greater or lesser degrees of access to the President and other key Administration decisionmakers.

Title and Rank

As shown in **Appendix A**, presidential science advisors have held a variety of titles since the Franklin D. Roosevelt Administration. Of the 14 Administrations reviewed, the most common title has been some variation of Science Advisor to the President (five Administrations), followed by Special Assistant to the President (four Administrations). The OSTP Director held the title of APST in the Obama, George H. W. Bush, and Clinton Administrations but not in the Trump or George W. Bush Administration.[56] The difference between an individual being the OSTP Director and the APST is more than semantic. This section outlines some of the policy issues related to whether the OSTP Director is also designated APST or has Cabinet rank.

Congressional Testimony

Some Members of Congress may wish to have the option to require the individual serving as the President's science advisor to give testimony on OSTP or science and technology policy issues. Others may not place great emphasis on overseeing the role of OSTP Director or APST and may have other sources from which they can obtain S&T analysis and information.

Congress expects that an executive branch official who administers a department or agency established by law will testify before it. This contrasts with an individual whose sole responsibility is to advise the President. Some presidential advisors, such as the OSTP Director, are in units of the EOP established by law and are also subject to confirmation by the Senate.

[55] At no time have the positions of OSTP Director and APST been filled by different people.

[56] Executive Order 13539, signed by President Obama, specifically designates that the Assistant to the President for Science and Technology shall serve as a co-chair of PCAST, along with one or two of the nonfederal members of PCAST. Executive Order 13226, signed by President George W. Bush, stated that the President would designate a "Federal Government official" to serve as a member and co-chair of PCAST. President Bush's designated co-chair was John Marburger, his OSTP Director.

Accordingly, Congress often asks OSTP Directors to testify before it. The executive branch has previously asserted that close presidential advisors are immune from compelled congressional testimony. That position, however, has been rejected by various congressional committees and by the only court to directly address the question.[57] Some members of the S&T community contend that Congress should permit an individual serving as APST to discriminate between privileged advice to the President that should not be disclosed to Congress and information appropriate to disclose to Congress.[58] If Congress desires to ensure the availability of the APST for testimony, it might opt to establish the position of APST by statute and require Senate confirmation. Some experts have expressed concern regarding confusion that might arise if Congress could require some Administration staff with "Assistant to the President" titles to testify, but not others.[59] Others have suggested that this might not be an effective approach since, even if such a position were established by statute, a President might opt not to nominate someone for that position or possibly appoint someone to a similarly titled position that does not exist in statute.

Cabinet Rank

Some members of the S&T community have expressed their desire for the OSTP Director to have a greater role and influence in the development of Administration policy. They assert that statutorily designating the OSTP Director as a Cabinet-level position would provide such an enhanced role and influence. In their view, the President would identify an individual nominated for the Cabinet-level OSTP Director position at the same time as other Cabinet members, shortly after the election of a new Administration. If also appointed to serve as APST, the individual could begin work immediately, though exercise of the duties of OSTP Director, with its enhanced stature, would have to await formal nomination and Senate confirmation.[60] If appointed early in a new Administration, some experts in the S&T community contend, the individual filling the APST position could help identify and recruit the best scientists, engineers, health professionals, and other public policy professionals for the S&T policy-related presidential appointments.

Additionally, some contend that an APST/OSTP Director with Cabinet rank would have greater access to the President and other senior Administration staff.[61] They assert that Cabinet rank would enhance the OSTP Director's authority and influence in incorporating scientific and technical viewpoints into Administration decisionmaking. Others contend that the issue of Cabinet rank for the APST/OSTP Director status would be unlikely to substantially improve the APST/OSTP Director's role and influence in EOP activities, including Cabinet meetings.[62]

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[57] Louis Fisher, "White House Aides Testifying Before Congress," *Presidential Studies Quarterly*, vol. 27, Winter 1997, pp. 140-141. CRS Legal Sidebar LSB10301, *Legislative Purpose and Adviser Immunity in Congressional Investigations*, by Todd Garvey.

[58] See, for example, Henry Kelly, Ivan Oelrich, Steven Aftergood, and Benn H. Tannenbaum, *Flying Blind: The Rise, Fall and Possible Resurrection of Science Policy Advice in the United States* (Washington, DC: Federation of American Scientists, 2004), http://www.fas.org/pubs/_docs/flying_blind.pdf.

[59] In an email from OSTP to CRS on January 24, 2012, OSTP stated that "As OSTP Director, Dr. Holdren signed a statement to the Senate Commerce committee prior to his confirmation hearing that he would be available to testify. No APST or OSTP Director/APST has declined to testify."

[60] National Academies, Committee on Science, Engineering, and Public Policy, *Science and Technology for America's Progress: Ensuring the Best Presidential Appointments in a New Administration* (Washington, DC: National Academy Press, 2008), http://www.nap.edu/catalog.php?record_id=12481.

[61] National Academies, Committee on Science, Engineering, and Public Policy, *Science and Technology for America's Progress: Ensuring the Best Presidential Appointments in a New Administration* (Washington, DC: National Academy Press, 2008), http://www.nap.edu/catalog.php?record_id=12481.

[62] Based on CRS discussions with Stanley Sokul, George W. Bush Administration Chief of Staff, OSTP, August 14,

From a historical perspective, some experts believe that Presidents and their science advisors have unique and idiosyncratic relationships. To these experts, a more important question is how an Administration manages and uses the extensive infrastructure of expert S&T advice that supports all aspects of federal decisionmaking.[63] Scientists, engineers, and S&T policy professionals—both within and outside of the federal government—play a substantial role in providing S&T input to federal policy decisionmaking in areas such as R&D, regulation, procurement, and standards development.

Other experts assert that the organization of the White House determines the S&T advisor's status and access. According to this perspective, if the President relies primarily on a group of White House staff members for advice, the advisor should be the APST. Conversely, if the Cabinet is the primary source of advice, then the science advisor should be made a member of the Cabinet. From this perspective, the title itself is less important than the access to the President that it provides.[64] Other critics contend that rather than focusing on the title, the S&T community should instead focus on the degree to which an Administration is transparent about its operations.[65]

Roles and Responsibilities

As discussed above, historically OSTP Directors have advised Presidents on S&T policy formulation, R&D budget issues, the policy significance of scientific and technical developments, and STEM education, among other issues. When holding the APST title, the OSTP Director manages the NSTC and co-chairs PCAST.[66] In addition, OSTP Directors can serve as a communication conduit between the EOP and the federal and nonfederal S&T community.

One alternative for Congress is to change the current statutory structure and duties of OSTP, separating the various OSTP roles and responsibilities and establishing separate positions and/or organizations for each. For example, the S&T community has debated the utility of having two different individuals serve as APST and OSTP Director. While some believe having two people in these roles might enhance the ability and potential of an APST to be part of the President's inner circle, others believe the potential for conflict between the two is high.[67]

Similarly, some members of the S&T community have suggested that the President appoint co-equal officials, one responsible for science policy and the other for technology policy. Shortly after assuming office, President Obama created the new title of Chief Technology Officer within the EOP and provided it funding through OSTP. The first Chief Technology Officer was also the Associate Director of OSTP for Technology.[68] Subsequent Obama Administration Chief Technology Officers did not hold an Associate Director position. In April 2019, President Trump

2008.

[63] Roger Pielke Jr., "Who Has the Ear of the President?," *Nature*, 450:347-348, November 15, 2007, http://www.nature.com/nature/journal/v450/n7168/full/450347a.html.

[64] National Academies, *Science and Technology Advice in the White House: Recommendations for President-Elect George Bush* (Washington, DC: National Academy Press, 1988).

[65] For a discussion of this issue, see David Goldston, "US Election: Not the Best Advice," *Nature*, 455:453, September 24, 2008, http://www.nature.com/news/2008/080924/full/455453a.html.

[66] President George W. Bush's OSTP Director managed the NSTC and co-chaired PCAST even in the absence of a joint appointment as APST.

[67] National Academies, Committee on Science, Engineering, and Public Policy, *Science and Technology in the National Interest: Ensuring the Best Presidential and Federal Advisory Committee Science and Technology Appointments* (Washington, DC: National Academy Press, 2005), http://www.nap.edu/catalog.php?record_id=11152.

[68] Aneesh Chopra was the first Chief Technology Officer. Todd Park succeeded him in 2012. Megan Smith succeeded Todd Park in 2014.

nominated Michael Kratsios to be an Associated Director of OSTP and designated him as the U.S. Chief Technology Officer. In August 2019, he was confirmed as an Associate Director.

In March 2014, in oral testimony OSTP Director Holdren stated that the Chief Technology Officer did not report to the OSTP Director.[69] Some S&T policy experts have expressed concern that bifurcation of authorities and responsibilities might create conflicts and a lack of integration.[70]

Splitting the functions of OSTP and assigning them to separate individuals or organizations might be challenging due to the size of OSTP's budget and staff.[71] For example, current resources might not effectively support two senior officials and their associated staffs. Congress might opt to increase funding and authorized staffing levels to support such a reorganization.

Number and Policy Foci of OSTP Associate Directors

Current statutory authority provides flexibility to the President with respect to the number of OSTP Associate Directors (up to four, each subject to Senate confirmation) and the scope of their areas of responsibility (entirely at the discretion of the President).[72] President Trump has only one Senate-confirmed Associate Director, but has established three Principal Assistant Director positions that do not require Senate confirmation. President Obama established four Associate Directors with responsibility for discrete policy areas: science; technology and innovation; national security and international affairs; and environment and energy. Under President George W. Bush there were two Associate Directors, one for science and one for technology.

Congress could opt to specify a fixed number of Associate Directors, and could assign some or all of them specific policy foci. Some Members of Congress have undertaken efforts in this regard. For example, the American Innovation and Competitiveness Act (P.L. 114-329) authorizes the President to designate one of the Associate Directors as the United States Chief Technology Officer. In its report (S.Rept. 110-124) on the Departments of Commerce and Justice, Science, and Related Agencies Appropriations Act, 2008 (S. 1745, 110th Congress), the Senate Committee on Appropriations recommended that OSTP create the position of Associate Director for Earth Science and Applications to coordinate all federal efforts to better understand and predict changes in the Earth's climate and oceans. The House-passed version of H.R. 5116 (111th Congress) would have required the OSTP Director to appoint an Associate Director to serve as the Coordinator for Societal Dimensions of Nanotechnology.

In addition, some members of the S&T community have proposed that one or more of the OSTP Associate Director positions should be a joint appointment to the National Economic Council (NEC), National Security Council (NSC), Domestic Policy Council (DPC), Office of Management and Budget and other high-level White House organizations. In this vein, President Trump appointed the OSTP Director and the Chief Technology Officer to the American Technology Council;[73] and appointed the OSTP Director to the National Space Council;[74]

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[69] Testimony of John Holdren, Director, Office of Science and Technology Policy, EOP, The White House, before the House Committee on Science, Space, and Technology, March 26, 2014.

[70] David Hatch, "Tech Czar Might Rule Policy Under Obama," *Congressional Daily*, September 10, 2008, http://www.nationaljournal.com/daily/tech-czar-might-rule-policy-under-obama-20080910.

[71] For more information, see "OSTP Budget and Staffing" below.

[72] 42 U.S.C. §6612.

[73] Executive Order 13794, "Establishment of the American Technology Council," 82 FR 20811 *Federal Register* 20811-20813, April 28, 2017.

[74] Executive Order 13803, "Reviving the National Space Council," 82 FR 31429 *Federal Register* 31429-31432, June

National Quantum Initiative Advisory Committee;[75] the National Council for the American Worker;[76] and as co-chair of the Ocean Policy Committee[77] President Obama appointed the OSTP Director and the Chief Technology Officer to the DPC;[78] made OSTP Director Holdren a member of the NEC by providing him with the APST title;[79] added the Chief Technology Officer as a member of the NEC; and issued Presidential Policy Directive 1 (PPD-1) stating that "When science and technology related issues are on the agenda, the NSC's regular attendees will include the Director of the Office of Science and Technology Policy."[80]

OSTP Budget and Staffing

The ability of OSTP to perform its statutory duties depends, in part, on the size of its budget and staff. **Figure 2** and **Figure 3**, above, illustrate OSTP's historical budget and staffing. Between FY1996 and FY2016, the budgets of Presidents Clinton, George W. Bush, and Obama included requests for the authorization of 32-40 full-time equivalent (FTE) positions while the actual number of OSTP-funded staff ranged from 20 to 33. The OSTP has used detailees and fellows to supplement its core staffing. Under President Trump, detailees, fellows, and IPAs account for more than half of total OSTP staff. During the George W. Bush Administration, detailees and fellows provided approximately half of OSTP's total staff; during the Clinton Administration, detailees and fellows accounted for approximately two-thirds of total OSTP staff; toward the end of the Obama Administration, detailees, fellows, and IPAs account for approximately two-thirds of total OSTP staff.

Some in the S&T community have expressed concerns that OSTP needs to have more career civil service professional staff and a larger budget.[81] In their view, additional career staff, who would continue to serve from one presidential Administration to the next, would help maintain institutional knowledge and provide a solid understanding of government operations. More career staff might also enable a new Administration to move more quickly on S&T policy issues and provide enhanced support to political appointees during presidential transitions. Reports

30, 2018.

[75] Executive Order 13885, "Establishing the National Quantum Initiative Advisory Committee," 84 FR 46873, *Federal Register* 46873-46874, September 5, 2019.

[76] Executive Order 13845, "Establishing the President's National Council for the American Worker," 83 FR 35099, *Federal Register* 35099-35103, July 19, 2018.

[77] Executive Order 13840, "Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States," 83 FR 29431, *Federal Register* 29431-29434, June 19, 2018.

[78] White House, *Further Amendments to Executive Order 12859, Establishment of the Domestic Policy Council*, February 5, 2009. For more information, see http://www.whitehouse.gov/the_press_office/Executive-OrderFurther-Amendments-To-Executive-Order-12859Establishment-Of-The-Domestic-Policy-Council/.

[79] White House, *Further Amendments to Executive Order 12835, Establishment of the National Economic Council*, February 5, 2009. For more information, see http://www.whitehouse.gov/the_press_office/Executive-Order-Further-Amendments-to-Executive-Order-12835-Establishment-of-the-National-Economic-Council/.

[80] Ibid.

[81] Henry Kelly, Ivan Oelrich, Steven Aftergood, and Benn H. Tannenbaum, *Flying Blind: The Rise, Fall and Possible Resurrection of Science Policy Advice in the United States* (Washington, DC: Federation of American Scientists, 2004), http://www.fas.org/pubs/_docs/flying_blind.pdf; and Jennifer Sue Bond, Mark Schaefer, David Rejeski, Rodney W. Nichols, *OSTP 2.0: Critical Upgrade: Enhancing Capacity for White House Science and Technology Policymaking: Recommendations for the Next President* (Washington, DC: Woodrow Wilson International Center for Scholars, June 2008).

expressing these views assert that this change would make OSTP staff similar to other EOP expert staff, such as those employed at OMB.[82]

Additional funding, these reports assert, would also provide OSTP with sufficient staff to conduct special analyses on emerging issues. Currently, such analyses are generally provided by OSTP's federally funded research and development center (FFRDC), the Science and Technology Policy Institute (STPI). (See "Science and Technology Policy Institute" box, above.)

Congress may wish to maintain the current staffing approach. Should Congress wish to enhance the funding and staffing of OSTP, it can do so through the appropriations process. The OSTP has requested $5.0 million for FY2021, $544,000 (9.8%) below the FY2020 enacted level of $5.5 million. For funding levels in previous years, see **Figure 2** and **Appendix B**. During the Obama Administration, funding ranged from $4.5 million (in FY2012) to $7.0 million (in FY2010).

OSTP and NSTC Participation in Federal Agency Coordination, Priority-Setting, and Budget Allocation

The OSTP and the NSTC participate in coordinating, setting priorities for, and allocating the budget for federal S&T activities. S&T policy organizations have suggested enhancing this participation. The following sections address OSTP interactions with other EOP offices and the science community, the role of the Director of OSTP, and the role of the NSTC.

OSTP Interactions with Other EOP Offices and the Science Community

Policy tensions and power struggles between OSTP and other EOP offices, and between OSTP and the science community are not new. During the George H. W. Bush Administration, tension existed between OSTP Director D. Allan Bromley and other high-ranking White House officials over the extent of Administration support for federal funding of commercial technology development.[83] In July 1981, George Keyworth, Reagan Administration OSTP Director, stirred controversy in the science community on his first speech to the American Association for the Advancement of Science (AAAS) by asserting that "Nowhere is it indicated that the OSTP or its director is to represent the interests of the scientific community as a constituency."[84] Carter Administration OSTP Director Frank Press battled the Council on Environmental Quality (CEQ), opposing the CEQ-advocated use of federal subsidies to the then-infant solar power industry and instead supporting a balance between market demand and scientific discovery.[85]

Role of OSTP Director

In the early 2000s a number of reports from the S&T community suggested that the OSTP Director should take a greater role in coordination, priority-setting, and budget allocation

[82] According to the FY2015 budget request, the OMB FY2014 budget was $89.3 million, which supported 470 full time equivalent staff. For more information, see http://www.whitehouse.gov/sites/default/files/docs/2015-eop-budget_03132014.pdf.

[83] Bob Davis, "White House, Reversing Policy Under Pressure, Begins to Pick High-Tech Winners and Losers," *Wall Street Journal*, May 13, 1991, p. A16; Bob Davis, "White House Tries to Distance Itself from Panel Report," *Wall Street Journal*, April 26, 1991, p. A16.

[84] Barbara J. Culliton, "Keyworth Gives First Speech," *Science*, July 7, 1981, pp. 183-184.

[85] David Dickson, *The New Politics of Science* (NY: Pantheon Books/Random House, Inc., 1984), pp. 37-38.

regarding the federal R&D budget;[86] energy;[87] STEM education;[88] international S&T policy;[89] and federal-state S&T policy.[90] Also at that time, some members of the S&T policy community suggested that the OSTP Director play a greater role in EOP policy bodies involved in priority-setting and budget allocation, such as the OMB, NEC, CEQ, DPC, and NSC.[91] If Congress wants the OSTP Director to play a greater role it could provide direction in report language or as a statutory responsibility (e.g., certification of priorities or budgets) for setting R&D priorities at the federal agencies, particularly for multi-agency and inter-agency activities.

Role of NSTC

Another recommendation found in these S&T community reports is to make the NSTC's authority equivalent to that of the NSC.[92] The NSTC, they assert, lacks the influence of NSC. The differences in statutory authority, staff, and budget are among the reasons cited for this disparity.

The NSTC has participated in presidential decision-making processes in different ways in different Administrations. For example, during the Clinton Administration, the NSTC issued six Presidential Review Directives (PRDs). The PRDs served as the basis for gathering information and policy options for the President. President Clinton then had this information available as he developed eight Presidential Decision Directives (PDDs) establishing new policy.[93] The NSTC has not developed PRDs or their equivalents since the end of the Clinton Administration.

Some experts in the S&T community suggest that the NSTC should issue formal directives rather than contributing input and deliberations into the policy documents of other entities. These experts argue that contributing input to and deliberating on other entity policy documents puts S&T and the NSTC in a supportive role. These experts assert that, in some situations, S&T input and ramifications should have a more prominent influence on public policy.[94]

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[86] Henry Kelly, Ivan Oelrich, Steven Aftergood, and Benn H. Tannenbaum, *Flying Blind: The Rise, Fall and Possible Resurrection of Science Policy Advice in the United States* (Washington, DC: Federation of American Scientists, 2004), http://www.fas.org/pubs/_docs/flying_blind.pdf.

[87] Former Senator Jeff Bingaman, "The Energy Challenge We Face and the Strategies We Need," The Karl Taylor Compton Lecture, Massachusetts Institute of Technology, April 25, 2008.

[88] National Science Board, *National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, and Mathematics Education System* (Ballston, VA: National Science Foundation, 2007), http://www.nsf.gov/nsb/documents/2007/stem_action.pdf.

[89] National Science Board, *International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise*, NSB 08-4 (Arlington, VA: National Science Foundation, 2008), http://www.nsf.gov/nsb/publications/2008/nsb084.pdf. Jennifer Sue Bond, Mark Schaefer, David Rejeski, Rodney W. Nichols, *OSTP 2.0: Critical Upgrade: Enhancing Capacity for White House Science and Technology Policymaking: Recommendations for the Next President* (Washington, DC: Woodrow Wilson International Center for Scholars, June 2008).

[90] Jennifer Sue Bond, Mark Schaefer, David Rejeski, Rodney W. Nichols, *OSTP 2.0: Critical Upgrade: Enhancing Capacity for White House Science and Technology Policymaking: Recommendations for the Next President* (Washington, DC: Woodrow Wilson International Center for Scholars, June 2008).

[91] Ibid.

[92] Henry Kelly, Ivan Oelrich, Steven Aftergood, and Benn H. Tannenbaum, *Flying Blind: The Rise, Fall and Possible Resurrection of Science Policy Advice in the United States* (Washington, DC: Federation of American Scientists, 2004) at http://www.fas.org/pubs/_docs/flying_blind.pdf.

[93] A list is available at http://www.fas.org/irp/offdocs/direct.htm.

[94] Henry Kelly, Ivan Oelrich, Steven Aftergood, and Benn H. Tannenbaum, *Flying Blind: The Rise, Fall and Possible Resurrection of Science Policy Advice in the United States* (Washington, DC: Federation of American Scientists, 2004) at http://www.fas.org/pubs/_docs/flying_blind.pdf.

In 2012, the Obama Administration asserted that it had undertaken efforts to revitalize and streamline the efforts of the NSTC. The Administration cited its establishment of a fifth NSTC committee—the Committee on Science, Technology, Engineering, and Math (STEM) Education—to coordinate federal programs and activities in support of STEM education. The Obama Administration stated that under President Obama NSTC committees met two or three times annually and each subcommittee met at least quarterly. The Obama Administration also asserted that it "oversaw the restructuring of the original NSTC committees, with elimination of interagency efforts, where appropriate, and initiation of new efforts, as indicated by Administration priorities and/or Congressional mandates."[95]

Under President Trump, there are six primary NSTC committees: S&T Enterprise, Environment, Homeland and National Security, Science, STEM Education, and Technology. In addition, there are two special committees: the Select Committee on Artificial Intelligence (AI) and the Joint Committee on Research Environments. The three NSTC Committees initiated under President Trump have the following responsibilities:

> The Committee on S&T Enterprise was formed in response to the charge of the OMB-OSTP FY2019 R&D Budget Priorities memo to increase efficiency across Federal R&D efforts. Current focus areas include expanding technology transfer, strengthening contributions of federal scientific collections to priority areas of national interest like infectious diseases, biosecurity, and food security, and coordinating policies and strategy around R&D infrastructure investments to support our national innovation base. [The Committee on S&T Enterprise has four subcommittees: Lab-to-Market, Research and Development Infrastructure, Networking and Information Technology Research and Development, and International Science and Technology.]...
>
> The Select Committee on AI, created in June 2018, advises the White House on interagency AI R&D priorities and improving the coordination of federal AI efforts to ensure continued U.S. leadership in this field. Members focus on policies to prioritize and promote AI R&D, leverage Federal data and computing resources for the AI community, and train the AI-ready workforce….
>
> Launched in May 2019, the Joint Committee on Research Environments (JCORE) brings together the NSTC Committee on Science and the Committee on S&T Enterprise to coordinate interagency work related to improving the safety, integrity, and productivity of research settings. [JCORE has four subcommittees: Reducing Administrative Burdens, Rigor and Integrity, Research Security, and Safe and Inclusive Research Environments.][96]

Options for Congress

Congress might choose to leave the roles of the OSTP Director and the NSTC in the budget process unchanged, might choose to increase their authorities, might choose to increase its oversight of their roles, or might do a combination of these.

Congress might mandate that OSTP review the S&T components of agency budgets prior to submission to OMB and empower OSTP to alter the distribution of funding between S&T priorities based on their relative importance. Such authority might increase the ability of OSTP to harmonize and coordinate S&T expenditures among federal agencies. Federal agencies might resist such a change in authority, as it might further complicate the budget development and submission process and create competition between OSTP and OMB directives. In addition, such

[95] Email from OSTP to CRS, January 24, 2012.

[96] The White House, NSTC website, "NSTC," https://www.whitehouse.gov/ostp/nstc/.

a mandate might have unintended consequences. For example, agencies might not choose to identify S&T-related programs to evade the mandate.

Congress might require that NSTC or OSTP review the S&T components of agency budgets to assess the correspondence between NSTC multi-agency R&D strategies and proposed federal investments. A hallmark of multi-agency R&D investment is the need to coordinate the magnitude and mission goals of agency investments in order to achieve broader federal R&D goals. Such a review might increase transparency regarding progress towards these broader federal R&D goals, but it might also require increases in expenditures. Identifying cross-cutting funding and efforts might require dedicated program offices and staff to track and report on multi-agency activities.

Congress might choose to formalize the NSTC structure and organization and provide additional funding and personnel to increase the robustness of its process. Providing statutory underpinnings for the NSTC might enable Congress to obtain greater insight into the activities of the NSTC through reporting requirements and oversight of its activities. Alternatively, Congress could mandate that the OSTP Director provide regular reports on the activities of the NSTC. The extent to which such mandatory reporting might occur without a statutory authorization of the NSTC is unclear.

Stature and Influence of PCAST

As discussed above, the role of PCAST is to advise the President on science, technology, and innovation-related issues. PCAST's members are to include individuals from industry, education and research institutions, and other organizations outside the federal government.

Legislative activity has focused less on PCAST than on the NSTC. In a 2008 report, some experts in the S&T policy community asserted that the stature and influence of PCAST had declined as PCAST focused on a narrower set of issues less likely to garner presidential interest.[97] These experts noted that although President George H. W. Bush held the first PCAST meeting at Camp David and participated in PCAST meetings, Presidents Clinton and George W. Bush only met occasionally for short periods of time with PCAST chair or committee members. During the Obama Administration, the PCAST co-chairs met with President Obama and senior EOP officials several times for focused discussions on specific topics that PCAST should undertake for its studies, updates on studies in progress, briefings on completed studies prior to public release, and actions the President could consider in response to PCAST's recommendations.[98] As of May 2019, President Trump has not appointed any PCAST members.

As a federal advisory committee, PCAST is unusual in that Executive Order 13539 directs that it is to be co-chaired by the APST and one of its members, as opposed to having an independent chair not directly associated with the Administration. Federal advisory committees generally do not have Administration staff as chairs. Administration staff are more commonly included as ex-officio members.[99] The designation of the APST as co-chair may reduce PCAST's ability to

[97] Center for the Study of the Presidency, Study Group on Presidential Science and Technology Personnel Advisory Assets, "*Presidential Leadership to Ensure Science and Technology in Service of National Needs: A Report to the 2008 Candidates*," Summer 2008.

[98] Email communication from OSTP to CRS, January 24, 2012.

[99] For example, the Director of the National Science Foundation is an ex-officio member of the National Science Board and the charter of the National Science Advisory Board for Biosecurity allows for non-voting ex-officio representatives of the Executive Office of the President and a number of federal agencies and entities. For more information, see CRS Report R40520, *Federal Advisory Committees: An Overview*, by Wendy Ginsberg (out of print; available to

provide independent thinking to the White House and may place the APST in an awkward position if PCAST members disagree with White House policy. Alternatively, PCAST recommendations may be more likely to be acted upon if the co-chair role of the APST helps to inform PCAST deliberations of Administration perspectives.

Some S&T policy organizations have suggested strengthening PCAST by broadening its mandate, explicitly including national and homeland security issues within its remit, enhancing its independence, and increasing its staff significantly.[100] Other suggestions include selecting the chair of PCAST solely from its non-Administration members; appointing members to staggered, overlapping terms unrelated to presidential and congressional election cycles; and providing all members with security clearances. President Obama authorized the APST to

> request that members of the PCAST, its standing subcommittees, or ad hoc groups who do not hold a current clearance for access to classified information, receive security clearance and access determinations pursuant to Executive Order 12968 of August 2, 1995, as amended, or any successor order.[101]

In 2012, OSTP asserted that most of the PCAST members had obtained security clearances so that PCAST could undertake studies related to national security.[102]

Some experts in the S&T community have also suggested increasing the number of presidential advisory committees. For example, they propose advisory committees focused on specific S&T policy issues, such as a Federal-State Science and Technology Council to enhance dialogue with the states, particularly on STEM education.[103] The costs of establishing such new advisory committees may pose a challenge to their creation. In addition, requirements of the Federal Advisory Committee Act (P.L. 92-463) regarding justification of any new advisory committee, its membership, and associated ethics rules (including financial disclosure) may complicate the establishment of new committees and the recruitment of committee members. As noted above, PCAST has taken on the responsibilities of several topic-specific advisory committees established in statute.

If Congress wanted the President to establish additional presidential advisory committees—either to address areas not currently covered by PCAST or to address issues currently covered by PCAST but with separate committees focused on a particular area (e.g., nanotechnology, networking and information technology)—it might opt to provide additional funding to OSTP expressly for this purpose.

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congressional clients from the author).

[100] See for example, Carnegie Commission on Science, Technology, and Government, *Science & Technology and the President* (New York: Carnegie Corporation of New York, October 1988); Henry Kelly, Ivan Oelrich, Steven Aftergood, and Benn H. Tannenbaum, *Flying Blind: The Rise, Fall and Possible Resurrection of Science Policy Advice in the United States* (Washington, DC: Federation of American Scientists, 2004); and Center for the Study of the Presidency, Study Group on Presidential Science and Technology Personnel Advisory Assets, *Presidential Leadership to Ensure Science and Technology in Service of National Needs: A Report to the 2008 Candidates*, Summer 2008.

[101] Executive Order 13539, "President's Council of Advisors on Science and Technology," April 21, 2010, http://www.gpo.gov/fdsys/pkg/FR-2010-04-27/pdf/2010-9796.pdf.

[102] Email communication from OSTP to CRS, January 24, 2012.

[103] Jennifer Sue Bond, Mark Schaefer, David Rejeski, Rodney W. Nichols, *OSTP 2.0: Critical Upgrade: Enhancing Capacity for White House Science and Technology Policymaking: Recommendations for the Next President* (Washington, DC: Woodrow Wilson International Center for Scholars, June 2008); and Center for the Study of the Presidency, Study Group on Presidential Science and Technology Personnel Advisory Assets, *Presidential Leadership to Ensure Science and Technology in Service of National Needs: A Report to the 2008 Candidates*, Summer 2008.

In 2012, OSTP asserted that during the Obama Administration PCAST had met six times per year compared to three or four times per year during the George W. Bush Administration. In addition, OSTP asserted in 2012 that PCAST had "met with every major Administration leader in science and technology, including Cabinet-level Secretaries, to gather their views on the topics most useful for PCAST to address, and to discuss implementation of PCAST's recommendations."[104]

In addition, OSTP has stated that the Obama Administration provided PCAST with the staff and financial resources necessary to develop reports in a timely fashion for Congress and the Administration. These resources, according to OSTP at the time, increased the ability of PCAST to provide reports and recommendations. PCAST released 18 reports during the George W. Bush Administration; under the Obama Administration, PCAST released 36 reports.[105] PCAST has not published any reports during the Trump Administration.

[104] Ibid.

[105] https://obamawhitehouse.archives.gov/administration/eop/ostp/pcast/docsreports.

Appendix A. President's Science and Technology Policy Advisors

Table A-1. President's Science and Technology Policy Advisors and Predecessor Organizations to OSTP, NSTC, and PCAST, 1941-Present

President	Advisors with Title(s) (Years in Office)	Executive Office of the President Agency (Year Established)	Interagency Coordination Organization[a] (Year Established)	Advisory Committee (Year Established)
F.D. Roosevelt	**Vannevar Bush**[b] (1941-1945), Director, Office of Scientific Research and Development	Office of Scientific Research and Development (OSRD; 1941)		Science Advisory Board (1933)
Truman	**John Steelman**[b] (1946-1947), Special Assistant to the President (1945-1946); Assistant to the President (1946-1953); Chairman, The President's Scientific Research Board (1946-1947) **Oliver Buckley**[b] (1951-1952), Chair, Science Advisory Committee (SAC) **Lee DuBridge**[b] (1952-1953), Chair, SAC		The President's Scientific Research Board (1946-1947);[c] Interdepartmental Committee for Scientific Research (1947)[c]	Science Advisory Committee (SAC) of the Office of Defense Mobilization (1946)[c]
Eisenhower	**Lee DuBridge**[b] (1953-1956), Chair, SAC; Science Advisor to the President **Isidor I. Rabi**[b] (1956-1957), Chair, SAC; Science Advisor to the President **James Killian Jr.** (1957-1959), Special Assistant to the President for Science and Technology; Chair, President's Science Advisory Committee (PSAC) **George Kistiakowsky** (1959-1961), Special Assistant to the President for Science and Technology; Chair, PSAC	Office of the Special Assistant to the President for Science and Technology (1957)	Federal Council for Science and Technology (FCST) (1959)	SAC (1953-56); President's Science Advisory Committee (PSAC; 1957, replaced SAC).

President	Advisors with Title(s) (Years in Office)	Executive Office of the President Agency (Year Established)	Interagency Coordination Organization[a] (Year Established)	Advisory Committee (Year Established)
Kennedy	**Jerome Wiesner** (1961-1963), Special Assistant to the President for Science and Technology; Director, OST; Chair, FCST; Chair, PSAC	Office of Science and Technology (OST; 1962)	FCST	PSAC
Johnson	**Jerome Wiesner** (1963-1964), Special Assistant to the President for Science and Technology; Director, OST; Chair, FCST; Chair, PSAC **Donald Hornig** (1964-1969), Special Assistant to the President for Science and Technology; Director, OST; Chair, FCST: Chair, PSAC	OST	FCST	PSAC
Nixon[d]	**Lee DuBridge** (1969-1970), Science Advisor to the President; Director, OST **Edward David Jr**. (1970-1973), Science Advisor to the President; Director, OST **H. Guyford Stever** (1973-1974), Science Advisor to the President; Chair, FCST	OST (until 1973, when office abolished)[d]	FCST	PSAC (until 1973, when member resignations were accepted and no new appointments were made).
Ford	**H. Guyford Stever** (1974-1977); Science Advisor to the President; Director, Office of Science and Technology Policy (OSTP)	Office of Science and Technology Policy (1976)	Federal Coordinating Council for Science, Engineering, and Technology (FCCSET; 1976, replaced FCST)	Intergovernmental Science, Engineering, and Technology Panel (ISETAP; 1976);[e] President's Council on Science and Technology (PCST; 1976)
Carter	**Frank Press** (1977-1981); Science and Technology Advisor to the President; Director, OSTP; Chair, FCCSET	OSTP	FCCSET dissolved as statutory entity and reestablished under an executive order (1978)	PCST (until 1978, abolished with its functions transferred to President by executive order); ISETAP (until 1978, dissolved as statutory entity and reestablished under an executive order)
Reagan	**George Keyworth II** (1981-1985), Science Advisor to the President; Director, OSTP **William R. Graham** (1986-1989), Science Advisor to the President; Director, OSTP	OSTP	FCCSET	White House Science Council (1982; reports to Science Advisor, not President; established by Science Advisor, not executive order)

President	Advisors with Title(s) (Years in Office)	Executive Office of the President Agency (Year Established)	Interagency Coordination Organization[a] (Year Established)	Advisory Committee (Year Established)
G.H.W. Bush	**D. Allan Bromley** (1989-1993), Assistant to the President for Science and Technology; Director, OSTP; Chair, PCAST	OSTP	FCCSET	President's Council of Advisors on Science and Technology (PCAST; 1990)
Clinton	**John Gibbons** (1993-1998), Assistant to the President for Science and Technology; Director, OSTP; Co-Chair, PCAST **Neal Lane** (1998-2001), Assistant to the President for Science and Technology; Director, OSTP; Co-Chair, PCAST	OSTP	National Science and Technology Council (NSTC; 1993)	President's Committee of Advisors on Science and Technology (PCAST; 1993)
G.W. Bush	**John Marburger, III** (2001-2009), Science Advisor to the President; Director, OSTP; Co-Chair, PCAST	OSTP	NSTC	President's Council of Advisors on Science and Technology (PCAST; 2001)
Obama	**John P. Holdren** (2009-2017), Assistant to the President for Science and Technology; Director, OSTP; Co-Chair, PCAST	OSTP	NSTC	President's Council of Advisors on Science and Technology (Reestablished; 2010)
Trump	**Kelvin Droegemeier**, Science Advisor to the President; Director, OSTP; Co-Chair, PCAST	OSTP	NSTC	President's Council of Advisors on Science and Technology (Extended/reestablished; 2017)

Sources: Congressional Research Service, based on information from the following sources: Public Papers of the Presidents (Washington, DC: GPO) with the following volumes were used as references: Dwight D. Eisenhower (1957, 1960); Lyndon B. Johnson (1962, 1966, 1967); Richard M. Nixon (1969, 1970, 1973), Gerald Ford (1976-1977), Jimmy Carter (1977, 1978), Ronald Reagan (1981, 1983, 1986), and George H. W. Bush (1989); Jeffrey K. Stine, "A History of Science Policy in the United States, 1940-1985," Report for the House Committee on Science and Technology Task Force on Science Policy, 99th Congress, 2nd session, Committee Print (Washington, DC: GPO, 1986), available at http://ia341018.us.archive.org/2/items/historyofscience00unit/historyofscience00unit.pdf; William T. Golden (ed.), *Science Advice to the President* (New York: Pergamon Press, 1979); William G. Wells, "Science Advice and the Presidency: 1933-1976," Dissertation, School of Government and Business Administration (Washington, DC: George Washington University, 1977); OSTP, "Previous Science Advisors," website at http://www.whitehouse.gov/administration/eop/ostp/about/leadershipstaff/previous; Truman Library at http://www.trumanlibrary.org/hstpaper/steelman.htm; "Lee Alvin DuBridge (Part II) (1901-1993), Interviewed by Judith R. Goodstein," Oral History, February 20, 1981, California Institute of Technology Archives at http://oralhistories.library.caltech.edu/68/01/OH_DuBridge_2.pdf; Nixon Presidential Library Archives, Officials of Administration at http://nixon.archives.gov/thelife/apolitician/thepresident/officialsofadministration.php; John T. Woolley and Gerhard Peters, The American Presidency Project [online], Santa Barbara, CA: University of California (hosted), Gerhard Peters (database) at http://www.presidency.ucsb.edu/; National Archives, "Records of the Office of Science and Technology," web page at http://www.archives.gov/research/guide-fed-records/groups/359.html. Other sources include Executive Order 9912, "Establishing the Interdepartmental Committee on Scientific Research and Development," 12 *Federal Register* 8799, December 27, 1947, at http://www.presidency.ucsb.edu/ws/index.php?pid=60725; Executive Order 9913, "Terminating the Office of Scientific Research and

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Notes: The science advisors may have additional titles not represented in this table. In recent times, the hierarchy of assistants to the President within the White House Office is as follows, going from high to low: Assistant to the President, Deputy Assistant to the President, Special Assistant to the President. (Source: Martha Joynt Kumar—Director, White House Transition Project and Emeritus and Professor, Department of Political Science, Towson University, "Assistants to the President at 18 Months: White House Turnover Among the Highest Ranking Staff and Positions," October 2, 2018, http://www.whitehousetransitionproject.org/wp-content/uploads/2018/10/Kumar_Assistants_to_the_President_Turnover_10-02-2018.pdf, and 3 U.S.C. 105.)

a. Prior to the designation of any individual to serve as the President's science and technology advisor, President Theodore Roosevelt appointed the Committee on the Organization of Scientific Work to assess the central organization of government scientific bureaus (agencies) with a focus on eliminating duplication.

b. Opinions differ on who is the first presidential science advisor. The OSTP website states that Oliver Buckley was the first science advisor; it does not include either Vannevar Bush or John Steelman in its list of presidential science advisors (source: OSTP, "Previous Science Advisors," http://www.whitehouse.gov/administration/eop/ostp/about/leadershipstaff/previous, accessed February 2, 2015). Others believe the latter two individuals were presidential science advisors as well. As OSRD Director, Vannevar Bush, submitted a report, *Science: The Endless Frontier*, to the President Franklin Roosevelt Administration that is the foundation for today's federal S&T policy. President Truman asked that John Steelman, as Director of War Mobilization and Reconversion in the EOP, chair a Presidential Scientific Research Board that was to make recommendations on how to enhance coordination and efficiency of federal R&D. Once this report was released, President Truman asked Steelman, a Presidential Assistant, to act as a liaison between the President and the newly formed Interdepartmental Committee on Scientific Research and Development. Buckley, Lee DuBridge, and Isidor Rabi were all Chairs of the Science Advisory Committee and as such, were given the title of Presidential science advisors. For more discussion of this issue, see "Oral History Interview with William T. Golden" at http://www.trumanlibrary.org/oralhist/goldenw.htm.

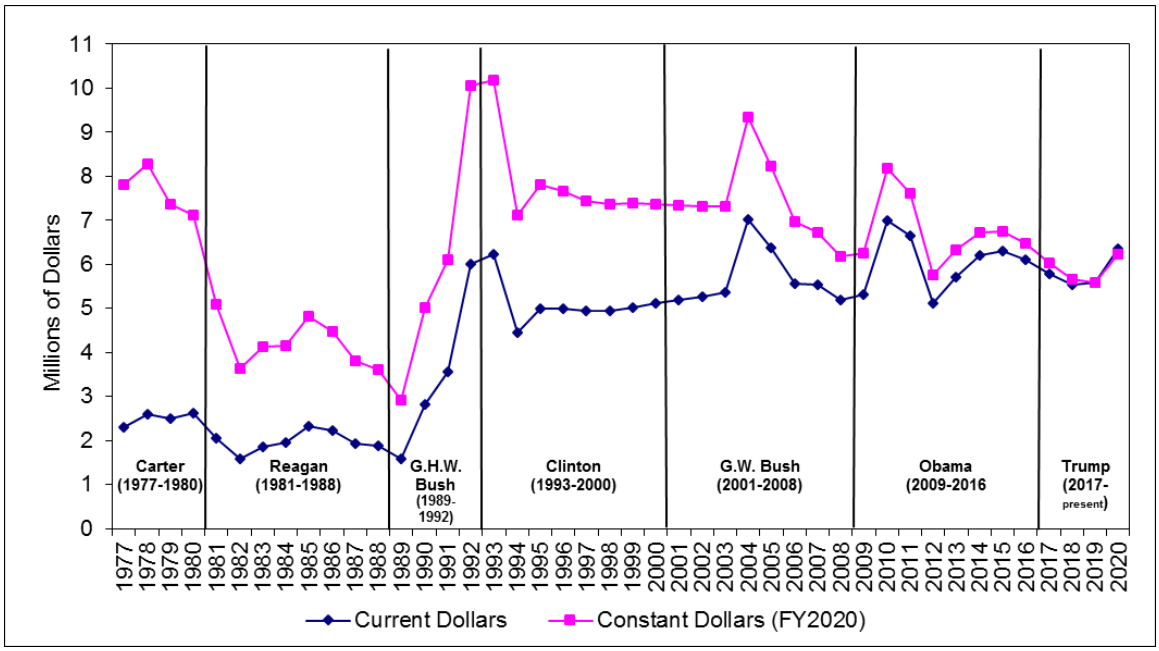
c. For an understanding of the charges to the different scientific advisory boards and committees, see "Letter to the Chairman, Science Advisory Committee" at http://trumanlibrary.org/publicpapers/viewpapers.php?pid=301; executive order establishing the President's Scientific Research Board, available at http://www.trumanlibrary.org/executiveorders/index.php?pid=467; and the Interdepartmental Committee for Scientific Research, available at http://www.trumanlibrary.org/publicpapers/index.php?pid=1847&st=&st1=.

d. On January 26, 1973, as part of a reorganization plan, the Office of Science and Technology within the Executive Office of the President was abolished. All of its duties, including that of Science Advisor, were transferred to the National Science Foundation (NSF). As a result, the NSF Director became the Science Advisor. For more details, see http://www.presidency.ucsb.edu/ws/index.php?pid=3819&st=&stl=.

e. ISETAP members included the OSTP Director, NSF Director, and state, local, and regional officials.

Appendix B. Historical OSTP Funding

Figure B-1. OSTP Funding, FY1977-FY2020



Sources: Congressional Research Service. Data from OMB Public Budget Database; budget requests; and congressional appropriations acts and committee reports, FY1977-FY2021; PCAST funding data from the Department of Energy, email communications with CRS and annual budget justifications.

Notes: In FY2008, Congress directed NSF to transfer $2.240 million to OSTP for Science and Technology Policy Institute (STPI) (not shown). If the STPI funding were included, FY2008 funding for OSTP would be $7.424 million in current dollars. The data above includes in funding for PCAST provided by the Department of Energy starting in FY2012. Funding in FY2013 is post-sequestration.

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