Activities of the Office of Government Relations

Karen Saxe

This quarterly column offers information on different facets of the American Mathematical Society Office of Government Relations (OGR) portfolio and activities.

Introduction

I write regularly (mostly in my blog `https://blogs.ams.org/capitalcurrents`) about annual appropriations for the National Science Foundation (NSF) and about NSF policies that might affect you. But, what *is* the NSF? When did it come to be? Why? What makes it different from all other federal agencies? Is it possible for a mathematician to get a position working at the NSF? If so, how?

A Brief History of the National Science Foundation

The NSF is the major source of federal funding for mathematics research done at colleges and universities in the United States. Overall, the NSF funds about 24 percent of all federally funded basic research done at colleges and universities; it is over 64 percent in the mathematical sciences. The Department of Defense, National Institutes of Health, and Department of Energy are other significant funders of mathematics research.[1] Money ("appropriations") for these agencies is allocated each year, and making the case for our country's continued and strengthened investment in basic research is part of the advocacy work of the AMS.[2]

The NSF is only one of several executive branch agencies that funds scientific research. The NSF is unique, as it is the *only* agency of the federal government that is

- devoted to supporting basic research and education across all scientific and engineering fields without a mission guiding its choices of projects to fund, and
- without any "in-house" labs.

In other words, the NSF program officers determine which proposals to fund based on potential, and there are no scientists employed doing research at the NSF.

Though the NSF is relatively young, the importance of investment in science has been recognized as long as our country has existed. On January 8, 1790, President Washington, in his first Annual Message to Congress (now the State of the Union Address), asserted "… there is nothing which can better deserve your patronage, than the promotion of Science and Literature. Knowledge is in every country the surest basis of publick happiness."[3]

Karen Saxe is associate executive director of the AMS and director of the Office of Government Relations. Her email address is `kxs@ams.org`.

[1] `https://www.ams.org/journals/notices/201904/rnoti-p576.pdf`

DOI: https://dx.doi.org/10.1090/noti1988

[2] `https://www.ams.org/government/dc-budgetprimer`

[3] `https://www.mountvernon.org/education/primary-sources/state-of-the-union-address`

He spoke about several science-related topics in that address (e.g., establishing a standard for weights). At his request, Congress passed an act in 1790 that led to our current Patent and Trademark Office. This can be considered the first congressional action on science policy.

Prior to the Civil War, public health, agriculture, and geography were the central scientific interests of politicians. As just one example, President Jefferson commissioned Lewis and Clark's famous expedition. In 1862 President Lincoln's Morrill Act established the land-grant university system focusing on agricultural research. Military concerns rose in importance during the Civil War. Concerns about food safety, public health, and environmental conservation re-emerged with increased interest in the early twentieth century.

In 1884 the Senate took up the question of how the federal government might interact with science (should they fund it, get advice from scientists, etc.). The Allison Commission (named for Senator William Boyd Allison of Iowa, who led this examination) considered establishing a federal department of science (and a national university, which had also been suggested by President Washington in that very first State of the Union Address[4]), but this department did not come to be. However, several science agencies were established between the Civil War and World War I. For example, the Weather Bureau (now called the National Weather Service) was established in a law signed by President Grant in 1870, and in 1906 President Theodore Roosevelt signed into law the Pure Food and Drug Act, establishing what we now call the Food and Drug Administration.

During the 1940s the Senate continued to discuss the role of the federal government in science and vice versa. During this period, President Franklin Roosevelt commissioned a report by his science advisor, Vannevar Bush. This now famous report—*Science, the Endless Frontier*—gave a vision for how the federal government might interact with science and technology and led directly to the NSF's establishment.[5] The report came out in 1945, and after five more years of congressional visioning and compromise, President Truman signed the law establishing the NSF on May 10, 1950.

That law directs the NSF "to initiate and support basic scientific research in the mathematical, physical, medical, biological, engineering, and other sciences, by making contracts or other arrangements (including grants, loans, and other forms of assistance)." The point about what fields would be funded was part of the debate during the five years of congressional discussion just alluded to. In particular, the question of whether or not to fund social sciences was discussed but not resolved at that time. Social science investments are now permitted, but their inclusion is regularly under scrutiny in Congress. Supporting mathematics was in the original law, which required that four divisions be set up, including one in "mathematical, physical, and engineering sciences."

This has been a very brief version of the complex history of how the federal government supports science (e.g., the Morrill Act) and how science supports the government (e.g., weather information used for military purposes).[6]

The NSF Today

The NSF is a relatively small—in terms of the size of its budget—federal agency. However, it is very important in advancing scientific research and education in the broadest terms. Today, the NSF

- has an annual budget of $8.1 billion (FY 2019);
- distributes 93 percent of this money to researchers across the country;
- supports "disciplinary" research through seven directorates;[7] and
- supports further research through interdisciplinary programs, including the "Big Ideas."[8]

The NSF funds research in all fifty states at about 2,000 academic and other private and public institutions across the United States, supporting the research of 386,000 individuals. In 2018 the NSF received more than 48,000 research proposals; the overall success rate was about twenty-five percent that year. It funds a wide range of programs and projects, including oceanographic research vessels, the Louis Stokes Alliances for Minority Participation, the world's largest and highest power magnet lab, and the Mathematical Sciences Institutes.

Congress requires that the NSF keep the public apprised of the United States and international science and engineering enterprise. It collects data and publishes the *Science & Engineering Indicators*.[9] These reports give interesting statistics on education, research and development, the global marketplace, and public attitudes toward science. "The State of US Science and Engineering," summarizing indicators, will be released on January 15, 2020. In the meantime, you can look at thematic reports (on a particular topic), examine state comparisons, and lots more.

You Too Can Spend a Year or Two Working at the NSF

Of the roughly 2,100 employees, about 200 are "rotators" (there temporarily, typically on leave from an academic institution). The director of the NSF, currently Dr. France Córdova, is appointed by the president and confirmed by

[4] https://www.mountvernon.org/education/primary-sources/state-of-the-union-address

[5] https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm

[6] *The NSF has its own history page:* https://www.nsf.gov/about/history

[7] https://www.nsf.gov/about/research_areas.jsp

[8] https://blogs.ams.org/capitalcurrents/mathematical-sciences-and-the-nsf-big-ideas

[9] *The most recent report was published in 2018 and appears here:* https://nsf.gov/statistics/2018/nsb20181

the United States Senate. March 18, 2020, will be the last day of Dr. Córdova's six-year term. The president also appoints the deputy director and the twenty-four members of the National Science Board (NSB)[10]; Senate confirmation is required for the director and deputy director.

Most mathematicians who work at the NSF work in the Division of Mathematical Sciences (DMS).[11] Some work in the Education and Human Resources Directorate (EHR)[12] and, occasionally, in the Computer and Information Science and Engineering (CISE) Directorate, particularly in the Computing and Communication Foundations (CCF) Division. In addition to the above divisions and directorates, statisticians are employed in the NSF National Center for Science and Engineering Statistics (this is the group that publishes the *Indicator* reports described at the end of the last section).[13]

You can spend a year or two at the NSF as a "rotator."

"Rotator" is not a technical term; it is slang for an NSF employee in a non-permanent position. A rotator is a mathematician (or other scientist, engineer, or educator) who typically spends one or two years at the NSF and then returns to their home institution. Rotators make recommendations about which proposals to fund; influence new directions in the fields of science, engineering, and education; and support cutting-edge interdisciplinary research.

As a rotator living in the Washington, DC, area, you will learn about the rich and fascinating landscape of science funding. You will be able to interact with scientists from all fields, from all over the country, and engage in exciting events in the area, scientific and otherwise. This is a great way to serve the mathematics community and learn about the breadth of activities going on at the NSF.

To become a rotator in DMS, you need to have a PhD or equivalent training in a field of the mathematical sciences plus six years of successful post-PhD research.[14] Normally, rotators are of the academic rank of associate professor or higher, visit the NSF on unpaid leave from their home institution, and are paid by the NSF. Time is allotted to focus on their own research, and travel funds are available. Rotators have shared their experiences in the *Notices* and in *SIAM News*.[15] John B. Conway, in the *Notices* article, talks about how this experience is very good background for becoming a department head. He also points to the fact that in reading many research proposals, you become more familiar with work in your own area and, as well, see a breadth of topics and thus expand your mathematical knowledge. Rotators are expected to function effectively both within specific programs and as a member of crosscutting and interactive teams.

For rotator positions in DMS, there is no deadline or formal application process, and DMS is constantly recruiting rotators. If you or someone you know might be interested, you/they can contact a DMS program director or the division director (DD) communicating your/their interest.

If you want to do some online reading, you should know that the proper title for a rotator is "(temporary) program director."

Information about rotators at NSF: `https://www.nsf.gov/careers/rotator`.

Most recent job posting for rotators in DMS: `https://www.nsf.gov/pubs/2018/dms18001/dms18001.jsp`.

To view all open program director positions in all directorates: `https://www.nsf.gov/careers/openings/index.jsp?org=NSF&archived=false&pub_sub_type=ScienceEngineering&x=9&y=5`.

Closing Words

The NSF will celebrate its seventieth anniversary in 2020, and planning for celebratory activities is underway. Happy 70th, NSF!

The AMS Office of Government Relations writes a biweekly blog: `https://blogs.ams.org/capitalcurrents`.

Posts include timely information on activities in Congress that affect mathematicians and the broader science community, historical tidbits on federal science policy, and opportunities for engaging with Congress and other policymakers.

Karen Saxe

Credits

Author photo is courtesy of Macalester College/David Turner.

[10] `https://www.nsf.gov/nsb`

[11] *Current staff list for DMS:* `https://www.nsf.gov/staff/staff_list.jsp?org=DMS&from_org=DMS`

[12] *Current staff list for EHR:* `https://www.nsf.gov/staff/staff_list.jsp?org=EHR&from_org=EHR`

[13] `https://www.nsf.gov/statistics`

[14] *Qualifications to work in other divisions at the NSF are similar, but may vary a bit.*

[15] *See* `http://www.ams.org/notices/200506/comm-conway.pdf` *and* `https://sinews.siam.org/About-the-Author/ready-for-the-bigger-picture-become-a-program-director-at-nsf`