NSF Fiscal Year 2000 Budget Request

This article is the 27th in an annual series of reports outlining the president's request to Congress for the budget of the National Science Foundation. Last year's report appeared in the May 1998 issue of the Notices*, pages 616–618.*

On February 1, 1999, President Clinton sent to Congress his budget request for fiscal year 2000, which begins October 1, 1999. For the second year in a row the government is projecting a large surplus, which for FY 2000 comes to $117 billion. However, the budget request contains only modest increases for research and development (R&D). Under the terms of the request, federal funding for R&D would decline by 1%, mostly due to cuts in defense research. Civilian R&D, which would rise 3%, now comprises more than half of all federal spending on R&D. Funding for basic research would increase by 4%, and the budget for the primary funder of mathematical sciences research, the National Science Foundation (NSF), would rise by 5%. The administration's request is just one step in the budget process, and the numbers could look quite different when Congress actually appropriates funds.

The government has a surplus, and support for science is strong in the administration and Congress. Why then are the requested increases for R&D not larger? A number of factors come into play. One is that the Clinton administration has other, higher priorities for the use of the surplus, such as shoring up Social Security and Medicare. Another factor is the pressure caused by the spending caps that were enacted in 1997. In fact, as Richard M. Jones put it in the electronic newsletter *FYI*,[1] these caps are "proving to be impossible to follow." Last year Congress, unable to hold spending below the caps, did not manage to pass its traditional taxing and spending blueprint and ended up using funds from the surplus.

Further complicating the outlook for science funding are the increasing demands to quantify the return on government investment in science. The Government Performance and Results Act (GPRA), passed in 1993, called on all federal agencies to come up with specific goals and metrics for measuring progress toward those goals. Agencies like the NSF have been struggling with the question of how to formulate appropriate metrics to measure progress in basic research. These agencies have come under increasing pressure from Congress to provide proof, as stipulated by GPRA, that the research they are supporting has worthwhile benefits for the nation. In mid-February the National Academies of Science and Engineering and the Institute of Medicine released a new report by their Committee on Science, Engineering, and Public Policy entitled "Evaluating Federal Research Programs: Research and the Government Performance and Results Act".[2] This report recommends different forms of what it calls "expert review" to measure performance outcomes in R&D. The first performance results mandated by GPRA are due in March 2000.

Last year saw a change in the top position at the NSF, when Neal Lane left the Foundation to become science advisor to President Clinton. Lane's successor is Rita Colwell, a molecular biologist and former head of the University of Maryland Biotechnology Institute. Colwell is best known for saving lives in countries like Bangladesh by the observation that filtering water through sari cloth can eliminate cholera bacteria. Since coming to the NSF in August 1998 she has moved swiftly to put her stamp on the Foundation by establishing new programs, such as one that provides fellowships for graduate students and advanced undergraduates to assist schoolteachers with science and mathematics content in K–12 courses.

Colwell has also embraced the administration's new initiative in information technology, called IT^2, as the NSF's main priority for FY 2000. Of the NSF's requested increase of $181 million, $110 million is slated to go to IT^2. The NSF is the lead agency in this six-agency effort, for which the administration has requested a total of $366 million in additional funds. IT^2 grew out of a report issued

[1] FYI: The American Institute of Physics Bulletin of Science Policy News *is available by sending an e-mail message to* `fyi@aip.org`.

[2] *This report may be found on the Web at* `http://www.nap.edu/readingroom/books/gpra/`.

last year by the President's Information Technology Advisory Committee, which outlined the importance of information technology to the nation's economy and warned that support for research in this area was lagging.

For its part of IT^2, the NSF will use the requested increment of $110 million to support research on software systems, scalable information infrastructure, and high-end computing, as well as research on how information technologies influence society, the economy, and the work force. This part of the initiative will be centered in the NSF's Computer and Information Sciences and Engineering (CISE) Directorate and will be funded as a program separate from existing CISE programs. Another part of the IT^2 initiative focuses on the development of "terascale" computing systems, high-capacity systems that will allow researchers to address problems that are too large for systems currently available. This part of the initiative, amounting to $36 million, would be supported by funds in the NSF's Major Research Equipment program.

The other big priority for the NSF for FY 2000 is an initiative called Biocomplexity in the Environment. This multidisciplinary effort seeks to understand interdependencies among living organisms and their environments. The budget request calls for an increment of about $70 million for the NSF to support activities in connection with the biocomplexity initiative. Unlike the funds for IT^2, which are centered in the CISE Directorate, most of the funding for the biocomplexity initiative comes under the rubric of Integrative Activities and is not centered in a specific disciplinary directorate. As a result, the funds for the biocomplexity initiative are likely to be spread more widely around the NSF. Because some of the research involves computation, data analysis, and modeling, there are opportunities for mathematicians to take part in this initiative.

There are also opportunities for mathematicians to take part in IT^2. Nevertheless, the way that initiative was planned must have been a disappointment to the NSF's Division of Mathematical Sciences (DMS). Last year the NSF launched an ini-

Table 1: National Science Foundation (Millions of Dollars)

	1996 Actual	Change	1997 Actual	Change	1998 Actual	Change	1999 Plan	Change	2000 Request
(1) Mathematical Sciences Research Support	$ 87.7	5.9%	$ 92.9	0.7%	$ 93.6	7.8%	$ 100.9	4.4%	$ 105.3
(2) Other Research Support (Note a)	2381.0	2.8%	2447.2	4.5%	2557.2	10.8%	2834.3	5.3%	2983.7
(3) Education and Human Resources (Note b)	601.2	3.0%	619.1	2.3%	633.2	8.8%	689.1	3.2%	711.0
(4) Salaries and Expenses (Note c)	136.5	2.3%	139.6	1.5%	141.7	5.4%	149.3	3.5%	154.5
(5) Totals	3206.3	2.9%	3298.8	3.8%	3425.7	10.2%	3773.7	4.8%	3954.5
(6) (1) as a % of the sum of (1) and (2)	3.55%		3.66%		3.53%		3.44%		3.41%
(7) (1) as a % of (5)	2.73%		2.82%		2.73%		2.67%		2.66%

Note a: Support for research and related activities in areas other than the mathematical sciences. Includes scientific research facilities and instrumentation, and the Antarctic program. **Note b:** The programs in this category provide support in all fields, including the mathematical sciences. **Note c:** Administrative expenses of operating the Foundation, including the Office of Inspector General.

Table 2: Directorate for Mathematical and Physical Sciences (Millions of Dollars)

	1996		1997		1998		1999		2000	
	Actual	% of Total	Actual	% of Total	Actual	% of Total	Plan	% of Total	Request	% of Total
(1) Mathematical Sciences	$ 87.7	(13.3%)	$ 92.9	(13.4%)	$ 93.6	(13.6%)	$ 100.9	(13.7%)	$ 105.3	(14.0%)
(2) Astronomical Sciences	108.7	(16.5%)	113.5	(16.4%)	113.6	(16.5%)	118.8	(16.2%)	122.2	(16.2%)
(3) Physics	131.9	(20.0%)	138.6	(20.0%)	142.7	(20.8%)	162.5	(22.1%)	167.4	(22.2%)
(4) Chemistry	127.7	(19.3%)	133.7	(19.3%)	130.1	(18.9%)	135.6	(18.5%)	138.5	(18.4%)
(5) Materials Research	175.1	(26.5%)	185.0	(26.7%)	178.9	(26.0%)	186.6	(25.4%)	190.5	(25.3%)
(6) Office of Multidisciplinary Activities	29.5	(4.5%)	29.8	(4.3%)	28.3	(4.1%)	30.0	(4.1%)	30.0	(4.0%)
(7) Totals	660.5	(100%)	693.5	(100%)	687.2	(100%)	734.4	(100%)	754.0	(100%)

tiative called Knowledge and Distributed Intelligence (KDI), and DMS director D. J. Lewis was closely involved in its formulation. KDI was crafted in such a way that mathematics was a central player and its funds were available to all areas supported by the NSF. As it turned out, mathematicians did very well in competing for KDI funds. For FY 2000, KDI was transformed and expanded to become IT^2 and, in the process, went from being an NSF-wide effort to one that is centered in a single directorate. Indeed, the overall outlook for the DMS was much rosier last year, when the budget request contained a whopping 17.4% increase for the DMS. When the appropriation came through, the increase for the DMS for FY 1999 had been whittled down to 7.8%, which was still quite good.

For FY 2000, the DMS is starting out with a requested increase of just 4.4%. In fact, this is the largest percentage increase for any division within the Mathematical and Physical Sciences (MPS) Directorate. In addition, mathematics is mentioned in the MPS budget writeup for the second year in a row as an area of high priority. These signs of support for mathematics simply do not translate into many dollars, given that the budget request for MPS overall is just 2.7%. In fact, there is constraint on programs across the Foundation, with most receiving requested increases in the 2%–4% range. Of special concern in mathematics, where support for graduate students is meager compared to other disciplines, is the fact that the budget for the program overseeing the NSF Graduate Fellowships is set for a decrease of 5.4%. Another factor increasing the strain on the DMS budget is the continuing decline in support for mathematical sciences research at the agencies of the Department of Defense.[3] This has led some mathematicians who in the past received support from the defense agencies to send their proposals instead to the DMS.

An important activity of the DMS for the past couple of years has been the recompetition of the mathematics institutes it funds. According to the NSF budget request document, the two existing institutes—the Mathematical Sciences Research Institute in Berkeley and the Institute for Mathematics and its Applications at the University of Minnesota—will be joined by a third institute.The institutes are funded through the DMS account called Infrastructure Support, which is slated to receive a $3 million increase to $32 million for FY 2000. Another program under Infrastructure Support is VIGRE (Vertical Integration of Research and Education), which has a requested budget of $16 million for FY 2000. The decrease of $3 million in the VIGRE budget between 1999 and 2000 reflects the fact that there were two VIGRE competitions in 1999 and there will be only one in 2000. The DMS category Research Project Support, which oversees traditional grants to individual investigators and small groups, has a requested budget of $73.3 million, up from $71.9 million for fiscal 1999. This increase, amounting to just 1.9%, barely covers inflation.

For further information on the NSF Fiscal Year 2000 Budget Request, consult the Web site `http://www.nsf.gov/home/budget/start.htm`.

—Allyn Jackson

[3]*For information on support for mathematical sciences research across the federal government, see the article "Mathematical Sciences in the FY 2000 Budget" in this issue of the* Notices.

Table 3: 5-Year Compilation of the NSF Budget, 1994–2000 (Millions of Dollars)

	1994 Actual	1995 Actual	1996 Actual	1997 Actual	1998 Actual	1999 Plan	2000 Request	1994–1998 Change	1994–2000 Change
(1) Mathematical Sciences Research Support	$ 78.0	$ 85.3	$ 87.7	$ 92.9	$ 93.6	100.9	105.3	20.0%	35.0%
Constant Dollars	52.6	56.0	55.9	57.9	57.4			9.1%	
(2) Other Research Support	2212.8	2439.6	2381.0	2447.2	2557.2	2834.3	2983.7	15.6%	34.8%
Constant Dollars	1493.1	1600.8	1517.5	1524.7	1568.8			5.1%	
(3) Education and Human Resources	569.0	611.9	601.2	619.1	633.2	689.1	711.0	11.3%	25.0%
Constant Dollars	383.9	401.5	383.2	385.7	388.5			1.2%	
(4) Salaries and Expenses	127.4	133.5	136.5	139.6	141.7	149.3	154.5	11.2%	21.3%
Constant Dollars	86.0	87.6	87.0	87.0	86.9			1.0%	
(5) Totals	2987.2	3270.3	3206.3	3298.8	3425.7	3773.7	3954.5	14.7%	32.4%
Constant Dollars	2015.7	2145.9	2043.5	2055.3	2101.7			4.3%	

Current dollars are converted to constant dollars using the Consumer Price Index (based on prices during 1982–1984).