

NSF Fiscal Year 2004 Budget Request

This article is the 31st in a series of annual reports outlining the president's request to Congress for the budget of the National Science Foundation. Last year's report appeared in the May 2002 issue of the *Notices*, pages 566–9.

The past couple of years have seen a greatly improved budget outlook for the mathematical sciences at the National Science Foundation (NSF). Still, fiscal year 2003, which began on October 1, 2002, has turned out to be a difficult and frustrating budget cycle for the entire foundation, including the Division of Mathematical Sciences (DMS). The main problem was the congressional appropriations process, which should have been completed by the start of the fiscal year but which dragged on into March 2003. As a result, the Bush administration had to release the fiscal 2004 request in February 2003 without the fiscal 2003 appropriation numbers to serve as a baseline.

In fiscal year 2002 the NSF designated the mathematical sciences as a “priority area” and pledged to increase support for the field over the next several years. As a start the DMS received that year a hefty \$30 million increase, raising its budget by 25 percent over the fiscal 2001 level. The priority area activities were to grow in fiscal 2003, with funding for those activities provided not just to the DMS but to other NSF divisions to support interdisciplinary work involving the mathematical sciences. The fiscal year 2003 budget request also added an additional \$30 million to the DMS.

But a budget request is not an appropriation; the request must pass through Congress, which typically reworks the budget according to its own priorities before appropriating funds. As a result, the NSF appropriation often looks very different from the request. As the congressional appropriations process for fiscal 2003 dragged on through fall 2002 and winter 2003, government agencies had to survive on budgets set at fiscal year 2002 appropriated levels. The DMS was left in the frustrating position of knowing the priority area would receive an increase but not knowing how much it would be. Without that information the DMS could

not begin the work of negotiating with other divisions the joint funding of interdisciplinary proposals; interdisciplinary research is one of the centerpieces of the priority area, along with fundamental mathematical and statistical research and education.

Adding to the anxiety was a move within the Senate late last summer to reduce the requested \$30 million increase for the DMS to just \$10 million. The Senate bill also directed the NSF to produce a report about what had been accomplished with the increases for the mathematical sciences. Such a report seems rather premature, given that the priority area was so recently established. The Senate action “was a surprise to me,” said Samuel M. Rankin III, director of the AMS Washington office, because ordinarily Congress does not specify the budget of items at the level of the NSF disciplinary divisions. Rankin immediately rallied mathematicians around the country to write to their senators and discussed the situation with contacts on Capitol Hill. The crisis was soon defused, and the increase to mathematics was restored. Rankin said that he does not know what happened but speculated that the cause was personality conflicts rather than serious opposition to increasing funding for mathematics. “That’s why it was relatively easy to change,” he noted.

When the appropriations bill was finally passed by Congress in March 2003, the DMS kept intact almost all of the \$30 million increase that was requested; its budget went from \$151.5 million for fiscal 2002 to \$178.5 million for fiscal 2003. “We got what we wanted,” Rankin stated. The conference report for the appropriations bill specified the amounts for the DMS and the Division of Physics; again, it is unusual for Congress to be so specific about division budgets. After giving the

amount for the NSF's Mathematical and Physical Sciences directorate, the conference report states: "Of this amount, \$179,617,000 is for Mathematics programs and not less than \$222,169,000 is for Physical Science programs."¹ Mathematics and physics both did well; the amount appropriated for the Division of Physics represents a 13 percent increase. But the instruction to the NSF to produce a report about mathematics has not died. The conference report contains the following: "The Foundation is directed to provide, by August 31, 2003, a report which documents what has been accomplished as a result of the growth in mathematics research funding."

William Rundell, who began as DMS director in September 2002, went through this difficult period just as he was learning the ropes at the NSF. At the time of this writing, the DMS did not know exactly

how much of the fiscal year 2003 increase would be for the priority area activities. Furthermore, most of the other divisions in the NSF did not even know what their budgets would be. As a result, even after the appropriations bill had passed, the DMS was still stymied in its planning for the priority area. The timing is critical: If the funding targets for the priority area are not met, future funding could be in jeopardy. Rundell was clearly eager to get going. "We have to work hard to ensure that all possible opportunities are picked up," he said. "The good news is that life is incredibly interesting for the mathematical sciences. An incredible number of interactions are possible that hopefully down the line will pay off. But the short-term ramifications are complicated."

The mathematical sciences priority area focuses on three themes: fundamental mathematical and

¹ The amount for the DMS given here differs from that in the accompanying tables due to a small across-the-board cut made after the appropriations bill passed.

Table 1: National Science Foundation (Millions of Dollars)

	2000 Actual	Change	2001 Actual	Change	2002 Actual	Change	2003 Plan	Change	2004 Request
(1) Mathematical Sciences Research Support	\$ 106.0	14.5%	\$ 121.4	24.8%	\$ 151.5	17.8%	\$ 178.5	13.1%	\$ 201.9
(2) Other Research Support (Note a)	2978.9	13.1%	3370.2	6.2%	3579.8	12.5%	4026.5	2.0%	4106.8
(3) Education and Human Resources (Note b)	683.6	16.3%	795.4	8.9%	866.1	4.3%	903.0	3.9%	938.0
(4) Salaries and Expenses (Note c)	154.9	11.6%	172.9	2.1%	176.6	14.4%	202.0	16.1%	234.5
(5) Totals	\$3923.4	13.7%	\$4459.9	7.0%	\$4774.1	11.2%	\$5310.0	3.2%	\$5481.2
(6) (1) as a % of the Sum of (1) and (2)	3.44%		3.48%		4.06%		4.25%		4.69%
(7) (1) as a % of (5)	2.70%		2.72%		3.17%		3.36%		3.68%

Tables prepared by Notices staff.

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:** Support for education in all fields, including the mathematical sciences. Does not include funds collected through H1-B Nonimmigrant Petitioner receipts. **Note c:** Administrative expenses of operating the NSF, including the Office of the Inspector General.

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

	2000		2001		2002		2003		2004	
	Actual	% of Total	Actual	% of Total	Actual	% of Total	Plan	% of Total	Request	% of Total
(1) Mathematical Sciences	\$106.0	14.0%	\$121.4	14.2%	\$151.5	16.5%	\$ 178.5	17.3%	\$ 201.9	19.0%
(2) Astronomical Sciences	122.5	16.2%	148.7	17.4%	166.0	18.0%	*	-----	183.1	17.3%
(3) Physics	168.3	22.3%	187.5	22.0%	195.9	21.3%	\$ 220.7	21.3%	217.5	20.5%
(4) Chemistry	138.6	18.3%	154.3	18.1%	162.8	17.7%	*	-----	181.7	17.1%
(5) Materials Research	190.5	25.2%	209.7	24.5%	219.4	23.8%	*	-----	246.1	23.2%
(6) Office of Multidisciplinary Activities	29.9	4.0%	32.4	3.8%	24.8	2.7%	*	-----	31.0	2.9%
(7) Totals	\$755.9	100.0%	\$854.1	100.0%	\$920.4	100.0%	\$1034.4	100.0%	\$1061.3	100.0%

* Unavailable at press time.

statistical research, education and training in the mathematical sciences, and interdisciplinary research focused on selected areas. These areas are managing large data sets, assessing and modeling uncertainty, and modeling complex nonlinear systems. The mechanisms for supporting research in these areas include group research, interdisciplinary training programs, and partnerships with other federal agencies. The DMS has already begun supporting such research; for example, it has a program funding collaborative research between mathematics and the geosciences; a program called Computational and Algorithmic Representations of Geometric Objects (CARGO), jointly supported with an NSF computer science division and with the Defense Advanced Research Projects Agency; and a mathematical biology program jointly funded with the National Institute of General Medical Sciences. The mathematical sciences priority area is one of six such areas designated by the NSF; the other five are: Biocomplexity in the Environment, Information Technology Research, Nanoscale Science and Engineering, Human and Social Dynamics, and Workforce for the 21st Century.

The fiscal year 2004 budget request was released by the Bush administration on schedule in February 2003. However, at that point Congress had not yet passed the fiscal year 2003 budget. Ordinarily the appropriations from the previous fiscal year are used as a baseline for the budget request, but because those numbers were not known, the request uses the fiscal 2003 request as the baseline. When Congress passed the fiscal 2003 budget in March 2003, it raised the NSF budget from the requested level of \$5.0 billion to \$5.3 billion, a 10.4 percent increase over the fiscal year 2002

level. Once these budget numbers were known, the requested fiscal 2004 increase looked paltry; indeed, NSF would stand to gain just 3.2 percent under the terms of the request. Such a small increase would be at odds with an authorization bill passed by Congress in November 2002 that calls for doubling the NSF budget by 2007 (see "Bass Attends Signing of NSF Reauthorization," *Notices*, pages 380–1). To achieve the doubling, the NSF budget would have to grow by around 15 percent per year. Whether such large gains will materialize is unclear, but there seems to be ample support in the House and Senate to give the NSF a larger increase for fiscal year 2004.

"Overall, the prognosis for 2004 is good," said Rundell. Having the mathematical sciences as an NSF priority area has clearly been good for the DMS budget. Many in the mathematical community would prefer to see the money focused on core areas of mathematics, with less emphasis on interdisciplinary research and education. But, Rundell explained, "We got our request because of the priority area, including the increase for the core areas." Would the DMS have gotten such an increase in 2003 without the priority area? No one knows for sure. As Rundell stated, "I firmly believe that, without stressing the utility of the mathematical sciences in other disciplines and without our willingness to tackle what is becoming a national issue concerning the lack of a trained scientific work force, we would not have been successful over the past few years in increasing the DMS budget."

—Allyn Jackson

Table 3: Compilation of NSF Budget, 1996–2002 (Millions of Dollars)

	1998 Actual	1999 Actual	2000 Actual	2001 Actual	2002 Actual	2003 Plan	2004 Request	1998–2002 Change	1998–2004 Change
(1) Mathematical Sciences Research Support	\$ 93.6	\$ 100.7	\$ 106.0	\$ 121.4	\$ 151.5	\$ 178.5	\$ 201.9	61.9%	115.7%
<i>Constant Dollars</i>	57.4	60.4	61.6	68.5	84.2			46.7%	
(2) Other Research Support (Note a)	2557.2	2777.6	2978.9	3370.2	3579.8	4026.5	4106.8	40.0%	60.6%
<i>Constant Dollars</i>	1568.8	1667.2	1729.9	1903.0	1989.9			26.8%	
(3) Education and Human Resources (Note b)	633.2	662.5	683.6	795.4	866.1	903.0	938.0	36.8%	48.1%
<i>Constant Dollars</i>	388.5	397.7	397.0	449.1	481.4			23.9%	
(4) Salaries and Expenses (Note c)	141.7	149.5	154.9	172.9	176.6	202.0	234.5	24.6%	65.5%
<i>Constant Dollars</i>	86.9	89.7	89.9	97.6	98.2			13.0%	
(5) Totals	\$3425.7	\$3690.3	\$3923.4	\$4459.9	\$4774.1	\$5310.0	\$5481.2	39.4%	60.0%
<i>Constant Dollars</i>	2101.7	2215.1	2278.4	2518.3	2653.8			26.3%	

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

For Notes a, b, and c, see Table 1.