NSF Budget Request for Fiscal Year 2008

This article is the 35th 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 2006 issue of the *Notices*, pages 580–2.

After a disappointing outcome for the current fiscal year, National Science Foundation (NSF) support for mathematics research is slated to receive a boost for next year. In February 2007, President Bush sent to Congress his budget request for fiscal year 2008, which begins on October 1 this year. The request for the NSF contains an 8.5% increase for the Division of Mathematical Sciences (DMS), the main funder of academic mathematics research in the United States. This increase is comparable to the 8.7% increase for the NSF overall.

Fiscal year 2007 started in October 2006, but appropriations for most of the government had to wait not only until after the elections in November but until after the start of the new Congressional session. From October 2006 until mid-February 2007, most federal agencies were operating on continuing resolutions that kept their budgets at fiscal 2006 levels. In fact, the President's fiscal 2008 budget request arrived ten days before Congress finally passed appropriations bills for fiscal 2007. The appropriation for the NSF hewed closely to the president's original request and accorded the DMS only a meager 3.3% increase, about level with inflation. This small increase is all the more disappointing when one notes that the appropriation gave the NSF overall an increase of 4.8%.

According to an analysis by the American Association for the Advancement of Science (`http://www.aaas.org/spp/rd/`), the president's 2008 budget request mirrors the main priorities set by the Bush Administration, putting constraints on domestic spending and calling for increases for the military. These priorities can be seen in the request's treatment of research and development: funding for basic and applied research would fall

Table 1: National Science Foundation (Millions of Dollars)

	2004 Actual	Change	2005 Actual	Change	2006 Actual	Change	2007 Estimate*	Change	2008 Request
(1) Mathematical Sciences Research Support	$ 200.3	0.0%	$ 200.2	-0.3%	$ 199.5	3.3%	$ 206.0	8.5%	$ 223.5
(2) Other Research Support (Note a)	4277.0	-1.8%	4199.7	6.8%	4483.5	3.7%	4650.8	10.8%	5153.0
(3) Education and Human Resources (Note b)	944.1	-10.7%	843.5	-17.0%	700.3	13.8%	796.7	-5.8%	750.6
(4) Salaries and Expenses (Note c)	230.6	2.9%	237.3	10.6%	262.5	0.4%	263.6	14.6%	302.0
(5) Totals	$5652.0	-3.0%	$5480.8	3.0%	$5645.8	4.8%	$5917.2	8.7%	$6429.0
(6) (1) as a % of the sum of (1) and (2)	4.47%		4.55%		4.26%		4.24%		4.16%
(7) (1) as a % of (5)	3.54%		3.65%		3.53%		3.48%		3.48%

Tables prepared by Notices *staff. Totals may not add up due to rounding.* **Note a:** Support for research and related activities in areas other than the mathematical sciences. Includes scientific research facilities and instrumentation. **Note b:** Support for education in all fields, including the mathematical sciences. **Note c:** Administrative expenses of operating the NSF, including the National Science Board and the Office of the Inspector General. *Estimate of 2007 appropriation from the National Science Foundation and from the R and D Budget and Policy Program, American Association for the Advancement of Science.

2% across the government, while funding for development would rise 3%, mainly due to weapons development in the Department of Defense and spacecraft development at the National Aeronautics and Space Administration.

When it comes to basic research, the President's American Competitiveness Initiative (ACI) figures prominently in the fiscal 2008 request. The idea behind the ACI is that investments in research in physical sciences and engineering will spur innovations needed to keep the United States competitive in the global economy. The three agencies taking the lead on the ACI are the NSF, the Office of Science in the Department of Energy, and the National Institute of Standards and Technology. Each of these agencies is slated for a healthy increase in 2008. The ACI is the main reason for the substantial 9.0% requested increase for the NSF's Mathematical and Physical Sciences (MPS) directorate. The ACI was launched in fiscal 2007, and while it did not produce gains for the DMS in that year, it is one of the drivers behind the requested 8.5% increase for the division for fiscal 2008.

Samuel M. Rankin III, director of the AMS Washington Office, is optimistic that the increases for fiscal 2008 will be appropriated, partly because Congress is now controlled by the Democrats. He said that the Democrats are backing the idea of an innovation initiative more strongly than are the Republicans, despite President Bush pushing for the ACI since last year. "The Democratic leaders are very vocal about supporting innovation, especially [House speaker] Nancy Pelosi," Rankin remarked. The Democrats have also expressed concern over the fate of the NSF's Education and Human Resources (EHR) directorate, whose budget has sustained cuts in recent years. While the 2007 appropriation provided a substantial 13.8% increase to EHR, the 2008 request would bring the EHR budget below the 2005 level.

In fiscal 2008 the NSF will devote US$52 million to a new foundation-wide initiative called Cyber-enabled Discovery and Innovation (CDI). According

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

	2004		2005		2006		2007		2008	
	Actual	% of Total	Actual	% of Total	Actual	% of Total	Estimate*	% of Total	Request	% of Total
(1) Mathematical Sciences	$ 200.3	18.3%	$ 200.2	18.7%	$ 199.5	18.4%	$ 206.0	17.9%	$ 223.5	17.8%
(2) Astronomical Sciences	196.6	18.0%	195.1	18.2%	199.7	18.4%	215.0	18.7%	233.0	18.6%
(3) Physics	227.8	20.9%	224.9	21.0%	234.1	21.5%	249.0	21.6%	296.1	23.6%
(4) Chemistry	185.1	17.0%	179.3	16.8%	180.7	16.6%	191.0	16.6%	210.5	16.8%
(5) Materials Research	250.6	23.0%	240.1	22.4%	242.6	22.3%	257.0	22.4%	282.6	22.5%
(6) Office of Multidisciplinary Activities	31.1	2.8%	29.8	2.8%	29.9	2.7%	32.0	2.8%	34.4	2.7%
(7) Totals	$1091.6	100.0%	$1069.4	100.0%	$1086.6	100.0%	$1150.0	100.0%	$1253.0	100.0%

Table 3: Compilation of NSF Budget, 2002–2008 (Millions of Dollars)

	2002 Actual	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Estimate*	2008 Request	2002–2006 Change	2002–2008 Change
(1) Mathematical Sciences Research Support	$ 151.5	$ 178.8	$ 200.3	$ 200.2	$ 199.5	$ 206.0	$ 223.5	31.7%	47.5%
Constant Dollars	*84.2*	*97.2*	*106.0*	*102.5*	*99.0*			*17.6%*	
(2) Other Research Support (Note a)	3579.8	4054.7	4277.0	4199.7	4483.5	4650.8	5153.0	25.2%	43.9%
Constant Dollars	*1989.9*	*2203.6*	*2264.2*	*2150.4*	*2224.0*			*11.8%*	
(3) Education and Human Resources (Note b)	866.1	934.9	944.1	843.5	700.3	796.7	750.6	-19.1%	-13.3%
Constant Dollars	*481.4*	*508.1*	*499.8*	*431.9*	*347.4*			*-27.8%*	
(4) Salaries and Expenses (Note c)	176.6	201.0	230.6	237.3	262.5	263.6	302.0	48.6%	71.0%
Constant Dollars	*98.2*	*109.2*	*122.1*	*121.5*	*130.2*			*32.6%*	
(5) Totals	$4774.1	$5369.3	$5652.0	$5480.8	$5645.8	$5917.2	$6429.0	18.2%	34.7%
Constant Dollars	*2653.8*	*2918.1*	*2992.0*	*2806.3*	*2800.5*			*5.6%*	

Current dollars are converted to constant dollars using the Consumer Price Index (based on prices during 1982–84).
For Notes a, b, and c, see Table 1.

to the NSF budget request, the purpose of CDI is to develop "a new generation of computationally based discovery concepts and tools to deal with complex, data-rich, and interacting systems." (See the accompanying article about the CDI in this issue of the *Notices*.) DMS director Peter March said that the NSF is still working out the details of the funding mechanisms for the CDI, but he expects that a wide spectrum, from individual grants to large group grants, will be used. Under the terms of the request, the DMS would receive an increase of US$5.2 million to fund CDI activities. This amount represents 10% of the CDI funds for NSF overall, and 50% of the CDI funds for the MPS directorate. "So the DMS is playing in some sense a central role," March said.

Science Beyond Moore's Law (SBML) is another initiative in which the DMS is participating. The name of this MPS-based initiative refers to an empirical observation made in 1965 by Intel cofounder Gordon Moore, who predicted that the power of computing hardware would double approximately every eighteen months. This prediction has proven to be very accurate. However, such increases cannot continue forever; eventually one reaches physical limits in the number of transistors that can be packed onto a silicon chip. SBML will address the question of how to get around this limitation and to continue the upward trend of computing speed and power. "If you look at the algorithms marshaled to solve standard computational problems, the algorithmic speed-up has also been exponential, exactly paralleling Moore's law," March noted. "Developing the computational and algorithmic side of things in order to take advantage of new forms of computing is the way Science Beyond Moore's Law will play out in DMS." Under the terms of the 2008 request, the DMS would invest US$1.5 million in SBML.

In addition, the request calls for the DMS to spend US$1.0 million on discovery-based experiences for undergraduate students and to increase funding for research networks and for the mathematical sciences institutes by US$2.7 million. But the biggest share of the division's requested US$17.5 million increase—US$7.3 million, or just over 40% of the increase—would go into the core disciplinary programs: Algebra, Number Theory and Combinatorics; Analysis; Applied Mathematics; Computational Mathematics; Foundations; Geometric Analysis; Mathematical Biology; Probability; Statistics; and Topology.

While the requested increase for core areas of mathematics is encouraging, a perennial question arises: Will the emphasis on initiatives compromise the DMS investment in the core? March does not think so. "There is more than one priority at NSF as a whole, but in particular in DMS," he said. The division must hold fast to its basic mission of funding a wide spectrum of mathematics research—a mission that is more important than ever, as support for core mathematics research has declined greatly in other federal agencies. At the same time, March explained, "Mathematics and statistics have a lot to contribute to the whole scientific enterprise, and having healthy, appropriately funded research projects that cut across the boundaries of science and engineering is absolutely crucial. It's not 'either/or', it's 'both/and'. We have to have both. So the question is one of balance. How do you balance these priorities with a fixed budget?" Achieving such a balance is the perpetual challenge the DMS faces, in fiscal 2008 and beyond.

—Allyn Jackson

Note: Consult the webpage `http://www.nsf.gov/about/budget` for further information on the fiscal 2008 budget request for the NSF.