

## Senate Matches NSF's Request for a Large 2009 Increase

### AAAS R&D Funding Update on NSF R&D in FY 2009 Senate Appropriations

#### Highlights

- The Senate Appropriations Committee has drafted a spending bill that would match the Bush Administration's request for a 12.5 percent increase in the National Science Foundation (NSF) budget for 2009 to \$6.9 billion (see Table), a large increase designed to keep NSF on track to double its budget between 2006 and 2016. **NSF's R&D investments would total \$5.2 billion in the Senate plan, a 15.1 percent increase to an all-time high in real terms.**

- **The Senate would agree with NSF in giving all of NSF's research directorates large increases in 2009** after flat funding in 2008 (see Figure 2). The 2009 NSF request and now the Senate bill clearly favor the physical sciences, with requested increases approaching 20 percent for the Mathematics and Physical Sciences (MPS; up 20 percent), Engineering (ENG; up 19 percent), and Computer and Information Science and Engineering (CISE; up 19 percent) directorates (see Table). The Biological Sciences (BIO; up 10 percent), Geosciences (GEO; up 12 percent), and especially the Social, Behavioral and Economic Sciences (SBE; up 8 percent) would lag behind but would narrowly match past funding levels.

- NSF's education and human resources programs would gain 3.3 percent to \$790 million in 2009, on top of \$40 million these programs just received in the current year as part of a 2008 supplemental bill.

#### NSF R&D in FY 2009 Senate Appropriations

On June 19, the Senate Appropriations Committee approved its version of the FY 2009 Commerce-Justice-Science (CJS) appropriations bill (S 3182) providing funding for the Department of Commerce, the National Science Foundation (NSF), and the National Aeronautics and Space Administration (NASA), for consideration by the full Senate in July. The House approved its own version of the bill on June 25; full details of the House version will be available shortly. Both the House and Senate bills contain close to \$57 billion in 2009 discretionary spending, \$5 to \$6 billion more than the current year and between \$3 and \$4 billion more than the President's request for these programs.

In his budget proposal for FY 2009, President Bush would follow through on his 2006 call to substantially increase funding for key physical sciences research agencies over ten years as part of an "American Competitiveness Initiative" (ACI) by keeping the NSF budget on track to double between 2006 and 2016, despite appropriations setbacks in 2007 and 2008. NSF is one of three agencies (the others are the Department of Energy (DOE) Office of Science, and the National Institute of Standards and Technology laboratories) favored with large requested increases as part of the ACI. In drafting the CJS bill, the Senate Appropriations Committee would match the request and would give **NSF a total budget of \$6.9 billion in FY 2009, \$759 million or 12.5 percent more than 2008** (see Table). (The requested increase was originally reported as 13.6 percent, but on June 30 NSF received \$62.5 million in additional 2008 funding as part of the war-related supplemental bill, thus increasing the 2008 base.) Although increases for NSF's physical sciences-related programs would lead the pack, there would be increases across the entire NSF research portfolio, which spans the range of science and engineering disciplines, and increases for NSF's education and human resources programs as well. The broad-based increases in the 2009 budget and the 2009 Senate appropriation could have a major impact on nearly all science and engineering disciplines, especially at universities.

After adjusting for inflation, the 2009 Senate appropriation and request would bring the NSF budget to an all-time high in inflation-adjusted terms (see Figure 1). After peaking in 2004, NSF funding fell in 2005 and 2006 but rose in 2007 and 2008 after Congress approved some though not all of the Bush Administration's requested ACI increases. The robust 2009 increase would still fall slightly short of the authorized funding level of \$7.3 billion enacted in the America COMPETES Act of August 2007.

NSF's R&D funding, which excludes NSF's education and training activities and overhead costs (such as polar logistics and administrative salaries), would total \$5.2 billion in the Senate plan, a gain of 15.1 percent or \$679 million that would also be an all-time high (see Table and Figure 1).

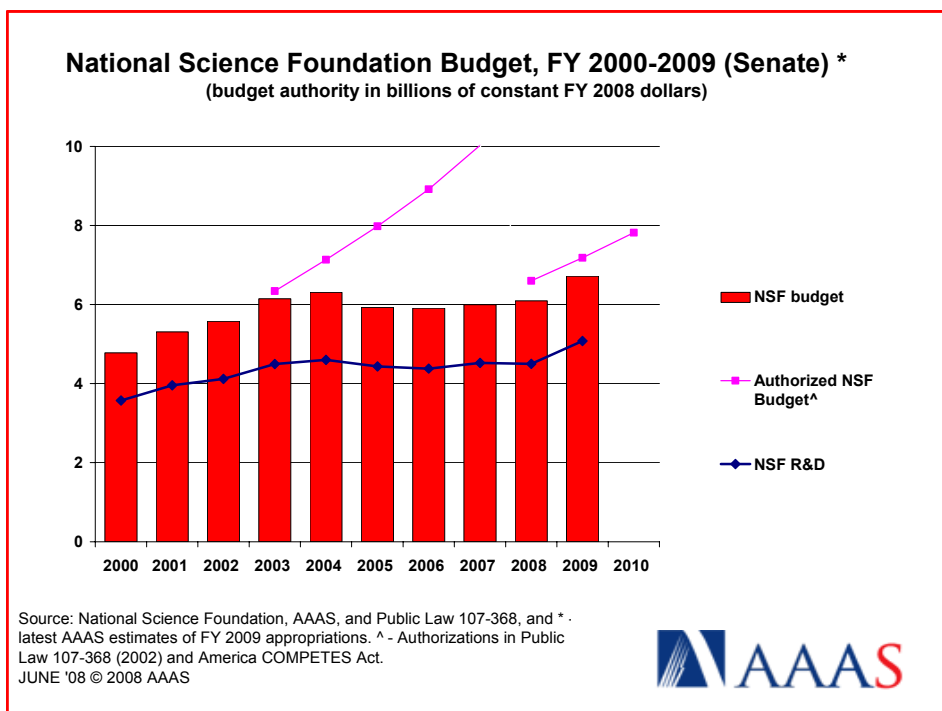


Figure 1. (click on the image for PDF)

NSF's main **Research and Related Activities (R&RA)** account, which funds nearly all of NSF's basic and applied research and contains NSF's discipline-based research directorates, would increase 15.9 percent to \$5.6 billion in both the Senate appropriation and the NSF budget request (see Table). **All of NSF's research directorates would receive large increases in 2009 after flat funding in 2008, and all would recover from budget cuts after 2004 to reach all-time highs in inflation-adjusted dollars (see Figure 2).** Both NSF and the Senate would clearly favor the physical sciences, with increases approaching 20 percent for the largest Mathematics and Physical Sciences (MPS) directorate (up 20 percent to \$1.4 billion), the Engineering (ENG) directorate (up 19 percent to \$757 million), and the Computer and Information Science and Engineering (CISE) directorate (up 19 percent to \$637 million; see Table). The Office of Cyberinfrastructure (OCI) would also see a strong gain with an 18 percent boost to \$219 million. OCI supports the procurement, development, and operation of state-of-the-art cyberinfrastructure resources for the entire research community.

The increases would be smaller but still substantial for other NSF research directorates away from the physical sciences. The Biological Sciences (BIO; up 10 percent to \$673 million), Geosciences (GEO; up 12 percent to \$846 million), and especially the Social, Behavioral and Economic Sciences (SBE; up 8 percent to \$233 million) would lag behind in percentage terms, but all would narrowly manage to match past funding levels in real dollars (see Figure 2), although funding for the SBE directorate has just barely kept pace with inflation this decade.

Within R&RA, the Senate would add \$11 million to the request for Integrative Activities (IA) for a 23 percent increase to \$287 million for its cross-disciplinary suite of programs. There would be a large 23 percent increase to \$115 million for Major Research Instrumentation (MRI), a program to distribute competitively awarded instrumentation grants to institutions for state-of-the-art research instrumentation that would be too costly to be funded through regular NSF research awards. The other large increase in IA would go to the Science and Technology Centers program (from \$1 million this year to \$16 million in 2009) to support a competition in 2009 to name five to seven new centers for multidisciplinary centers integrating research, education, workforce development, and technology transfer. The Senate would boost the Experimental Program to Stimulate Competitive Research (EPSCoR) program to \$125 million, \$10 million more than this year. EPSCoR assists research institutions and states that have traditionally been underrepresented in federal R&D funding to build research capacity. The program is currently open to 25 states, Puerto Rico, and the U.S. Virgin Islands; collectively, the EPSCoR states received just 10.4 percent of NSF R&D funds in FY 2004. But the Senate, despite its generosity, expresses its concern over the strength and effectiveness of the EPSCoR program and calls for a comprehensive review of the program, including recommendations for improving it and criteria for when a state might graduate (to date, no state has lost its EPSCoR eligibility).

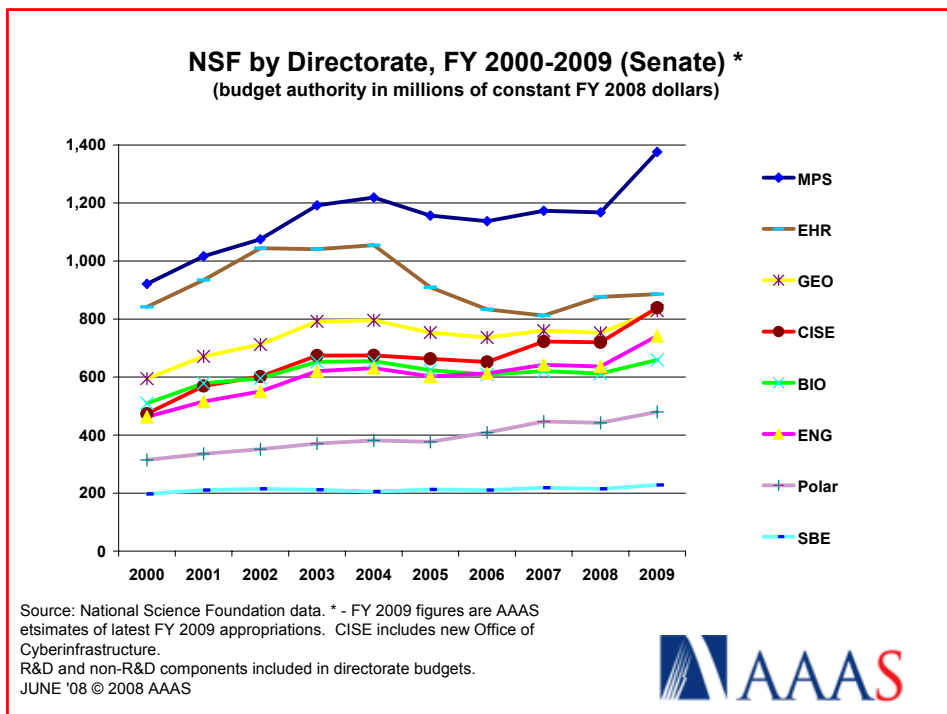


Figure 2. (click on the image for PDF)

NSF R&D facilities funding would be one of the few areas in the 2009 NSF budget to decline. The Major Research Equipment and Facilities Construction (MREFC) budget would fall \$53 million or 26 percent to \$152 million in the Senate plan (see Table), \$5 million more than the request. From funding 7 projects in 2008, the 2009 budget would fund only 3 construction projects and one new design project, although 4 more projects would inch along with previously appropriated funds. MREFC funds only the construction of large scientific facilities; smaller facilities projects, planning and design for future facilities, research instrumentation grants, and facilities operations are funded in R&RA by the research directorates. In 2009, NSF would ramp up construction of the Advanced Laser Interferometer Gravitational Wave Observatory (AdvLIGO), an upgrade to the existing LIGO in Washington and West Virginia of the world's most sophisticated optical interferometers, with a \$51 million allocation. The Atacama Large Millimeter Array (ALMA) would receive \$82 million for its eighth year of funding out of a planned 11, and construction of the IceCube project in Antarctica would begin winding down with \$11 million in 2009 toward full

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operations in 2011. A small \$2.5 million request would initiate design work on the Advanced Technology Solar Telescope (ATST); the Senate would give ATST \$7 million in MREFC and \$2.5 million in R&RA.

**NSF education and human resources programs would increase \$25 million or 3.3 percent to \$790 million in the Senate appropriation, but would remain 16 percent below 2004 levels in real terms after bottoming out in 2007 from steep cuts in 2005 and 2006** (see Figure 2). These programs just received \$40 million in current-year funding as part of the 2008 supplemental.

### NSF Funding Mechanisms

**The large proposed increases for the research directorates, now endorsed by the Senate, would mean a year of gains to reverse recent declines in competitively awarded research grants.** Looking only at competitively awarded research grants, NSF's core funding mechanism, NSF expects to fund 8,880 research grants next year, an 18 percent increase after several years stuck near 7,500, while at the same time NSF hopes to increase the median award size to \$123,575 (up 4.6 percent). After several years of declining success rates, NSF projects that it will fund 23 percent of research grant proposals, up from 21 percent in 2008. The broad-based increases would allow every research directorate to increase the three key measures of the number of research grants, the median grant size, and the projected success rate. The 2009 increases could be slightly smaller in percentage terms because the research directorates just received \$22.5 million in additional 2008 funding as part of the supplemental, enabling them to make more awards in the remainder of this fiscal year.

### Outlook and Next Steps

The full Senate is expected to debate and approve the Commerce-Justice-Science bill in July, while the House is also expected to consider its version in July. But there is increasing doubt as to whether Congress will try to send a final version of the bill to President Bush before the October 1 start of FY 2009. The President has threatened to veto any 2009 appropriations bill that exceeds his request; since both the House and Senate versions of the bill do so and since Congress is not inclined to do the heavy lifting of negotiating a House-Senate compromise bill only to see it vetoed, the bill may have a long way to go before its funding levels become final. As was the case last year, the final funding outcome for NSF will depend on whether the higher congressional bill total will prevail or whether, as was the case in 2008, Congress will rewrite the bill with lower funding levels to fit the President's budget totals.

(This analysis is one of a series of AAAS R&D Funding Updates on FY 2009 congressional appropriations. The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D in FY 2009 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/rd>) in the "FY 2009 R&D" or the "What's New" sections.)

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Table. NSF R&amp;D in FY 2009 Senate Appropriations

**Table. National Science Foundation  
Senate Appropriations Committee Action on R&D in the FY 2009 Budget  
(budget authority in millions of dollars)**

	FY 2008 Estimate	FY 2009 Request	Action by Senate				
			FY 2009 Senate	Chg. from Request Amount	Chg. from Request Percent	Chg. from FY 2008 Amount	Chg. from FY 2008 Percent
Research and Related Activities (R&RA) 1/ :							
Mathematical and Physical Sciences	1,167	1,403	<b>1,404</b>	1	0.1%	237	20.3%
Engineering	637	759	<b>757</b>	-2	-0.3%	120	18.9%
Biological Sciences	612	675	<b>673</b>	-2	-0.3%	61	10.0%
Geosciences	753	849	<b>846</b>	-3	-0.3%	93	12.4%
Computer and Info. Science and Eng.	535	639	<b>637</b>	-2	-0.3%	102	19.1%
Office of Cyberinfrastructure	185	220	<b>219</b>	-1	-0.3%	34	18.4%
Social, Behavioral and Econ. Scis.	215	233	<b>233</b>	-1	-0.3%	18	8.2%
International Office	41	47	<b>47</b>	0	-0.3%	6	14.4%
US Polar Programs 2/	443	491	<b>489</b>	-1	-0.3%	47	10.6%
Integrative Activities 3/	232	276	<b>287</b>	11	3.9%	54	23.4%
Arctic Research Commission	1	2	<b>2</b>	0	-0.3%	0	3.8%
BA adjustment	5	0	<b>0</b>	0	--	-5	-100.0%
<b>Total R&amp;RA 1/</b>	<b>4,827</b>	<b>5,594</b>	<b>5,594</b>	<b>0</b>	<b>0.0%</b>	<b>767</b>	<b>15.9%</b>
Major Research Equipment	205	148	<b>152</b>	5	3.1%	-53	-26.0%
Education and Human Resources R&D	59	66	<b>66</b>	0	0.0%	7	11.9%
<i>Less Non-R&amp;D in R&amp;RA 1/</i>	<i>-590</i>	<i>-633</i>	<i>-632</i>	<i>1</i>	<i>-0.2%</i>	<i>-42</i>	<i>7.0%</i>
<b>TOTAL NSF R&amp;D</b>	<b>4,501</b>	<b>5,175</b>	<b>5,180</b>	<b>6</b>	<b>0.1%</b>	<b>679</b>	<b>15.1%</b>
Non-R&D Programs and Activities:							
Non-R&D in R&RA 1/	590	633	<b>632</b>	-1	-0.2%	42	7.0%
Other Education and Human Res. ( Total E.H.R. Budget )	707	724	<b>724</b>	0	0.0%	18	2.5%
Agency Ops. & Award Management	282	305	<b>301</b>	-5	-1.5%	19	6.7%
National Science Board	4	4	<b>4</b>	0	0.0%	0	1.5%
Inspector General	11	13	<b>13</b>	0	0.0%	2	14.6%
<b>Total NSF Non-R&amp;D Activities</b>	<b>1,594</b>	<b>1,679</b>	<b>1,674</b>	<b>-6</b>	<b>-0.3%</b>	<b>80</b>	<b>5.0%</b>
<b>Total NSF Budget</b>	<b>6,095</b>	<b>6,854</b>	<b>6,854</b>	<b>0</b>	<b>0.0%</b>	<b>759</b>	<b>12.5%</b>

AAAS estimates based on FY 2009 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2008 and FY 2009 request figures based on OMB R&D data and supplemental agency budget data.

Figures are rounded to the nearest million. Changes calculated from unrounded figures.

1/ R&RA funds are not appropriated by directorate. The FY 2009 Senate directorate figures are AAAS estimates based on report language in the FY 2009 appropriations bill.

2 / All figures include transfers of polar icebreakers costs to the Coast Guard.

3/ Includes EPSCOR program in all years.

4/ FY 2008 figures include recently enacted supplemental appropriations (Public Law 110-252).

**June 30, 2008 - AAAS estimates of Senate Appropriations Committee-approved appropriations.**

**These figures may be amended or rejected by the full Senate.**