

INTEGRATIVE ACTIVITIES

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\$239,990,000

The FY 2005 Budget Request for Integrative Activities (IA) is \$239.99 million, an increase of \$95.85 million, or 66.5 percent, above the FY 2004 Estimate of \$144.14 million.

Integrative Activities Funding (Dollars in Millions)

	FY 2003	FY 2004	FY 2005	Change over	
	Actual	Estimate	Request	FY 2004 Amount	Percent
Integrative Activities	97.86	144.14	239.99	95.85	66.5%
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RELEVANCE

Integrative Activities (IA) supports emerging cross-disciplinary research and education, recognizing the importance of these types of integrative efforts to the future of science and engineering. IA is a source of federal funding for the acquisition and development of research instrumentation at U.S. academic institutions, and funds a number of research centers and programs that support and enhance NSF workforce preparation and investment strategies. In FY 2005, this account also includes funding for the Math and Science Partnership (MSP) program and support for a new Foundation-wide Innovation Fund.

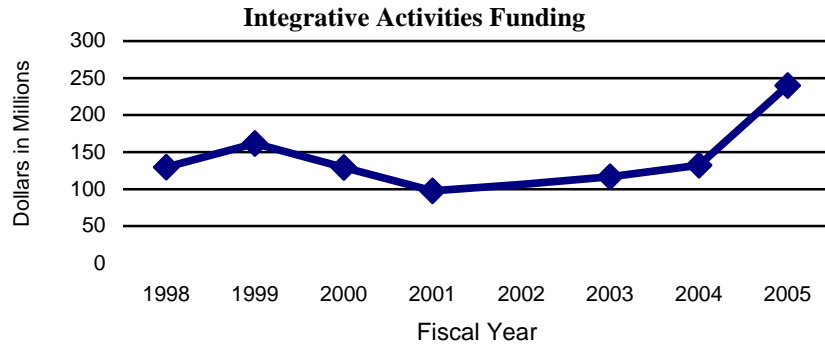
Funds requested and appropriated to IA are managed by a variety of organizations within NSF, which provides the Foundation the flexibility needed to broaden support for emerging cross-disciplinary research programs and activities. For example, the Math and Science Partnership (MSP), previously funded in the Education and Human Resources (EHR) Appropriation, has been transferred to IA in FY 2005 to enable better integration with other NSF disciplines.

Integrative Activities Funding by Program (Dollars in Millions)

	FY 2003	FY 2004	FY 2005	Change over	
	Actual	Estimate	Request	FY 2004 Amount	Percent
Math and Science Partnership ¹	[\$144.07]	[\$139.17]	80.00	80.00	N/A
Partnerships for Innovation	4.97	9.94	10.00	0.06	0.6%
Disaster Response Teams	0.99	0.00	0.00	N/A	N/A
Innovation Fund	N/A	N/A	5.00	5.00	N/A
Science and Technology Centers	1.69	0.99	30.99	30.00	3030.3%
Science of Learning Centers	2.19	19.88	20.00	0.12	0.6%
Major Research Instrumentation	83.45	109.35	90.00	-19.35	-17.7%
Science and Technology Policy Institute	3.97	2.99	3.00	0.01	0.3%
Research and Development (R&D) Database	N/A	0.99	1.00	0.01	1.0%
NAS Study	0.60	N/A	N/A	N/A	N/A
Total, Integrative Activities	\$97.86	\$144.14	\$239.99	\$95.85	66.5%

Totals may not add due to rounding.

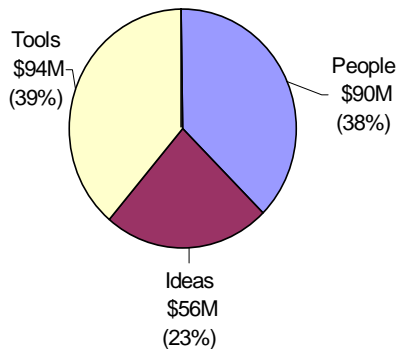
¹Funding for the MSP has been moved from the EHR Account and is reflected in IA in FY 2005.



NSF uses various internal and external mechanisms to review the relevance of proposed and existing programs and to help identify emerging opportunities for agency-wide foci and their associated goals for the future. These include Committees of Visitors, advisory committees, academy and other reports, workshops, and long-range planning documents, among others. Three aims (strategic goals) guide NSF's Integrative Activities efforts:

STRATEGIC GOALS

Integrative Activities



- **PEOPLE:** Supports promising partnerships among academe, state/local/federal government and the private sector that will explore new approaches to support and sustain innovation and broaden participation.
- **IDEAS:** Facilitates the advancement of scientific knowledge and learning research through support of Science and Technology Centers, Science of Learning Centers and other disciplinary research.
- **TOOLS:** Enables enhancement of the infrastructure for the conduct of research. Investments support acquisition of research instrumentation and the development of laboratories and other facilities needed to do world-class

Summary of Integrative Activities Funding by Strategic Goal
(Dollars in Millions)

	FY 2003 Actual	FY 2004 Estimate	FY 2005 Request	Change over FY 2004	
				Amount	Percent
People	4.97	9.94	90.00	80.06	805.4%
Ideas	4.87	20.87	55.99	35.12	168.3%
Tools	87.42	113.33	94.00	-19.33	-17.1%
Organizational Excellence	0.60	0.00	0.00	0.00	0.0%
Total, IA	\$97.86	\$144.14	\$239.99	\$95.85	66.5%

Budget Highlights

PEOPLE (+\$80.06 million, for a total of \$90.0 million)

IA People Investments
(Dollars in Millions)

	FY 2003	FY 2004	FY 2005	Change over	
	Actual	Estimate	Request	FY 2004 Amount	Percent
Collaborations	4.97	9.94	90.00	80.06	N/A
Total, IA People	\$4.97	\$9.94	\$90.00	\$80.06	N/A

COLLABORATIONS

- *Math and Science Partnership (MSP)*. The budget includes \$80.0 million for the Math and Science Partnership program. FY 2005 marks the fourth year for the MSP program at NSF. In FY 2005, NSF begins the process of phasing out the program, although it continues support for (a) out-year commitments to *Comprehensive* and *Targeted* awards made in the first and second competitions and (b) data collection and program evaluation.

In launching its MSP program in FY 2002, NSF assumed important responsibilities for implementing a key facet of the President's No Child Left Behind (NCLB) vision for K-12 education. The MSP responds to a growing national concern – the lackluster performance of U.S. children in mathematics and science. NCLB articulates this concern and identifies key underlying factors for the poor performance of U.S. students: too many teachers teaching out of field, too few students taking advanced coursework, and too few schools offering challenging curricula and textbooks.

Integrating the expertise of higher education with that of K-12 to strengthen and reform science and mathematics education, the MSP seeks to improve student outcomes in mathematics and science for *all* students, at all K-12 levels. The MSP program therefore supports the development, implementation and sustainability of promising partnerships among institutions of higher education, K-12 school systems and other important stakeholders to:

- Ensure that all K-12 students have access to, are prepared for and are encouraged to participate and succeed in challenging curricula and advanced mathematics and science courses;
- Enhance the quality, quantity and diversity of the K-12 mathematics and science teacher workforce; and
- Develop evidence-based outcomes that contribute to our understanding of how students effectively learn mathematics and science.

The MSP program is distinguished from other efforts with a focus on K-12 mathematics and science education by its emphasis on (a) partnerships between institutions of higher education – especially their disciplinary faculty in mathematics, science and/or engineering – and local school districts; and (b) institutional/organizational change in all core partners that ensures the sustainability of promising policies and practices derived from evidence collected in project work. The following domains constitute the key features of the MSP program: partnerships that effectively engage STEM disciplinary faculty; teacher quality, quantity and diversity; challenging courses and curricula; evidence-based design and outcomes; and institutional change and sustainability.

Three components comprise the MSP program at NSF: (a) *Comprehensive* and *Targeted Partnerships*, (b) *Research, Evaluation and Technical Assistance* (RETA) projects and (c) *Institute*

Partnerships: Teacher Institutes for the 21st Century. MSP *Comprehensive* projects implement change across the K-12 continuum in mathematics, science or both. *Targeted* projects focus on improved student achievement in a narrower grade range or disciplinary focus in mathematics and/or science.

In the *Comprehensive* Appalachian Mathematics and Science Partnership (AMSP), for example, the University of Kentucky partners with 52 rural districts in Kentucky, Virginia and Tennessee, as well as nine other universities/colleges, to improve student achievement in both mathematics and science. The *Comprehensive Partnership* Promoting Rigorous Outcomes in Mathematics/Science Education (PROM/SE) between Michigan State University and five consortia of school districts in Michigan and Ohio utilizes instruments from the Third International Mathematics and Science Study (TIMSS) to collect detailed data on students and teachers, and uses that data to develop more focused and challenging content standards, align standards with instructional materials and improve mathematics and science teaching.

The Vertically Integrated Partnerships K-16 project, a *Targeted Partnership* housed at the University System of Maryland, joins four university partners with the Montgomery County public schools and others to improve high school science instruction. In the Texas Middle and Secondary Mathematics Project, also a *Targeted Partnership*, Stephen F. Austin State University and twelve independent school districts unite to improve mathematics teaching and learning in grades 4-12. The East Alabama Partnership for the Improvement of Mathematics Education partners Auburn University with Tuskegee University and others to improve mathematics education in twelve school districts.

The *Institute Partnerships*, the newest component of the MSP portfolio, are expected to build on the acknowledged strengths of the original NSF *Teacher Institutes*, while giving attention to the changing needs of today's teachers. The *Institutes* are intended to develop teacher leaders who have deep content expertise in mathematics, science and technology related areas; who are excited about newer developments in these fields; and who have the disciplinary depth and stature to motivate students towards continued study of mathematics and science in advanced courses.

All funded MSP projects participate in and contribute to the *MSP Learning Network*, a network of researchers and practitioners studying and evaluating promising strategies to deepen our understanding of how students effectively learn mathematics and science. MSP-RETA projects provide large-scale research and evaluation capacity for the *MSP Learning Network*, and provide *Partnership* awardees with assistance in the implementation and evaluation of their work. The Design, Validation and Dissemination of Measures of Content Knowledge for Teaching Mathematics project at the University of Michigan, for example, is developing and validating instruments to assess teachers' knowledge of mathematics content and how this content is used in teaching upper elementary and middle school algebra and geometry. The instruments are being designed to be especially useful in measuring growth in teacher learning as a result of professional development.

In FY 2003, 271 proposals for *Comprehensive* or *Targeted Partnerships* and an additional 48 RETA proposals were received and externally merit reviewed. From these, 13 Partnership awards were made, including one prototype project for an *Institute Partnership* in anticipation of a major focus on this new MSP component in the FY 2004 competition. Ten RETA awards were also made in FY 2003, including one to establish MSPnet, the electronic community for MSP projects. For the current FY 2004 competition, over 200 proposals have been received and are under review.

NSF continues to cooperate and coordinate its MSP work with that of the U.S. Department of Education (ED) to manage their respective MSP programs for the greatest effectiveness, communicating through the *MSP Learning Network*; through the regular meetings of a *Tiger Team* of

representatives from NSF and ED; and through a host of other collaborative activities. In addition, NSF and ED continue to co-manage one *Comprehensive* project and one *Targeted* project awarded in FY 2002 and jointly funded.

- *Partnerships for Innovation (PFI)*. The FY 2005 Request for the PFI program is \$10.0 million. PFI funding will support partnership grants that seek to (1) stimulate the transformation of knowledge created by the national research and education enterprise into innovations that create new wealth, build strong local, regional and national economies and improve the national well-being, (2) broaden the participation of all types of academic institutions and all citizens in NSF activities to more fully meet the broad workforce needs of the national innovation enterprise, and (3) catalyze or enhance enabling infrastructure necessary to foster and sustain innovation in the long-term. These awards average \$600,000 for a maximum of three years, and more than 90 percent involve academic institutions that do not normally receive a high amount of funding from NSF. On average, fifteen to twenty awards are made each year through this program.

IDEAS (+\$35.12 million, for a total of \$55.99 million)

IA Ideas Investments
(Dollars in Millions)

	FY 2003	FY 2004	FY 2005	Change over	
	Actual	Estimate	Request	FY 2004 Amount	Percent
Fundamental Science and Engineering	0.99	0.00	5.00	5.00	N/A
Centers Programs	3.88	20.87	50.99	30.12	144.3%
Total, IA Ideas	\$4.87	\$20.87	\$55.99	\$35.12	168.3%

FUNDAMENTAL SCIENCE AND ENGINEERING

- *Innovation Fund*. The budget includes \$5.0 million for a Foundation-wide Innovation Fund. The Innovation Fund provides the agility needed to invest in frontier activities that transcend intellectual and organizational boundaries and test nascent community-driven ideas difficult to fund otherwise. The Fund will seed explorations of emerging science and engineering questions, test instrumentation and process designs, and introduce novel ways to engage U.S. citizens in science and engineering. Emphasis will be placed on strategic investments where focused attention will benefit all of science and engineering, particularly activities at the interfaces of disciplines, integration of research and education, and initiation of new partnerships with other agencies or international entities.

CENTERS PROGRAMS

- *Science and Technology Centers (STCs)*. NSF created the Science and Technology Centers (STC) program in 1989. STCs are university-based research efforts that foster a new collaborative culture among researchers and educators at all levels in academia, industry, government laboratories, and other public and private organizations. In FY 2005, \$30.0 million will fund a new cohort of STCs. An estimated six centers will be funded. An additional \$990,000 is included for ongoing administrative support of STCs (e.g., annual site visits, contractor support costs, meetings, workshops).
- *Science of Learning Centers (SLCs)*. The FY 2005 Request for the SLC program is \$20.0 million. NSF's investment in SLCs was initiated in FY 2003 to build on the Foundation's support for learning research in multiple disciplines. SLCs are built around a unifying research focus and incorporates a diverse, multidisciplinary environment involving appropriate partnerships with academia, industry, international partners, and other public and private entities at all levels of education.

In FY 2005, NSF will continue the third of five years of support for approximately four to five Centers (\$3.0 million to \$5.0 million per year) awarded in the program's first competition. In addition, the SLC program will support a second cohort of up to 20 Catalyst awards (\$200,000 to \$250,000 each). This funding level is designed to support a diverse portfolio of research projects, providing leadership across a broad range of science and engineering approaches to science of learning research.

TOOLS (-\$19.33 million, for a total of \$94.0 million)

IA Tools Investments
(Dollars in Millions)

	FY 2003	FY 2004	FY 2005	Change over	
	Actual	Estimate	Request	FY 2004 Amount	Percent
Infrastructure and Instrumentation	83.45	109.35	90.00	-19.35	-17.7%
Federally-Funded R&D Centers	3.97	3.98	4.00	0.02	0.5%
Total, IA Tools	\$87.42	\$113.33	\$94.00	-\$19.33	-17.1%

INFRASTRUCTURE AND INSTRUMENTATION

- *Major Research Instrumentation (MRI).* Funding for the MRI program is reduced by \$19.35 million from a FY 2004 Estimate of \$109.35 million to \$90.0 million. MRI funding will (1) support the acquisition and development of major state-of-the-art instrumentation for research, research training, and integrated research and education activities at U.S. institutions, instrumentation that is too costly to support through regular NSF programs, (2) improve access to and increase use of modern research and research training instrumentation by scientists, engineers, graduate and undergraduate students, (3) enable academic departments or cross-departmental units to create well-equipped learning environments that integrate research with education, (4) promote partnerships between academic researchers and private sector instrument developers, and (5) ensure that at least \$25.0 million goes to support teaching-intensive institutions and minority-serving institutions, including Historically Black Colleges and Universities, Tribal Colleges, and community colleges, with a focus on research training for American students.

FEDERALLY-FUNDED RESEARCH AND DEVELOPMENT (R&D) CENTERS

- *Science and Technology Policy Institute.* NSF's FY 2005 budget provides \$3.0 million for the Science and Technology Policy Institute (STPI) and \$1.0 million for a research and development (R&D) database. STPI is a Federally-Funded Research and Development Center established by Congress in 1992 to support the complex task of devising and implementing science and technology policy. The Institute provides analytical support to the Office of Science and Technology Policy (OSTP), to identify near-term and long-term objectives for research and development and to identify options for achieving those objectives. In addition, the Institute supports the Office of Science and Technology Policy by assembling and analyzing information regarding significant science and technology developments and trends. In FY 2003, the Institute for Defense Analysis (IDA) was competitively selected to operate STPI, displacing the RAND Corporation, which had operated the Institute since its establishment in FY 1992.