

MANAGEMENT'S DISCUSSION AND ANALYSIS

AGENCY PROFILE

Mission and Vision

The National Science Foundation (NSF or “Foundation”) is the steward of America’s science and engineering enterprise. As an independent agency created by Congress in 1950, our mission is to advance the progress of science and engineering in the United States by supporting all fields of fundamental science and engineering except medical sciences. Although NSF provides only 4 percent of the total federal budget for research and development (*Figure 1*), NSF plays a major role in the support of research at the Nation’s academic institutions. NSF provides nearly half of the federal support for nonmedical basic research at America’s colleges and universities, and in many fields such as mathematics, computer science and the environmental sciences, NSF is the major source of federal support (*Figure 2*).¹

Figure 1. Federal Support for Research and Development

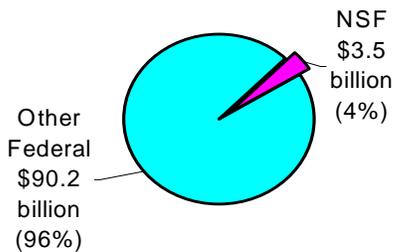
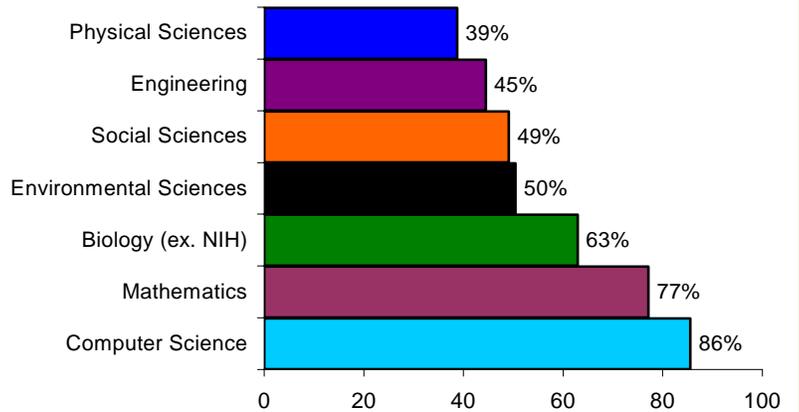


Figure 2. NSF Support as a Percent of Total Federal Support of Academic Basic Research in Selected Fields



The remarkable progress in science and engineering that defined post-World War II America reflects the strength of America’s basic research enterprise. This progress also reflects NSF’s leadership in opening new frontiers of scientific inquiry, extending technological capability, and developing a world-class workforce in science and engineering. The results of NSF’s investments—new discoveries and innovations—enable the United States to remain competitive in the global marketplace, sustain economic prosperity, protect the environment, and maintain a high quality of life. NSF investments have advanced math and science education at all levels and

¹ Source for Figures 1 and 2: NSF/SRS/R&D Statistics Program, *Survey of Federal Funds for Research and Development: FY 2002–2004*

supported generations of outstanding researchers and educators, including more than 160 U.S. and U.S.-based Nobel laureates. Moreover, advances in science and technology—for example, the development of detectors that will inhibit border penetration by a nuclear or radiological weapon and advance ad-hoc networking to enable more rapid first responder capability—are critical to homeland security and America's ability to combat global terrorism. NSF's vision—to enable the Nation's future through discovery, learning, and innovation—is realized by pursuing high-risk endeavors that advance the frontiers of science and engineering and produce new information and knowledge. NSF's pursuit of these new frontiers is key to sustaining America's economic and social future.

Organizational Structure

NSF is headed by a Director who is appointed by the President and confirmed by the Senate. A 24-member National Science Board (NSB), also appointed by the President with the consent of the Senate, meets six times a year to establish the overall policies of the Foundation. The NSB also serves the President and the Congress as an independent advisory body on policies related to the U.S. science and engineering enterprise.

NSF is funded primarily by Congressional appropriations, and its seven directorates and three program offices are organized by disciplinary area and programmatic activity. There are also two management offices that have responsibility for NSF's business and operations (*Figure 3*). A brief description of each directorate and office can be found in *Appendix 1*. In October 2004, the Office of International Science and Education was moved from the Social, Behavioral, and Economic Sciences Directorate to make international leadership a higher priority in Foundation activities. In July 2005, NSF established the Office of Cyberinfrastructure to coordinate and provide support for state-of-the-art cyberinfrastructure resources, tools, and services essential to the conduct of 21st century science, engineering, and education.

The NSF workforce totals approximately 1,400 full-time staff, roughly 85 percent who are permanent employees and 15 percent are "rotators." To complement the permanent workforce, NSF regularly recruits visiting scientists, engineers, and educators who are leaders in their fields. These "rotators" spend one to three years with the agency. Recruiting active researchers and educators to fill rotating assignments infuses new talent and expertise into NSF and is integral to the Foundation's mission of supporting the entire spectrum of science and engineering research and education, particularly research at the frontier. Currently, NSF has on board about 170 such "rotators."² In addition, NSF employs nearly 400 contractors who are engaged in commercial administrative activities.³

How We Work: A Catalyst for Innovation

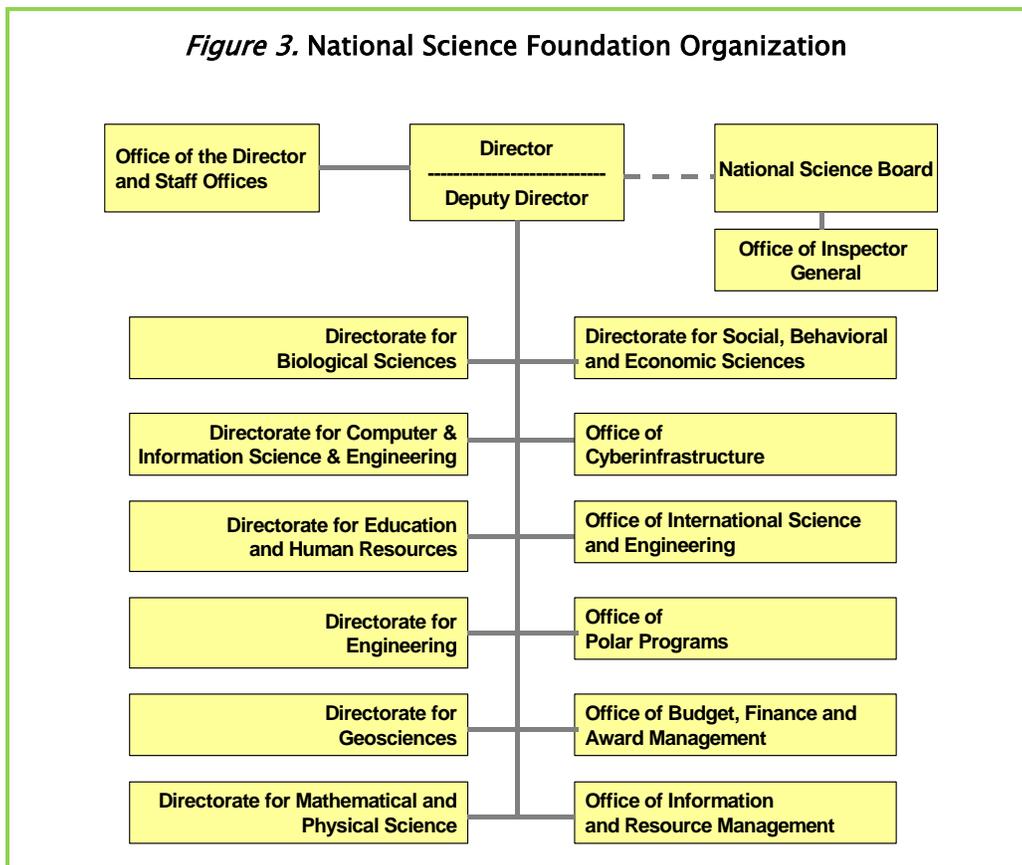
Unlike most other federal research agencies, NSF does not operate its own laboratories or research facilities (with the exception of operations in the polar regions). Instead, our role is that of a catalyst, seeking out the best *Ideas*, providing state-of-the-art *Tools* and facilities, and

² Temporary appointments are made under the Intergovernmental Personnel Act (IPA), which are funded through program accounts, or through NSF's Visiting Scientists, Engineers, and Educator (VSEE) Program, funded through the administrative accounts and counted as federal FTE. As of September 30, 2005, NSF had 134 IPAs and 38 VSEEs on staff.

³ In July 2005, 386 contractors were engaged in NSF activities.

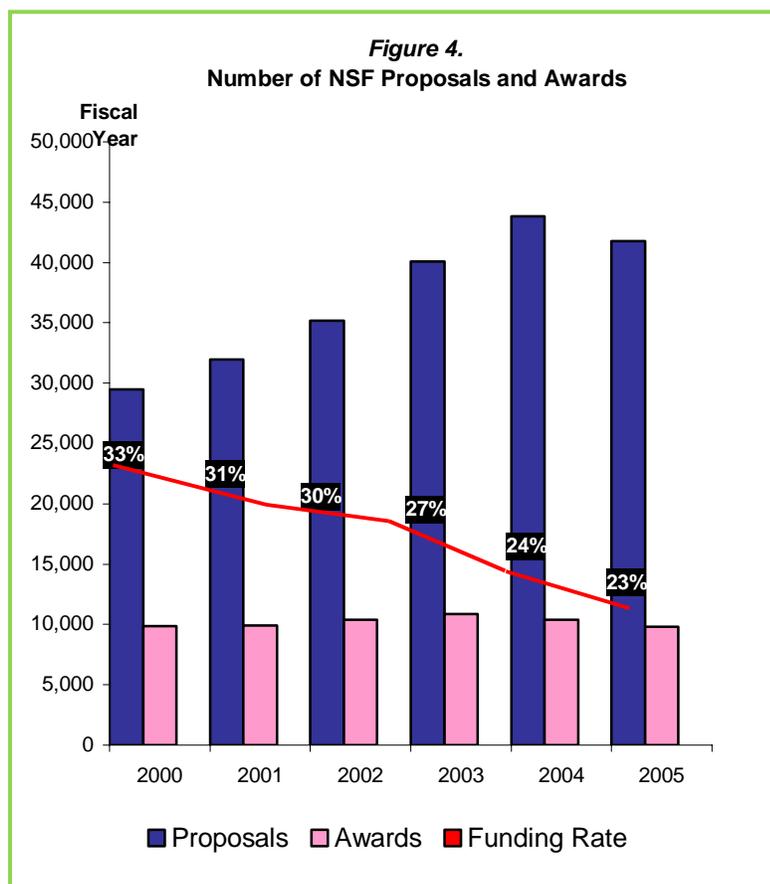
identifying the most capable *People* and allowing them to pursue innovation. NSF directly supports scientists, engineers, and educators through their home institutions, usually colleges and universities, throughout the country.

In FY 2005, NSF received 41,760 proposals and funded 9,794 new awards to nearly 1,700 colleges, universities, and other public institutions throughout the country (*Figure 4*).⁴ Ninety percent of NSF funding is allocated through a merit-based competitive process that is recognized throughout the government as the gold standard for responsible use of public funds.⁵ With about one in four proposals funded, the level of competition is such that nearly \$2 billion of proposals are declined, even though they received ratings equal to funded proposals. These declined proposals represent a rich portfolio of lost opportunities at the frontiers of science and engineering with an untold impact on the Nation's future economic growth.



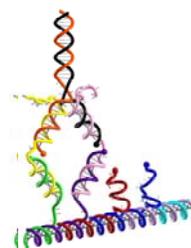
⁴ In FY 2005, NSF's total investment portfolio included about 20,000 awards for which an obligation was made.

⁵ For additional information about NSF's merit review process see *Report to the National Science Board on NSF's Merit Review Process, FY 2004* at www.nsf.gov/publications/pub_summ.jsp?ods_key=nsb0512.



In FY 2005, NSF awards directly involved an estimated 195,000 people, including senior researchers, post-doctoral associates, teachers, and students from kindergarten through graduate school. NSF's investment portfolio is a rich mix of programs and partnerships that reach broad and diverse segments of the science and engineering research and education community as well as the general public. (For more examples of research and education projects supported by NSF in FY 2005, visit the NSF website at www.nsf.gov.)

► Chemical Bonding Center (CBC) awards are designed to encourage talented researchers to investigate major problems that have solutions with the potential for long-term societal benefit. The awards encourage multidisciplinary teams to tackle “big problems” in chemistry in an atmosphere that is flexible, tolerant of risk, and open to “outside-the-box” thinking. NSF funded three new centers in FY 2005: California Institute of Technology (Cal Tech), Columbia University, and the University of California at Irvine. These centers are looking for new and more economical ways of storing solar energy; investigating new kinds of nanoscale molecular machines for drug delivery and other applications; and illuminating the inner workings of molecules. Illustrated at right is the type of DNA-based walking machine that will be explored at the new CBC Center for Molecular Cybernetics at Cal Tech (illustration by Niles Pierce, Cal Tech).



► NSF-supported educational and informational projects reach countless children and adults through films, museum exhibits, innovative television programs, radio shows, and web-based resources. *Cyberchase*, a mystery-adventure cartoon produced by Thirteen/WNET, is a vehicle for teaching mathematics and problem solving, with action centering around three children and their avian sidekick, Digit. *Forces of Nature*, a National Geographic film made with NSF support, showcases the awesome spectacle of earthquakes, volcanoes, and severe storms. The film follows scientists on their quest to understand what triggers these natural disasters.



► NSF honored seven of the Nation's leaders in research and education as Director's Distinguished Teaching Scholars in FY 2005. These scholars not only achieved groundbreaking results in research, but they also demonstrated strong teaching and mentoring skills and made major educational contributions. Each received an award of up to \$300,000 for over four years. Recipients were William McCallum, University of Arizona; Ken Ono, University of Wisconsin; Robert Chang, Northwestern University; Evelyn Hu, University of California, Santa Barbara; Edward (Joe) Redish, University of Maryland; Angelica Stacy, University of California, Berkeley; and Paul Bierman, University of Vermont. In the photo at left is Joe Radish (*in the hat*) working with colleagues and students at the Enrico Fermi Summer School on Physics Education Research in Varenna, Italy.

President's Management Agenda

The foundation of all NSF's programmatic activities is a commitment to excellence in management and stewardship of the public's investment. We demonstrated this commitment in FY 2005 by joining only five other agencies in attaining successful "Green" ratings in four or more of the President's Management Agenda (PMA) initiatives.⁶ NSF continues to make progress on the *Competitive Sourcing* initiative—rated "Red" at year-end but "Yellow" for progress—by working closely with the White House Office of Management and Budget (OMB) on establishing specific milestones for the near term. NSF will conduct a series of streamlined competitions beginning with one in FY 2006 to support award oversight and monitoring activities.

► In its documentation of NSF's *Human Capital* performance, the Office of Personnel Management (OPM) commented that: "NSF's progress toward the 'Green'... is a result of its dedicated, prudent pursuit of excellence. Similar to its strategies dealing with science and engineering research programs, the Foundation has studiously examined and then capitalized on its workforce planning activities and talent resources, its performance culture, and its leadership and knowledge management practices and activities to prod and stimulate changes that assure and improve its efficiency and effectiveness."

⁶ For more information on the PMA visit www.whitehouse.gov/omb/budget/fy2002/mgmt.pdf and www.whitehouse.gov/results/.

NSF achieved a “Green” status as a result of several key initiatives: The Administrative Functions Study (AFS) is addressing the issue of the changing nature of work in NSF’s program directorates. NSF’s workforce planning initiative is defining an agencywide process for workforce planning that is coordinated with the budget cycle, data-driven, and understandable to managers and staff. We are also implementing a Learning Management System that will improve coordination of training and development opportunities and facilitate better connections between those opportunities and the needs of NSF organizations.

► NSF has successfully maintained its “Green” rating in *Financial Performance* since 2001, when it was the only agency to receive a “Green” baseline rating. In FY 2005, NSF received the best agency scores on the Chief Financial Officers (CFO) Council’s Metric Tracking scorecard and consistently earned “Green” ratings for accuracy and timeliness of financial reporting on the Treasury Department’s Financial Management Scorecard. NSF senior managers meet at least quarterly to

review integrated financial and performance information that covers all major areas of responsibility. The Enterprise Information System (EIS), the Financial Accounting System (FAS), and Report.web reporting systems provide financial, budgetary, awards, and performance information (including Program Assessment Rating Tool, or PART) that is accessible in multiple formats at every workstation on a 24/7, real-time basis. Managers use this information to make decisions regarding NSF budget priorities and business processes.

► NSF has successfully maintained its “Green” in *Electronic Government* (E-Gov) for four consecutive years. In fact, virtually all of NSF’s business interactions have been conducted electronically with our external grantee community since 2000. The agency is actively engaged in supporting numerous other E-Gov initiatives, including E-Human Resources Initiatives, Integrated Acquisition Environment, E-Authentication, and the Lines of Business initiatives. NSF is a Grants.gov partner agency and continues to co-lead the Grants Management Line of Business. In FY 2005, NSF posted 100 percent of funding opportunities on “Grants.gov Find” and identified 23 programs that accept applications via the “Apply” function. FastLane, the agency’s interactive real-time system used to conduct business with the grantee community over the Internet, can now interface directly with Grants.gov. Enhancements to the Electronic Jacket System (E-Jacket), a web-based application designed to electronically process proposals, reduced the processing time of proposals by 11 percent, on average, as compared to legacy applications.

Figure 5. President’s Management Agenda Scorecard			
	Baseline	Status	Progress
	Sept. 30, 2001	Sept. 30, 2005	
Strategic Management of Human Capital			
Competitive Sourcing			
Improving Financial Performance			
Expanded E- Government			
Budget and Performance Integration			
<i>Note: Green (G) indicates success; Yellow (Y), mixed results; and Red (R) unsatisfactory. Ratings are issued quarterly by OMB. For more information, see www.results.gov/agenda/scorecard.html.</i>			

Security of information technology (IT) systems is a management issue of the highest priority for NSF. Enhancements to an already strong security program allowed NSF to complete all program and system milestones on the FY 2005 Plan of Actions and Milestones (POAM), test all major application and general support system contingency plans, and implement new federal guidance for system categorization and security control review. All major NSF systems have current certification and accreditation (C&A) status. We updated our Security Awareness Training to reflect new security risks and implemented an aggressive vulnerability assessment program to continuously monitor the IT environment. In the Office of the Inspector General's (OIG's) Federal Information Security Management Act FY 2005 Independent Evaluation Report of September 9, 2005, the OIG noted that, "based on the result of our FY 2005 independent evaluation, we determined that the National Science Foundation (NSF) has an established information security program and has been proactive in reviewing security controls and identifying areas to strengthen this program." NSF's security program and posture continues to be positive and reflects our commitment to continued investment and improvement to what will remain complex and challenging issues in the years ahead.

► NSF achieved "Green" status for *Budget and Performance Integration* in the first quarter of FY 2005. A key factor cited by OMB in announcing this achievement was that "NSF can estimate the resources necessary to achieve its long-term strategic goals and track those resources from operating plans to obligations to expenditures." A more detailed discussion of the integration of budget and performance is included in the performance discussion on page I-14.

Meeting Future Challenges

NSF has a long record of success in leveraging its agile, motivated workforce, management processes, and technological resources to enhance productivity and effectiveness. NSF is widely recognized in government for its financial management and electronic business acumen. Historically, about 95 percent of NSF's budget supports the conduct of research and education, with administrative overhead accounting for about 5 percent. In addition to achieving "Green" status on four of the five PMA initiatives, all NSF programs under the current strategic plan evaluated by the PART have received the highest rating of "Effective."⁷ Governmentwide, only 15 percent of programs assessed by PART have been rated as "Effective." In addition, NSF was recently ranked as the second best U.S. federal government workplace in a study by the Partnership for Public Service and the American University Institute for the Study of Public Policy Implementation.⁸

The current environment in which NSF operates is changing. There has been a significant increase in workload and workload complexity in recent years. The 42 percent increase in the number of proposals received since FY 2000 has been accompanied by a rise in multidisciplinary, collaborative projects, international activities as well major research facility projects. Although the Foundation's budget has increased nearly 40 percent over this period, staff has increased only

⁷ For a more information about OMB's Program Assessment Rating Tool (PART), visit www.whitehouse.gov/omb/part/ and see page I-13 and Chapter II of this report.

⁸ The results were published by the Partnership for Public Service (PPS) and the American University's Institute for the Study of Public Policy Implementation based on the results of OPM's most recent Federal Human Capital Survey. See www.nsf.gov/news_summ.jsp?cntn_id=104464&org+NSF&from=news.

11 percent. In addition, meeting new external administrative, oversight, and accountability requirements are an additional burden on the Foundation's limited staffing and funding resources. In FY 2002, NSF embarked on a business analysis study to address the fundamental challenges facing the agency as it becomes a fully integrated organization with increased capabilities for working both within and across traditional disciplinary and organizational boundaries. During FY 2005, the study supported several PMA initiatives and emphasized opportunities in merit review and award management and oversight. Senior management reviewed a set of options in these areas, and this portion of the business analysis has moved to the preliminary stages of implementation.

Another product of the business analysis is the Administration Functions Study, which addresses the impact of rapidly changing work processes, shifts in workload, and advances in technology on the Foundation's ability to efficiently perform its administrative duties. The study, with considerable staff input at all levels, is examining the distribution of administrative functions among staff in the science and engineering directorates and will recommend strategies to better align those functions in support of the NSF mission. The technology portion of the business analysis is focusing on the development of baseline and target architectures, the IT implementation plan, and the technology governance framework. The baseline architecture portion of the study includes a complete inventory of NSF's systems and an analysis of business processes and services in an effort to identify redundancies and opportunities to introduce efficiencies. The IT implementation plan provides links between the baseline and target architecture and is described in terms of ten major IT projects that will ultimately establish the long-term technology roadmap for NSF.