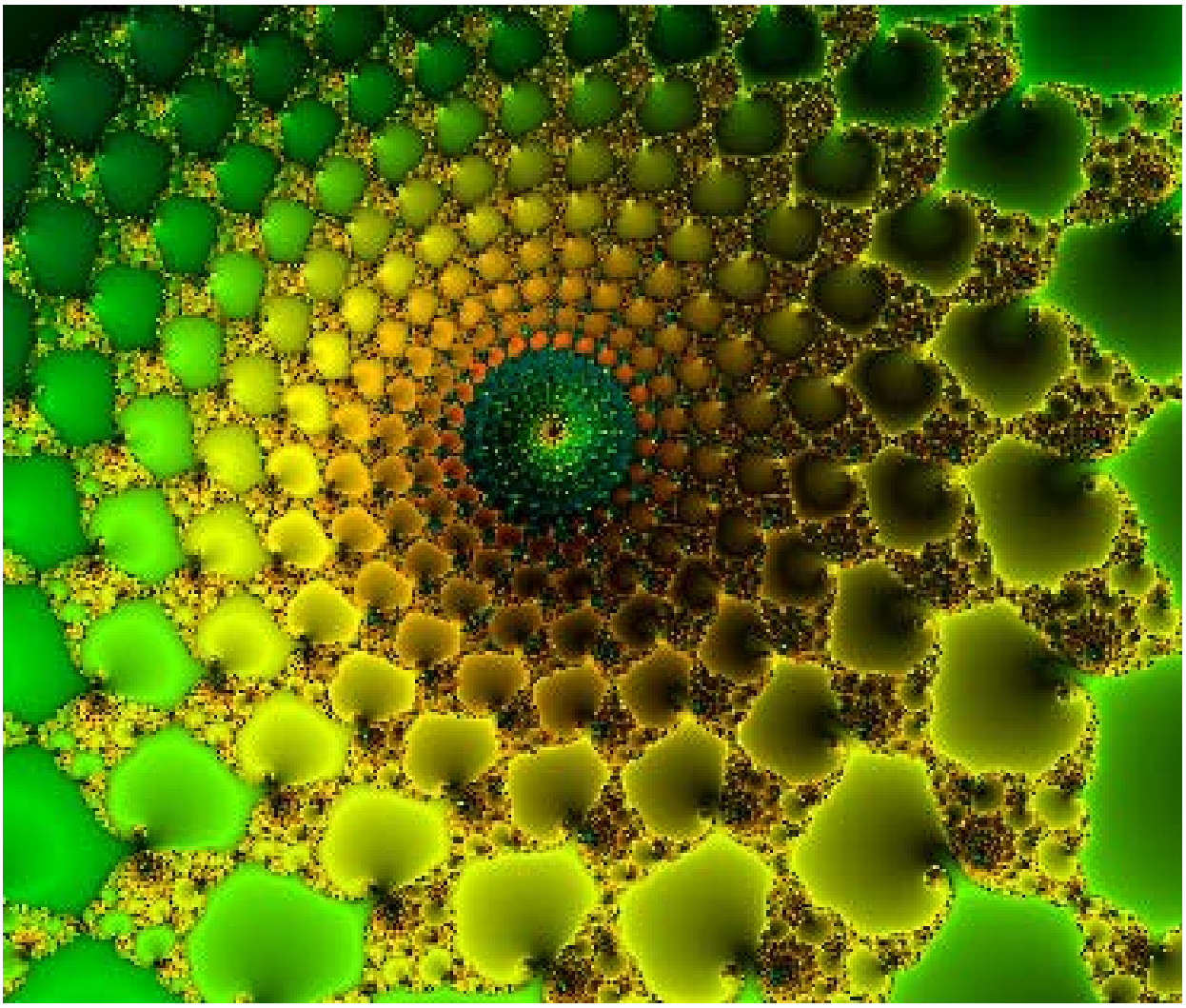
United States
National Science Foundation



FY 2005
PERFORMANCE AND ACCOUNTABILITY REPORT

November 15, 2005

THE NSF STATUTORY MISSION

To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense; and for other purposes.

THE NSF VISION

Enabling the Nation's future through discovery, learning and innovation.

NSF investments – in people, in their ideas, and in the tools they use – will catalyze the progress in science and engineering needed to establish world leadership and secure the Nation's security, prosperity, and well-being.

On the cover: This image is a representation of a "Beehive Pool" fractal, a region in the complicated geometric object introduced by mathematician Benoit Mandelbrot in the 1970's to study certain equations. Fractals are self-similar structures containing patterns within patterns. Fractal-like structures can be found in nature, in clouds, shorelines, and other seemingly random phenomena. NSF is one of the major supporters of mathematical sciences. NSF's strong role in supporting mathematics is a crucial one as mathematics provides the backbone for advances in other technical, engineering and health-related areas as well as a broad basis for industrial and technological development. (Image courtesy of Frances Griffin. For more information visit www.nsf.gov/news/mmg/mmg_disp.cfm?med_id=51856&from=search_list.)

NATIONAL SCIENCE FOUNDATION

FY 2005 Performance and Accountability Report

www.nsf.gov/publications/pub_summ.jsp?ods_key=par

For more information about the National Science Foundation, visit NSF's website at www.nsf.gov. For copies of this report please send your request to Accountability@nsf.gov. We welcome your comments; contact John Lynskey, Deputy Director, Division of Financial Management, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230 (jlynske@nsf.gov).

A MESSAGE FROM THE DIRECTOR

I am pleased to present the *Performance and Accountability Report (PAR)* of the U.S. National Science Foundation (NSF) for Fiscal Year (FY) 2005. This report presents the agency's financial condition and the results of our business operations for the past fiscal year. It also details our performance in meeting the goals established in our strategic plan.

Unlike other federal agencies that support research focused on a defined area such as agriculture, space or energy, NSF has responsibility for the overall health of science and engineering across *all* disciplines and at all levels of education. NSF accomplishes this mission by seeking out and funding research and education projects at the frontiers of science and engineering. Science and technology have become the driving force for progress and prosperity in the global economy, and NSF has a special responsibility in ensuring that the U.S. remains at the leading edge. For it is only by advancing the frontiers of science and engineering that the nation can develop the knowledge and innovative technologies needed to address new challenges, ensure national security, sustain economic prosperity and competitiveness, protect the environment, and maintain a high quality of life for all.

In FY 2005, NSF received nearly 41,800 proposals and made close to 9,800 awards to 1,700 colleges, universities and other research enterprises throughout the country. The discoveries resulting from NSF investments are both exciting and transformative. One recent advance shed light on an age-old question, "are we alone in the universe?" A team of astronomers found a new planet with a hot, rocky, geologically-active world orbiting a star not much different from our Sun. Similarly, NSF-supported researchers are developing new approaches to understanding living systems: chemist J. Andrew McCammon and his colleagues harnessed 10.4 teraflops (one teraflop is equal to one trillion operations per second) of computing power to simulate the behavior of molecules. This has led to a new understanding of the behavior of molecules inside cells and opened a new path for disease treatments, including for one of today's most devastating epidemics, the human immunodeficiency virus (HIV). These are just two examples of recent basic research breakthroughs.

Underlying the Foundation's programmatic achievements is a strong commitment to organizational excellence and sound financial management. There are several achievements of note:

- NSF received our eighth consecutive unqualified opinion from an independent audit of our financial statements, with no material weaknesses reported. My statement of assurance as to the completeness and reliability of our financial and performance information and NSF's compliance with the Federal Managers' Financial Integrity Act of 1982 (FMFIA) and the Federal Financial Management Improvement Act of 1996

(FFMIA) can be found in Management's Discussion and Analysis, which follows this message.

- NSF is among a handful of agencies that now have achieved successful "Green" ratings in four or more of the President's Management Agenda initiatives.

- All NSF programs evaluated to date by OMB's Program Assessment Rating Tool (PART) are among the 15 percent governmentwide that have received the highest "Effective" rating.

Finally, I am particularly pleased to share with you that NSF achieved one of the highest ratings – second among all agencies – for the "Best Place to Work" in the government. This ranking, based on the most recent Office of Personnel Management survey of federal employees, clearly reflects the level of dedication and innovation that defines both the staff and management at NSF who make organizational excellence a reality.

I invite you to visit our website (www.nsf.gov/discoveries) to learn about the discoveries that are emerging every day, many which will enhance our future in profound and extraordinary ways.

Arden L. Bement, Jr.
Director

November 8, 2005

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**

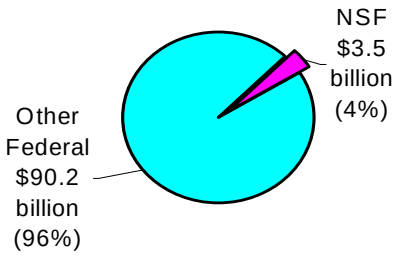
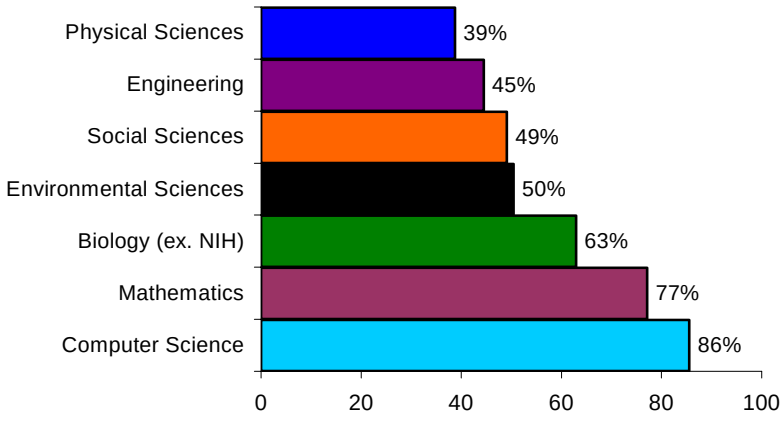


Figure 2. **NSF Support as a Percent of Total Federal Support of Academic Basic Research in Selected Fields**



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

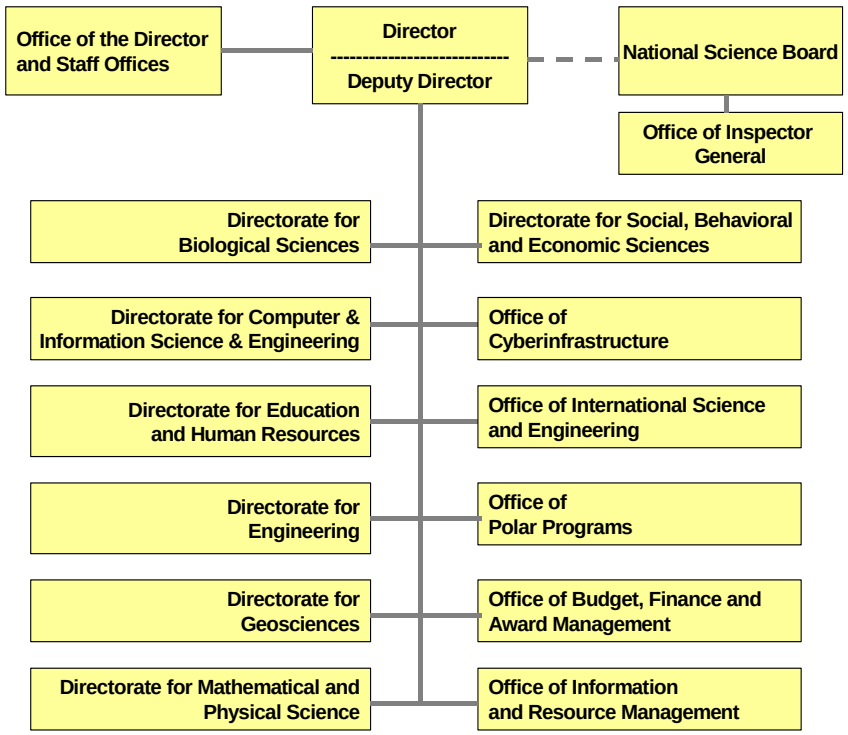
[2] Temporary appointments are made under the Intergovernmental Personnel Act (IPA), which are funded through program accounts, or through NSF's Visiting Scientists, Engineers, and Educator (VSEE) Program, funded through the administrative accounts and counted as federal FTE. As of September 30, 2005,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

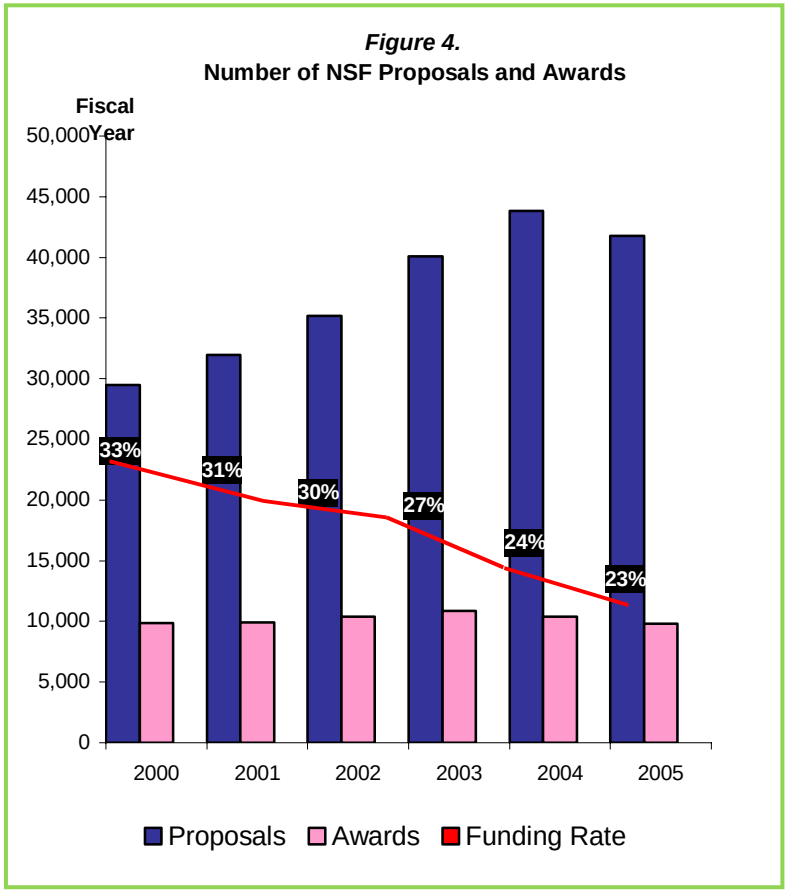
In FY 2005, NSF received 41,760 proposals and funded 9,794 new awards to nearly 1,700 colleges, universities, and other public institutions throughout the country (*Figure 4*).[4] Ninety percent of NSF funding is allocated through a merit-based competitive process that is recognized throughout the government 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.

Figure 3. National Science Foundation Organization



[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.

Figure 5. President's Management Agenda Scorecard	Baseline	Status	Progress
	Sept. 30, 2001	Sept. 30, 2005	
Strategic Management of Human Capital	R	G	G
Competitive Sourcing	R	R	Y
Improving Financial Performance	G	G	G
Expanded E-Government	Y	G	G
Budget and Performance Integration	R	G	G

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.

▶ 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.

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.

PERFORMANCE SUMMARY AND HIGHLIGHTS[9]

NSF's leadership in advancing the frontiers of science and engineering research and education is demonstrated, in part, through internal and external performance assessments. The results of our performance assessment process provide our stakeholders and the American taxpayer with vital information about the return on our investments. Performance assessment at NSF is guided by the Government Performance and Results Act of 1993 (GPRA),[10] OMB's PART,[11] and by NSF's *FY 2003–2008 Strategic Plan*.[12]

Assessing Long-Term Research

GPRA requires federal agencies to develop a strategic plan, establish annual performance goals, and report annually on the progress made toward achieving these goals. GPRA and PART pose a special challenge to agencies like NSF, which are involved in long-term science and education research. It is often not possible to link outcomes to annual investments because results from investments in basic research and education can be unpredictable. Science and engineering research projects can generate discoveries in an unrelated area, and it can take years to recognize discoveries and their impact. Assessing the impact of advances in science and engineering is inherently retrospective and is best performed using the qualitative judgment of experts. The use of external experts to review results and outcomes is a common, longstanding practice of the academic research and education community. NSF's use of such panels, such as the Committees of Visitors (COVs) and Advisory Committees (ACs) pre-dates GPRA and has been recognized as a valid, quality assessment by GAO and others.

The Foundation has used COVs and ACs for more than 20 years. These experts conduct independent assessments of the quality and integrity of our programs. On broader issues, NSF often uses external third parties such as the National Academies for outside review. We also convene external panels of experts for special studies. A schedule of NSF's program evaluations can be found in *Appendix 4A* and a list of the external evaluations completed in FY 2005 can be found in *Appendix 4B*.

OMB's approval of an alternative format for NSF performance assessment allowed us to develop a multilayer assessment approach, integrating quantitative metrics and qualitative reviews. NSF established an AC for GPRA Performance Assessment (AC/GPA) comprised of experts in various disciplines and fields of science, engineering, mathematics, and education to provide advice and recommendations to the NSF Director regarding the Foundation's performance under GPRA. As the reporting and determination of results for performance goals are inherently governmental functions, NSF makes the final determination on achievement using AC findings as one critical input.

This year, the AC/GPA met on June 16 and 17, 2005, to review a collection of over 900 outstanding accomplishments—or "nuggets"—compiled by NSF program officers. In prior years,

[9] This discussion presents highlights of NSF's FY 2005 Government Performance and Results Act of 1993 (GPRA) results and pertinent issues. For a comprehensive discussion of each of NSF's FY 2005 GPRA performance goals and PART measures, see Chapter II, *Performance*.

[10] For more information about GPRA, visit www.whitehouse.gov/omb/mgmt-gpra/gplaw2m.html.

[11] For more information about the Program Assessment Rating Tool (PART), visit www.whitehouse.gov/omb/part/ and *www.whitehouse.gov/omb/budget/fy2006/pma/nsf.pdf*.

[12] *NSF's FY 2003–2008 Strategic Plan* is available at www.nsf.gov/pubs/2004/nsf04201/FY2003-2008.pdf.

the AC/GPA, which includes experts in statistics and performance assessment, has had thorough discussions about the sampling technique used for compiling the nuggets. The approach to nugget collection is a type of nonprobabilistic sampling, commonly referred to as "judgmental" or "purposeful" sampling. This type of sampling is designed to identify notable examples and outcomes resulting from NSF's investments.

The aggregate of notable examples and outcomes collected can, by itself, demonstrate significant agencywide achievement in the strategic outcome goals. It is possible, although unlikely, that the AC could incorrectly conclude that NSF failed to show significant achievement due to the limited set of nuggets when, in fact, we actually achieved our goals. That is, the Committee could conclude that NSF did not show sufficient achievement based upon over 900 distinct accomplishments while, if time permitted, reviewing hundreds or thousands more would add enough data to show sufficient total results. The inverse, however, could not occur. If a subset of nuggets were sufficient to show significant achievement, adding more results would not change that outcome. Therefore, the limitation imposed by using a "judgmental" sample is that there is a possibility, though small, that significant achievement *would not* be sufficiently demonstrated while a larger sample would show otherwise.

In addition, the AC/GPA had access to all award abstracts, investigator project reports[13], and three years of COV reports (COV reports are prepared every three years) to give a full picture of the NSF portfolio. Moreover, the process of assessment by NSF's external advisory committee is itself assessed by an independent, external management consulting firm. A more detailed discussion of the verification and validation of GPRA and PART data can be found on page I-13 and in Chapter II.

FY 2005 GPRA Results

NSF's Strategic Plan outlines four overarching strategic outcome goals—*Ideas*, *Tools*, *People*, and *Organizational Excellence. Ideas*, *Tools*, and *People* are mission-oriented strategic goals focused on the long-term results of NSF's investments in science and engineering research and education. The *Organizational Excellence* goal is focused on administrative and management activities. NSF also tracks 17 other performance goals, which include performance measures from PART evaluations and goals that target award size, duration, and dwell time (time-to-decision) related to the effectiveness and efficiency of the agency's activities. A future concern continues to be proposal volume. Significant increases in proposal volume could affect timeliness of decisions and the willingness of the research and education communities to volunteer their time to perform reviews and serve on panels.

In FY 2005, NSF achieved all four strategic outcome goals[14] and 14 of 17 (82%) of our other performance goals. Overall, NSF achieved 86 percent of our annual performance goals. In the last five years, NSF's achievement of goals has ranged from a low of 64 percent in FY 2000 to a high of 90 percent in FY 2004. Selected results are presented in *Figure 6.*

[13] Not all investigator project reports were available to the Committee either because they were late or had not been submitted. A recent OIG audit determined that over a five-year period, approximately 47 percent of required final and annual reports were submitted late or not at all. Of 43,000 final project reports, 8 percent were never submitted and 53 percent were submitted an average of 5 months late. NSF is taking steps to ensure the timely submission of all such reports in the future.

[14] For the *People* goal, the AC/GPA concluded that one performance indicator was not achieved. The Committee noted regarding the trend in *People* funding that "[t]his trend should be monitored carefully by the AC/GPA because it could have an adverse impact on NSF's ability to demonstrate significant achievement in the future. See Chapter II for a comprehensive discussion of NSF's performance goals.

Figure 6.

Selected FY 2005 Performance Goals and Results

Strategic Outcome Goals	Results
IDEAS: Advancing the frontiers of science and engineering ensure that America maintains its global leadership. Investments in Ideas build the intellectual capital and fundamental knowledge that drive technological innovation, spur economic growth, increase national security, and improve the quality of life for humankind around the globe.	● FY 2001 ● FY 2002 ● FY 2003 ● FY 2004 ● FY 2005
TOOLS: State-of-the art tools and facilities are essential for researchers working at the frontier of science and engineering. Investments in Tools, including a wide range of instrumentation, multi-user facilities, distributed networks, and computational infrastructure, as well as the development of next-generation research and education tools, are critical for advancement at the frontier.	● FY 2001 ● FY 2002 ● FY 2003 ● FY 2004 ● FY 2005
PEOPLE: Leadership in today's knowledge economy requires world-class scientists and engineers and a workforce that is scientifically, technically, and mathematically strong. Investments in People aim to improve the quality and reach of science, engineering and math education and enhance student achievement.	● FY 2001 ● FY 2002 ● FY 2003 ● FY 2004 ● FY 2005
ORGANIZATIONAL EXCELLENCE: NSF is committed to excellence and results-oriented management and stewardship. NSF strives to maintain an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices. *(Note: This goal was established in FY 2004.)*	● FY 2004 ● FY 2005
Other Performance Goals	**Results**
AWARD SIZE: Increase average annualized award size for research grants to $140,000.	● FY 2001 ● FY 2002 ● FY 2003 ● FY 2004 ● FY 2005
AWARD DURATION: Increase average duration of research grants to 3 years. NSF is not successful for this goal. Progress on this goal is budget dependent. Program Directors must balance competing requirements: increasing award size, increasing duration of awards, and/or making more awards. NSF will continue to focus on increasing award size and duration, together with recovering from recent declines in success rates, as permitted within budget constraints. The performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program or activity performance.	■ FY 2001 ■ FY 2002 ■ FY 2003 ■ FY 2004 ■ FY 2005
CUSTOMER SERVICE/TIME-TO-DECISION: Inform applicants about funding decisions within 6 months of receipt for 70 percent of proposals.	■ FY 2001 ● FY 2002 ● FY 2003 ● FY 2004 ● FY 2005

KEY

● *Goal was achieved.*

■ *Goal was not achieved.*

The impact and success of NSF's programs in achieving important discoveries is illustrated in the following examples. Additional examples can be found in Chapter II and on NSF's website at www.nsf.gov/discoveries/.

A "Smart" Bio-Nanotube: Materials scientists working with biologists at the University of California, Santa Barbara have developed "smart" bio-nanotubes—with open or closed ends—that could be developed for drug or gene delivery applications. The nanotubes are "smart" because in the future they could be designed to encapsulate and then open up to deliver a drug or gene in a particular location in the body. The scientists found that by manipulating the electrical charges of lipid bi-layer membranes and microtubules from cells, they could create open or closed bio-nanotubes, or nanoscale capsules.

Of Microbes and Mars: Researchers at the University of Arizona in Tucson have discovered life beneath the parched surface soil of one of the driest places on Earth—Chile's Atacama Desert. Their finding may influence how scientists look for life in a similarly extreme location—Mars. The similarities between the Atacama and Mars are striking. The surface of Mars has apparently been dry for millions or even billions of years. But the driest "absolute desert" region of the Atacama is not much moister; it rains there about once every 20 years, although no one measures it. In fact, the desiccated vista of dirt and rocks is so Mars-like that the National Aeronautics and Space Administration (NASA) uses the area as a model for the Red Planet. Despite its inhospitable qualities, a team of NSF-funded scientists has discovered microbial life about a foot below the rough terrain. This finding contradicts a previous report asserting that the Atacama's absolute desert is too dry to support life and is essentially sterile. These findings suggest that how researchers search for evidence of life on the Red Planet may affect whether they find it or not.

Really Old Bones: A team of Indiana University anthropologists has excavated fossils of early humans in Gona, in the Afar region of Ethiopia, which they believe come from nine individuals of the species *Ardipithecus ramidus* who lived between 4.3 and 4.5 million years ago. "While biomolecular evidence helps us to date the timing of major events in the evolution of apes and humans, there is no substitute for fossils when it comes to trying to picture the anatomy and behavioral capabilities of our early relatives," notes NSF Program Officer Mark Weiss. "The late Miocene-early Pliocene is a particularly important era as it was roughly at that time that our ancestors and those of the chimpanzee parted company. Each new fossil helps to tell a bit more of the story of these early stages in human origins." Several Ethiopian dig sites have yielded hominid fossils from that time period. The Gona site was previously known for the excavation of the oldest stone tools ever discovered. Plant and animal fossils indicate that these early humans lived in a low-lying area with swamps, springs, streams, and volcanic centers, with a mosaic of woodlands and grasslands.

PART Evaluations

In 2002, OMB developed the PART, a systematic method for assessing the performance of program activities across the federal government. Each year, about 20 percent of an agency's programs must undergo PART review. All four NSF programs that were evaluated for the FY 2005 PART process — *Individuals, Facilities, Information Technology Research, and Nanoscale Science and Engineering* — received the highest rating of "Effective." Of the more than 600 federal programs that have been evaluated by PART, only 15 percent have been rated as effective. Moreover, all of NSF's priority areas and programs under the current strategic plan that have undergone PART evaluation to date have been rated as effective. These outstanding results reflect the fact that NSF's competitive awards process helps ensure quality, relevance, and performance, which are key components of the Administration's Research and Development (R&D) Criteria.

Figure 7. NSF PART Evaluations Investment Category/ Priority Area	Budget Year	Result
Tools		
Facilities	FY 2005	Effective
Polar Tools, Facilities, and Logistics	FY 2006	Effective
People		
Individuals	FY 2005	Effective
Institutions	FY 2006	Effective
Collaborations	FY 2006	Effective
Priority Areas		
Information Technology Research	FY 2005	Effective
Nanoscale Science and Engineering	FY 2005	Effective
Biocomplexity in the Environment	FY 2006	Effective
For more information visit: www.whitehouse.gov/omb/budget/fy2006/pma/nsf.pdf		

NSF completed eight out of the nine PART assessment recommendations for the FY 2005 PARTs, resulting in continued high performance, as shown in the "effective" program ratings. The only remaining improvement from the FY 2005 PARTs is to strengthen project management and performance for facilities. In response, NSF achieved its goal for facilities operation for the first time in FY 2005. Since NSF did not achieve its facilities goal regarding cost and schedule in FY 2005, projects funded by the Major Research Equipment and Facilities Construction (MREFC) appropriation will be required to provide quarterly financial reporting, comparing budgeted expenditures to actual expenditures for each Work Breakdown Schedule (WBS) identified in their construction project as described in the approved Project Execution Plan. MREFC projects will also be required to provide quarterly status reports with a graph of cumulative earned value for the construction of the overall project. NSF will include language in the cooperative agreement for each MREFC awardee to be completed by the end of FY 2006.

Data Verification and Validation

For the sixth consecutive year, NSF engaged an independent, external consulting firm, IBM Business Consulting Services (IBM), to verify and validate the reported results of the agency's annual performance goals. The assessment is based on guidance established by GAO's *Guide to Assessing Agency Annual Performance Plans (GAO/GGD-10.1.20)*. IBM validated the accuracy of NSF's performance data and reported outcomes of performance goals and indicators; verified the reliability of the processes used to collect, process, maintain, and report data; reviewed system and other internal controls to confirm that quality input resulted in quality output; documented and assessed the COV process of two qualitative goals being reviewed for the first time; and

documented any changes to processes and data for those goals undergoing an updated review. IBM's final report included the following: [15]

> *Overall, we conclude that NSF continues to make a concerted effort to report its performance results accurately and has effective systems, policies, and procedures to promote data quality. NSF relies on sound business policies, internal controls, and manual checks of system queries to report performance and maintains adequate documentation of processes and data for an effective verification and validation review.*
>
> *Based on our review, we verified the adequacy of the processes and data to yield valid and reliable results for all 21 goals under review.*

About its review of the work of the AC/GPA, IBM included the following in their final report:

> *We once again verify and validate that the AC/GPA process is sufficiently robust and reliable to yield a valid conclusion on NSF's achievement in its Strategic Outcome Goals. The process involves a robust collection of performance information, reviewed qualitatively by a highly qualified and diverse Committee of science experts, with sufficient documentation and transparency to assure accountability and confidence in the AC/GPA's assessment.*
>
> *…we did assess the process NSF used to provide information and guidance to the Committee; the quality of the performance information; the Committee's qualifications and independence; and how the Committee performed its work. Based on our observations, we verify that this process is appropriate and leads to a proper determination of results by the Committee.*

Integration of Budget, Performance, and Cost

NSF's *FY 2003–2008 Strategic Plan* establishes a framework that aligns and integrates NSF's performance goals with programmatic activities and budget.[16] As shown on the Strategic Goal Structure chart (*Figure 8*), all programmatic activities are aligned to an "investment category" and one of the four strategic goals of *Ideas, Tools, People* and *Organizational Excellence*. We are able to track budgetary resources, obligations, and expenditures and identify the full cost of its programs. (See following discussion on *Organizational Excellence*, which explains the allocation of overhead to develop the full cost of programs.) In December 2004, OMB recognized our integration of budget, performance, and cost and upgraded our Budget and Performance Integration Initiative to a successful "Green" rating.

NSF's *Statement of Net Cost*[17] reports the full cost of each of the strategic goals of *Ideas, Tools,* and *People* and the ten primary programmatic activities (the "investment categories") that are associated with these three strategic goals. It is these investment categories, along with NSF's priority areas,[18] that are the primary programs that undergo OMB's PART review.

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[15] *NSF Government Performance and Results Act (GPRA) and Program Assessment Rating Tool (PART) Performance Measurement Verification and Validation, FY 2005 Final Report*, October 2005.
[16] NSF's FY 2005 and FY 2006 Budget Requests are available at www.nsf.gov/about/budget/.
[17] For a detailed discussion of the Statement of Net Cost, see Financial Statement Note 10 (page III-45).
[18] NSF's FY 2005 priority areas are: *Biocomplexity in the Environment; Nanoscale Science and Engineering; Mathematical Sciences;* and *Human and Social Dynamics.*

Figure 9 shows NSF's FY 2005 obligations for the four strategic outcome goals: $2.74 billion for *Ideas;* $1.40 billion for *Tools;* $1.06 billion for *People;* and $0.28 billion for *Organizational Excellence.* NSF's *Organizational Excellence* goal focuses on administration and management; its portfolio supports operational costs such as staff compensation and benefits, administrative travel, training, rent, IT business systems, the OIG and the NSB. In the *Statement of Net Cost,* these *Organizational Excellence* operational costs have been allocated to the 10 investment categories aligned to *Ideas, Tools,* and *People,* in order to identify the full cost of NSF's primary programs. *Figure 10* shows the FY 2005 obligations for *Ideas, Tools,* and *People* with *Organizational Excellence* allocated to the ten investment categories by Congressional appropriation.

Figure 8.

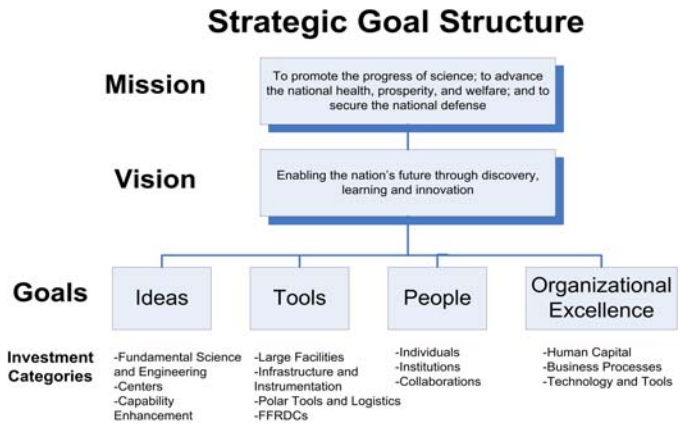
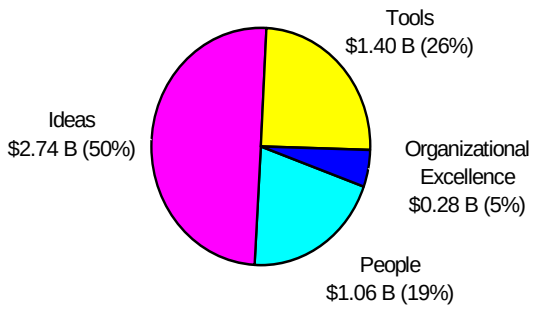


Figure 9.

FY 2005 Budget Obligations, $5.48 billion*



*See Figure 10, second note.

It is important to note that this view of how NSF deploys its budget does not reflect the fact that NSF investments often serve multiple purposes. For example, research projects in programs categorized under *Ideas* commonly provide funds that involve graduate students. They contribute, therefore, to the *People* strategic outcome goal. These indirect investments are important to the attainment of the Foundation's goals and Program Officers are expected to take such potential contributions into account when making awards. The synergy attained across the four strategic goals attests to the real strength of the NSF process.

Figure 10.

FY 2005 Support of NSF's Strategic Outcome Goals and Investment Categories By Appropriation

(obligations in millions of dollars)

	R&RA*	EHR*	MREFC*	S&E*	NSB*	OIG*	**TOTAL**
IDEAS							
Fundamental Science & Engineering	2,212.9	60.5	0.0	96.9	1.6	4.4	2,376.3
Centers	238.7	0.0	0.0	10.2	0.2	0.5	249.5
Capability Enhancements	140.2	109.7	0.0	10.6	0.2	0.5	261.2
TOOLS							
Large Facilities	327.3	0.0	148.3	20.3	0.3	0.9	497.2
Infrastructure & Instrumentation	452.4	17.9	0.0	20.0	0.3	0.9	491.6
Polar Tools, Facilities & Logistics	263.4	0.0	16.9	11.9	0.2	0.5	293.0
FFRDC's	183.6	0.0	0.0	7.8	0.1	0.4	191.9
PEOPLE							
Individuals	350.1	176.7	0.0	22.4	0.4	1.0	550.6
Institutions	34.6	112.0	0.0	6.2	0.1	0.3	153.2
Collaborations	31.5	366.8	0.0	17.0	0.3	0.8	416.3
TOTAL	$4,234.8	$843.5	$165.1	$223.4	$3.6	$10.2	$5,480.8 **

Notes:

* NSF has six congressional appropriations: Research & Related Activities (R&RA), Education and Human Resources (EHR), Major Research Equipment and Facilities Construction (MREFC), Salaries and Expenses (S&E), Office of Inspector General (OIG), and National Science Board (NSB).

** Base obligation of $5,480.8M plus Donation Account ($30.3M), H1-B Nonimmigrant Petitioner Receipts ($25.9M), Reimbursable Authority ($111.8M), and appropriation with expired obligation authority in FY 2005 ($5.1M) equals total obligations incurred as shown on the Statement of Budgetary Resources ($5,653.9M).

FFRDC: Federally Funded Research and Development Centers

Totals may not add due to rounding.

MANAGEMENT INTEGRITY: CONTROLS, COMPLIANCE AND CHALLENGES

The Federal Managers' Financial Integrity Act of 1982 (FMFIA) requires annual review of an agency's internal accounting and administrative controls. The results of NSF's assessment are reported here in the agency's *FY 2005 Performance and Accountability Report*, consistent with the provisions of the Reports Consolidation Act of 2000.

At NSF, the Chief Operating Officer (COO) oversees the effort to evaluate and report to the Director on the status of management controls, with executive secretariat support provided by the Chief Financial Officer (CFO). The Senior Management Integration Group (SMIG), chaired by the COO, considers accountability and controls within the broader context of agency operations. Assistant Directors and Staff Office Directors provide annual statements on FMFIA reviews and the status of internal control within their organizations. These statements serve as the primary basis for the Foundation's assurance that management controls are adequate and effective. Together, the statements cover programmatic, administrative, IT and financial functions, including assessments from the CFO and the Chief Information Officer. The statements are consolidated, then reviewed by the COO and SMIG. The individual organizational reviews, together with a consolidated summary assessment, are reported to the Director.

Based on the organizational reviews conducted June – August 2005, and the consideration by the COO and SMIG, it was reported to the Director that the agency's management controls and financial management systems, taken as a whole, provide reasonable assurance that provisions of FMFIA Section 2 (internal and administrative controls) and Section 4 (financial systems) were achieved for FY 2005, as well as requirements of the Federal Financial Management Improvement Act (FFMIA). NSF systems are in compliance with applicable laws and administrative requirements, including *OMB Circular A-123: Management Accountability and Controls* and *OMB Circular A-127: Financial Management Systems.*

During the FY 2005 internal control evaluation process no material weaknesses were identified, as defined by OMB guidance. However, concerns were expressed about the FedTraveler system, part of the Federal E-government initiative. Several flaws were identified in the system currently provided to NSF – regarding appropriate documentation, security for privacy protection, and potential for financial errors. NSF has put in place several manual procedures to help ensure the integrity of the process. Because of these interventions, we do not believe that deficiencies in FedTraveler rise to the level of a material weakness. The agency is also pursuing options for improvements, in concert with the General Services Administration, OMB and other agencies involved, and is working directly with the contractor on process improvements to be made in the first quarter of FY 2006.

As in previous years, senior management also identified issues that, while not management control deficiencies, could be potential impediments to effective controls in the future if not addressed. Challenges were identified, in particular, in the following areas: adequate travel funds for staff oversight of projects; administrative resources for increased workload, additional space requirements, the changing electronic workplace; and the interoperability of multiple electronic systems. There are efforts underway to address these cross cutting issues, including a business analysis, human capital planning, and continual improvement of IT systems and security. All of these actions contribute to sustaining NSF's record of effective and efficient management.

During FY 2005, NSF also initiated efforts to prepare to meet the new requirements in revised OMB *Circular A-123: Management's Responsibility for Internal Control* effective FY 2006. A senior management Accountability and Performance Integration Council (APIC) was established to serve as a focal point for assessing, documenting, and reporting on internal control under the revised guidance. NSF management also obtained expert consulting services to assist in planning for implementation of the revised A-123 requirements. NSF provided the agency plan for implementing the revised requirements in Appendix A of A-123 to OMB. During this ongoing planning process, there were no indications of any significant weaknesses related to internal control. Progress on the planning was shared, on a regular basis, with OIG and the independent auditors through the Audit Coordinating Committee.

In the FY 2005 Independent Auditors' Report, NSF received an unqualified opinion on its financial condition, with no material weaknesses. The FY 2005 audit includes two reportable conditions: post-award monitoring and contract monitoring. In resolving all FY 2004 post-award monitoring corrective action plan recommendations, management believes that NSF has mitigated the possibility of a significant deficiency that would adversely affect its ability to record, process, summarize and report financial data. In regard to contract monitoring, significant progress has been made and we will continue to pursue corrective action to complete our response. Here, too, management judges that safeguards are in place adequate to divert any serious threat to agency stewardship of Federal funds. NSF management's position is fully discussed in the response to the Auditors' report.

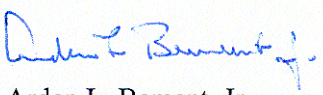
The Director of NSF has determined that the Foundation is in substantial compliance with FMFIA and FFMIA. His statement of assurance appears below.

Director's Statement of Assurance for FY 2005

I am pleased to report that:

- NSF is in substantial compliance with the requirements of the Federal Managers' Financial Integrity Act of 1982 (FMFIA) and the Federal Financial Management Improvement Act of 1996 (FFMIA), and there are no material weaknesses in the agency's internal control; and
- As required by section 1116(e) of title 31 of the United States Code, the financial and performance information contained in this report is complete and reliable as defined by the Office of Management and Budget guidance.

My assessment is based on the results of the agency's senior management internal control review conducted in late summer, the Independent Auditor's Report received on November 4, 2005; and an independent external consulting firm's recent verification and validation review of NSF's GPRA and PART performance results.



Arden L. Bement, Jr.

November 8, 2005

FINANCIAL DISCUSSION AND ANALYSIS

NSF is committed to excellence in financial management. We strive to provide our stakeholders with the highest quality of business services. We honor that commitment by preparing annual financial statements in accordance with United States general accepted accounting principles (GAAP) for federal government entities and subjecting the statements to an independent audit to ensure their integrity and reliability in assessing the performance. For FY 2005, NSF received an unqualified opinion that the financial statements were fairly stated in all material respects. The FY 2005 Auditors' Report includes two reportable conditions: post-award monitoring and contract monitoring. In resolving all FY 2004 post-award monitoring corrective action plan recommendations, management believes that NSF has mitigated the possibility of a significant deficiency that could adversely affect our ability to record, process, summarize and report financial data. With regard to contract monitoring, significant progress has been made and we will continue to pursue corrective action. For further discussion, see management's response on page III-17.

NSF's CFO Five-Year Financial Management Plan supports the President's Management Agenda (PMA) by establishing key components to accomplish our financial management strategic vision. These components are: efficient stewardship and accountability to maximize the public resources provided to NSF; quality business services for our external and internal customers; efficient delivery of operations, transactions and outreach through e-systems; new and improved business practices through the development of constructive partnerships; and proactive leadership in all endeavors.

Understanding the Financial Statements

NSF's FY 2005 financial statements and notes are presented in the format required for the current year by *OMB Circular No. A-136, Financial Reporting Requirements* dated August 23, 2005, which supercedes, *OMB Bulletin No. 01-09, Form and Content of Agency Financial Statements,* dated September 25, 2001, and OMB memoranda, specifically *M-04-20, FY 2004 Performance and Accountability Reports and Reporting,* dated July 22, 2004. NSF's current year financial statements and notes are presented in a comparative format. The Stewardship Investment schedule presents information over the past five years. The following table (*Figure 11*) summarizes the significant changes in NSF's financial position during FY 2005.

Figure 11.

Significant Changes in NSF's Financial Position in FY 2005

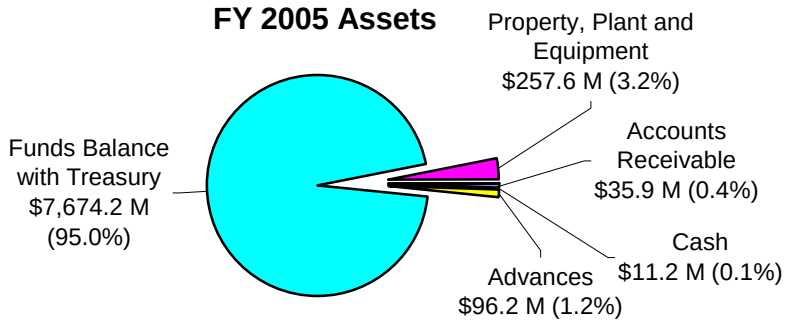
(dollars in thousands)

Net Financial Condition	FY 2005	FY 2004	Increase/ (Decrease)	% Change
Assets	$8,075,059	$7,929,034	$146,025	2%
Liabilities	$377,543	$396,113	($18,570)	-5%
Net Position	$7,697,516	$7,532,921	$164,595	2%
Net Cost	$5,408,174	$5,100,143	$308,031	6%

The following is a brief description of the nature of each required financial statement and its relevance. Certain significant balances or conditions are explained to help clarify their relationship to NSF operations.

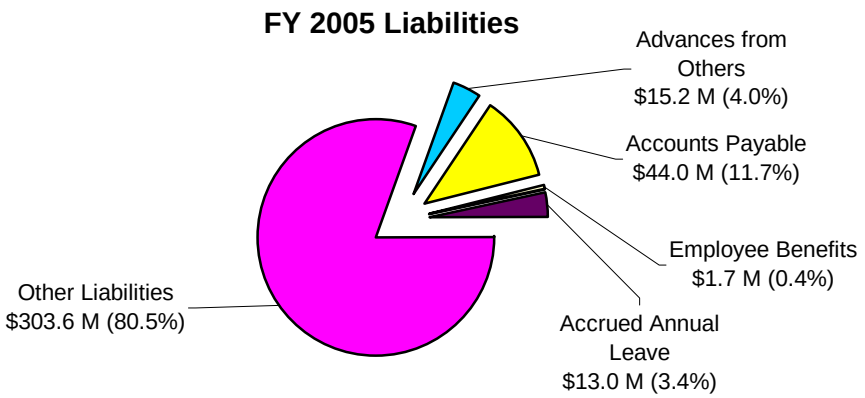
Balance Sheet: The Balance Sheet presents the total amounts available for use by NSF (assets) against the amounts owed (liabilities) and amounts that comprise the difference (net position). Three line items consisting of *Fund Balance with Treasury; Property, Plant and Equipment;* and *Advances* represent 99 percent of NSF's current year assets (*Figure 12*). *Fund Balance With Treasury* is funding available through the Department of Treasury accounts from which NSF is authorized to make expenditures and pay amounts due. *Property, Plant and Equipment* comprises capitalized property located at NSF headquarters and NSF-owned property in New Zealand and Antarctica that supports the U.S. Antarctic Program (USAP). *Advances* are funds advanced to NSF grantees, contractors, and other government agencies.

Figure 12.



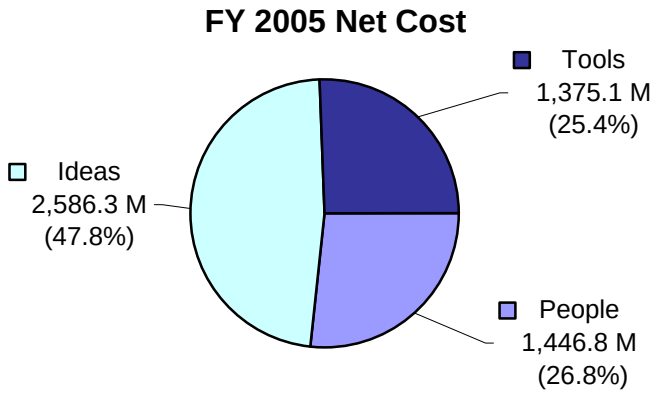
Three line items, *Advances From Others*, *Accounts Payable*, and *Accrued Liabilities* (*Other Liabilities)* represent 96 percent of NSF's current year liabilities (*Figure 13*). *Advances From Others* are amounts remaining from funds advanced to NSF by other federal entities for grant administration. NSF maintains the expertise and automated systems for the administration of research grants upon which other federal entities rely. *Accounts Payable* includes liabilities to NSF vendors for unpaid goods and services received. *Accrued Liabilities* are amounts recorded for NSF's grants and contracts for which work has been completed and payment has not been made.

Figure 13.



Statement of Net Cost: This statement presents the annual cost of operating NSF programs. Gross cost less any offsetting revenue for each NSF program is used to arrive at the net cost of specific program operations. *Intragovernmental Earned Revenues* are recognized when these related program or administrative expenses are incurred and deducted from the full cost of the programs to arrive at the net cost of operation. In FY 2005, the *Statement of Net Cost* was reordered to reflect the current presentation order of NSF's strategic goals. The *Statement of Net Cost* reflects programmatic changes that were made in FY 2005, including an update to the principles for classifying NSF's Centers program and re-categorization of several activities under the *People* goal. The increase in Polar Tools, Facilities and Logistics reflects the activity associated with construction of the South Pole Station Modernization Project.

Figure 14.



Note: Included in Ideas, Tools, and People, is approximately 5 percent of NSF's Salaries & Expenses, National Science Board and the Office of the Inspector General costs that are the administration and management costs addressed by NSF's Organizational Excellence strategic goal.

Approximately 95 percent of all current year NSF costs incurred were directly related to the support of our *Ideas, Tools,* and *People* programs (*Figure 14*). Costs were incurred for indirect general operation activities (e.g., salaries, training, activities related to the advancement of NSF information systems technology, and activities of the NSB and the OIG). These costs were allocated to NSF's investment categories under *Ideas, Tools, and People,* and account for slightly more than 5 percent of the total current year *Net Cost of Operations*. These administrative and management activities are the focus of our *Organizational Excellence* strategic goal.

Statement of Changes in Net Position: This statement presents the accounting items that caused the net position section of the Balance Sheet to change from the beginning to the end of the reporting period. NSF's Net Position increased to $7.7 million in FY 2005—an increase of 2 percent—due to the increase in *Unexpended Appropriations. Unexpended Appropriations* is affected mainly by *Appropriations Received* and *Appropriations Used*, with minor impact from *Appropriation Transfers* from the U.S. Agency for International Development (USAID) and *Other Adjustments*, which include appropriation rescissions and cancellations.

Statement of Budgetary Resources: This statement provides information on how budgetary resources were made available to NSF for the year and the status of those budgetary resources at year-end. For FY 2005, *Budgetary Authority* for Research and Related Activities, Education and Human Resources, Major Research Equipment and Facilities Construction, the combined National Science Board, OIG and Salaries & Expenses were $4,255 million, $848 million, $175 million and $239 million, respectively. *Total Budgetary Resources* decreased by 2.52 percent and *Net Outlays* increased by 6 percent in FY 2005. The *Net Outlays* reported on this statement reflects the actual cash disbursed for the year by Treasury for NSF obligations; it is reduced by the amount of Donation Fund receipts, to include donations and interest received by NSF.

Statement of Financing: This statement illustrates the relationship between *Net Obligations* derived from NSF's budgetary accounts and the *Net Cost of Operations* reported on the *Statement of Net Cost*, which is derived from NSF's proprietary accounts. The statement is structured to first identify total resources classified by obligations, and then other adjustments are made to those resources based on how additional items financed those resources or contributed to net cost. *Total Resources Used to Finance Activities* are only resources that have been obligated and are derived from information provided on the Statement of Budgetary Resources. *Total Resources Used to Finance Items Not Part of Net Cost of Operations* consists mainly of an adjustment to undelivered orders of the agency that are reflected in net obligations but not part of *Net Cost of Operations*. *Components Requiring or Generating Resources in Future Periods* adjusts for future funded expenses that are recognized in *Net Cost of Operations* but resources will not be provided until subsequent periods.

Stewardship Investments: Stewardship investments are NSF-funded investments that yield long-term benefits to the general public. NSF investments in research and education yield quantifiable outputs, including the number of awards made and the number of researchers, students, and teachers supported or involved in the pursuit of discoveries in science and engineering and in science and math education. Stewardship investments from FY 2004 to FY 2005 showed consistent incremental increases in research and human capital activities in support of NSF's overall mission as reported in monetary investments and measured outputs.

Budgetary Integrity: NSF Resources and How They Are Used

NSF is funded primarily through six Congressional appropriations that totaled $5.5 billion[19] in FY 2005. As of September 30, 2005, other FY 2005 revenue sources included $111.8 million in reimbursable authority, $9.7 million in appropriation transfers from other federal agencies, and $31.2 million in donations to support NSF activities.

As shown in the Statement of Net Cost, NSF made investments in fundamental research and education through ten investment categories linked to the agency's three mission-oriented strategic outcome goals of *Ideas, Tools, and People*.[20] These investment categories, together with NSF's priority areas, constitute the agency's PART programs. The investment categories are: Individuals, Institutions; Collaborations; Fundamental Science and Engineering; Centers;

[19] Includes a governmentwide 0.80 percent rescission, an across-the-board reduction required in Division J (I) Miscellaneous Provisions and Offsets, section 122(a) of the FY 2005 Consolidated Appropriations Act.

[20] See page I-15 for a discussion of NSF's fourth strategic goal of *Organizational Excellence*, which focuses on the agency's administrative and management activities.

Capability Enhancement; Large Facilities; Infrastructure and Instrumentation; Polar Tools, Facilities, and Logistics; and Federally Funded Research and Development Centers. NSF provided support across the full range of science and engineering disciplines. In addition, we funded research in four key multidisciplinary priority areas: Biocomplexity in the Environment, Nanoscale Science and Engineering, Mathematical Sciences, and Human and Social Dynamics. NSF supported education activities for students and teachers from pre-K through the post-doctoral level. Among major research facility projects supported were EarthScope, a distributed geophysical instrument array that will enhance our understanding of the structure and dynamics of the North America continent and the IceCube Neutrino Detector Observatory in Antarctica.

At the time of this report, NSF had not yet received its FY 2006 appropriations. For FY 2006, in keeping with efforts to promote fiscal responsibility across the government, NSF will focus on four priorities: strengthen core disciplinary research; provide broadly accessible cyberinfrastructure and world-class facilities; broaden participation in the science and engineering workforce; and sustain organizational excellence in NSF management practices. During the coming year, we will also focus on four additional themes: crosscutting areas of emerging opportunity to support interdisciplinary endeavors that hold exceptional promise for advancing knowledge and addressing national priorities; international collaborations that are critical in today's global science and engineering community; interagency initiatives such as the Climate Change Science Program; and homeland security activities.

Improper Payments Information Act of 2002: Summary of Initiative Efforts, Results, and Agency Plans

The Improper Payments Information Act (IPIA) of 2002 and OMB guidance requires agencies to review all programs and activities, identify those susceptible to significant erroneous payments, and determine an annual estimated amount of erroneous payments made in those programs.

In support of our implementation of the PMA initiative on improper payments, we conducted a risk assessment of NSF payments in accordance with IPIA guidance. The risk assessment confirmed NSF's "Research and Education Grants and Cooperative Agreements" program (NSF's IPIA program), identified in former Section 57 of OMB Circular No. A-11, as requiring review and meeting IPIA reporting thresholds of erroneous payments over $10 million and 2.5 percent of program payments.

NSF's 2004 initial response to the IPIA requirements was directed to awards already identified as high-risk through our pre-existing Award Monitoring and Business Assistance Program. In FY 2005, we revamped our Improper Payments Plan and implemented a process to ensure improper payments testing for NSF's IPIA program portfolio.

NSF contracted with McBride, Lock, and Associates, Certified Public Accountants, to conduct an annual statistical review of NSF's Federal Cash Transaction Report (FCTR) transactions received from grant recipients. Management Analysis, Inc. (MAI) conducted the statistical sample determination under a subcontract agreement with McBride, Lock, and Associates. NSF staff in the Division of Financial Management and Division of Institution and Award Support worked closely with both contractors to create a milestone chart, develop sampling plans, and ensure ongoing grantee communication throughout the review.

The contractors sampled the universe of all FCTR transactions in NSF's IPIA program from the quarter ending December 31, 2003, through the quarter ending September 30, 2004. The sample encompassed each of the quarterly transactions for each grantee. FCTR transaction data analyzed was selected randomly from the entire universe. The results of the review and the extrapolation of results to the $4.2 billion universe of NSF's IPIA program payments determined IPIA rates of 0.0248 percent or $1.05 million. NSF's results are well below the $10 million IPIA Act requirement for reduction plan reporting.

NSF's electronic process for cash draws and FCTR payments is highly automated and accurate. Our grant payment process in paying eligible grant recipients has been near perfect—99.9 percent—for many years and is one of the most accurate in government. Therefore, our IPIA initiative focuses on the awardees' proper use of taxpayer funds. These statistically favorable results demonstrate the effectiveness of NSF's end-to-end award management process.

As the lead research grant-making agency participating in the IPIA initiative, NSF encountered challenges in developing an appropriate plan for sampling FCTRs. This year we overcame the challenges and implemented a successful IPIA assessment program for grantees. The combination of contractor and internal resources provided a knowledgeable team. NSF will continue its successful IPIA program in the future and will discuss results and our inclusion in future reporting requirements with OMB. Additional detailed information is provided in *Appendix 5A.*

Financial System Strategy

The goal of our financial management team has always been to provide the highest quality of business services to our customers, stakeholders, and staff through effective funds control, prompt and streamlined award processes, and reliable and timely financial data to support sound management decisions. Our Financial Accounting System (FAS) enables us to achieve these goals. Introduced in April 2001, FAS is an online, real-time custom developed system that provides the full spectrum of financial transaction functionality required by a grants-making agency. FAS allows NSF to consistently meet financial reporting deadlines, helps ensure FFMIA compliance, and provides accurate, on-demand financial information to NSF staff. The system includes extensive reporting capabilities to assist in verifying funds throughout the fiscal year.

FAS is extensively integrated with all of NSF's core business systems, including the Proposal and Reviewer System (PARS), the Awards System, Guest (panelists) Travel System, and the FastLane System that supports grants management. FAS is used to monitor, control, and ensure the management and financial accountability of approximately 20,000 active awards with more than 2,000 external grantees. FAS distributes funds electronically to grantees in a seamless and highly controlled environment. Grantees can check available funds in real time on a daily basis. The extensive reporting capabilities built into the software include daily, weekly, monthly, and quarterly reports, which provide up-to-date financial information about NSF operations for program and grantee decision support. All FAS-generated reports are posted electronically and are available to staff via Report.web. Information from FAS is captured and used in our Enterprise Information System reporting. FAS is custom software that was developed and is maintained by NSF to support our extensive grant-making enterprise.

FAS, which was recently updated, is remarkably stable and reliable. Funding support for the system enables NSF to meet interface and integration requirements of any governmentwide initiatives (e.g., e-Travel, CCR/BPN, e-Learning, GWA-TAS/BETC); to adopt new legislative,

regulatory, and policy requirements as they are promulgated; and to implement required technical upgrades. FAS supports both the grant and core financial processes. Consistent with NSF's eGovernment Implementation Plan, NSF does not anticipate development of any substantive FAS capabilility (steady-state) for the next several years. During this time frame, NSF will conduct reviews of both the grants management and financial management requirements, assess the status and capabilities of the governmentwide line of business initiatives, and define a comprehensive plan for addressing next generation grants and financial management priorities.

Key Financial Metrics

The information presented in this section relates certain key financial measures of NSF's core business of awarding grants and our progress in associated electronic processes. We have an established record of success in leveraging automation to increase efficiency and productivity. In FY 2004, the Department of Treasury inaugurated a Financial Management Service Scorecard, which issues quarterly ratings (Figure 15). NSF has consistently received the highest "Green" ratings for accuracy and timeliness of our financial reporting.

Figure 15.
U.S. Department of Treasury Financial Management Scorecard

Category	Standard	Results *(as of 6/30/05)*
Accuracy of Reporting*	Green: If differences outstanding for less than 3 months.	●
Timeliness of Reporting*	*Green*: If original and supplemental reporting completed by the third workday.	●
Cash and Investments Held Outside of the Treasury (CIHO) Reporting**	*Green:* If no differences between CIHO activity reported monthly (via 224, 1218/1221 and 1219/1220) and quarterly/annual financial statements.	N/A

● Green

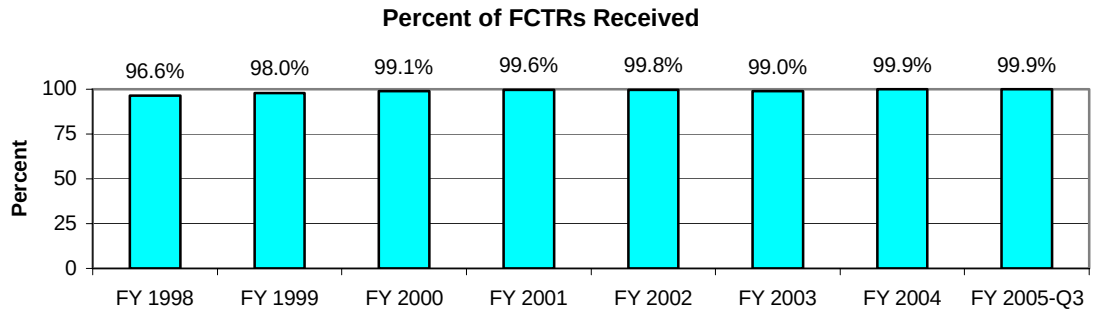
* FMS 224, SF1218/1221 and FMS 1219/1220.
** NSF does not have CIHO accounts.

Figures 16 and *17* focus on the FCTR process, a key part of NSF's core grant business. In FY 1998, we developed FastLane, a secure, web-based application that enables grantees to electronically transmit their FCTR (SF 272) reports. By FY 2000, nearly 100 percent of NSF grantees were submitting FCTR reports through FastLane and this trend continues.

Figure 18 provides the CFO Metrics Tracking System (MTS) Scorecard for June 2005, the most recent data available. The MTS, sponsored by the CFO Council Committee on Performance Measurement, provides monthly details on core financial metrics across government. Since MTS was launched in January 2005, NSF has had the highest scores of any government agency. MTS scorecards and information are available at www.fido.gov/mts/cfo/public/200506/.

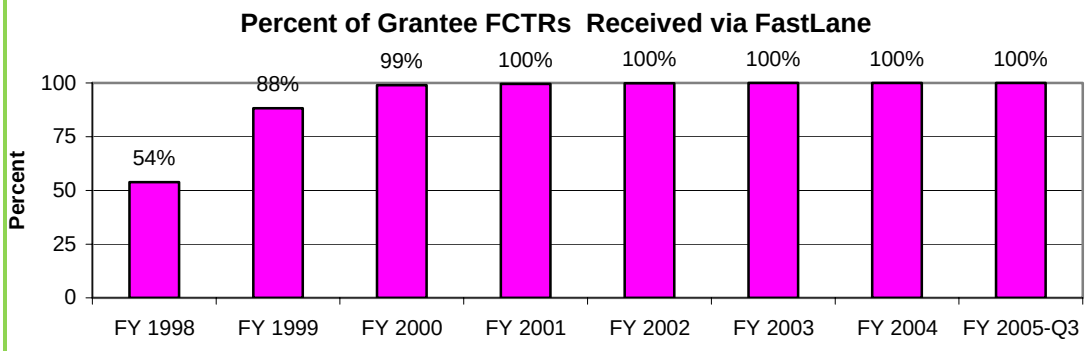
Figure 19 provides information on Treasury's Taxpayer Identification Number (TIN) compliance for August 2005. In 2005, the Department of Treasury began reporting TIN compliance and requesting corrective action by agencies that were not reaching a 95 percent threshold.

Figure 16.



NSF grantees can use FastLane to transmit Federal Cash Transaction Reports (FCTRs). As a result, nearly 100 percent of grantees submit their FCTRs.

Figure 17.



NSF receives nearly 100 percent of grantee FTCRs through FastLane.

Figure 18.

CFO COUNCIL METRIC TRACKING SYSTEM
FINANCIAL MANAGEMENT INDICATORS

Indicator	Definition	Standard	Data through 6/30/05
1. Fund Balance with Treasury (Net)	Identifies the difference between the fund balance reported in Treasury reports and the agency fund balance with Treasury recorded in its general ledger on a net basis.	*Green:* fully successful <= 2% *Yellow:* minimally successful > 2% - <= 10% *Red:* unsuccessful > 10%	GREEN 0.0%
2. Amount in Suspense (Absolute) Greater than 60 Days Old	The timeliness of clearing and reconciling suspense accounts. This metric is reported quarterly.	*Green:* fully successful <= 10% *Yellow:* minimally successful > 10% - <= 20% *Red:* unsuccessful > 20%	GREEN 0.0%
3. Delinquent Accounts Receivable from Public Over 180 days	The success in reducing or eliminating delinquent accounts receivable from the public. This metric is reported quarterly.	*Green:* fully successful <= 10% *Yellow:* minimally successful > 10% - <= 20% *Red:* unsuccessful > 20%	GREEN 3.63%
4. Electronic Payments	The number of electronic payments measures the extent to which vendors are paid electronically.	*Green:* fully successful >= 96% *Yellow:* minimally successful >= 90% - < 96% *Red:* unsuccessful > < 90%	GREEN 99.84%
5a. Percent Non-Credit Card Invoices Paid on Time	How many non credit card invoices are paid on time in accordance with the Prompt Payment Act (PPA).	*Green:* fully successful >= 98% *Yellow:* minimally successful >= 97% - < 98% *Red:* unsuccessful < 97%	GREEN 98.00%
5b. Interest Penalties Paid	The amount of interest penalties paid on late invoices relative to total dollars paid in accordance with the PPA.	*Green:* fully successful <= 0.02% *Yellow:* minimally successful > 0.02% - <= 0.03 *Red:* unsuccessful > 0.03%	GREEN 0.0012%
6a. Travel Card Delinquency Rates Individually Billed Account (IBA)	The percent of travel card balances outstanding over 61 days for Individually Billed Accounts (IBA).	*Green:* fully successful <= 2% *Yellow:* minimally successful > 2% - <= 4% *Red:* unsuccessful > 4%	YELLOW 2.31%
6b. Travel Card Delinquency Rates Centrally Billed Account (CBA)	The percent of travel card balances outstanding over 61 days for Centrally Billed Accounts (CBA).	*Green:* fully successful = 0% *Yellow:* minimally successful > 0% - <= 1.5% *Red:* unsuccessful > 1.5%	GREEN 0.00%
6c. Purchase Card Delinquency Rates	The percent of purchase card balances outstanding over 61 days.	*Green:* fully successful = 0% *Yellow:* minimally successful > 0% - <= 1.5% *Red:* unsuccessful > 1.5%	GREEN 0.00%

Figure 19.

Taxpayer Identification Number (TIN) Compliance

Total Monthly Payment Volume	Number of Payments with Invalid TINs	Number of Payments with Valid TINs	Percent of TIN Compliance as of 8/31/05
4,317	15	4,302	99.65%

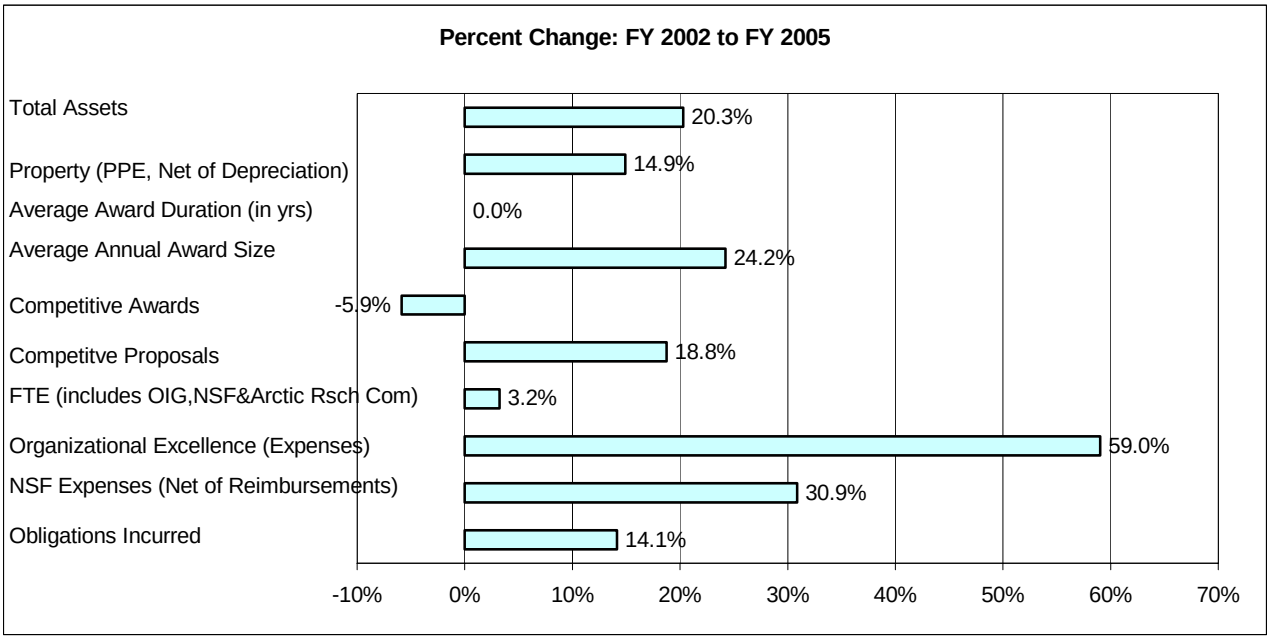
Figure 20.

Recent Trends

The following table summarizes several of NSF's key workload and financial indicators. From FY 2002 to FY 2005, NSF's obligations, expenses, and administrative and management costs increased. In spite of this, the number of competitive awards has continued to decrease as NSF sought to maintain award size and duration. Staffing has finally begun to increase to address a long-standing workload problem. NSF's total assets increased mainly due to the multi-year Antarctic South Pole Station modernization project that is nearing completion, which is reflected in our increase in Property, Plant and Equipment.

(dollars in millions)

	FY 2002	FY 2003	FY 2004	FY 2005	%Change FY 02-05
Obligations Incurred	$4,953.64	$5,578.64	$5,870.72	$5,653.90	14.1%
NSF Expenses (Net of Reimbursements)	$4,132.27	$4,707.77	$5,100.14	$5,408.17	30.9%
Organizational Excellence (Expenses)	$183.89	$196.36	$268.30	$292.43	59.0%
FTE (includes OIG, NSB & Arctic Rsch Comm)	1,239	1,242	1,274	1,279	3.2%
Competitive Proposals	35,164	40,075	43,851	41,760	18.8%
Competitive Awards	10,406	10,844	10,380	9,794	-5.9%
Average Annual Award Size	$115,666	$135,609	$139,637	$143,669	24.2%
Average Award Duration (in yrs)	2.9	2.9	2.9	2.9	0.0%
Property (PP&E, Net of Depreciation)	$224.14	$230.78	$240.44	$257.56	14.9%
Total Assets	$6,713.15	$7,424.92	$7,929.03	$8,075.06	20.3%



Future Business Trends and Events

NSF is continuously evolving as we address new priorities and meet new challenges. The future will require a continued concentration on management excellence through increased attention on specific, financial operations issues. For example, the PMA and other new administrative policy initiatives mandate that NSF, like other agencies, demonstrate consistent results and progress in improving financial management practices. NSF, although continuing to receive high marks from OMB and the financial community, must engineer constant improvements to adapt to changing management and policy initiatives. We are also committed to leveraging technology to improve service to stakeholders. In addition, we proactively address management challenges identified through internal review and oversight. In the following section, we describe some of the areas we will focus on in both the immediate future and the long term.

OMB Circular A-123: NSF is proactively preparing to meet all requirements of revised *OMB Circular A-123, Management's Responsibility for Internal Control*. Preparations include internal organizational assessments and contracting with an experienced consulting firm that provides training expertise and experience in assessing entity and financial reporting control adequacy, including information technology assessments. We will use the results of a gap analysis to develop our FY 2006 compliance sustainment activities. We have initiated the following action plan to comply with the new requirements: (1) organization structure review, (2) financial reports review, (3) materiality determination, (4) identification of key business processes, (5) integration of internal control baseline activities, (6) development of a testing plan, and (7) determination of documentation standards. Senior Management will use Appendix A of the circular to review and strengthen controls over financial reporting.

E-Travel: NSF is a leader in implementation of the President's E-Travel initiative. We selected the EDS FedTraveler, one of three government-wide approved systems, to provide our travelers with an integrated web-based travel system. In FY 2005, we were not able to fully implement FedTraveler because EDS could not deliver a fully operational system as scheduled. FedTraveler has fallen short of EDS representations and NSF's expectations. As a result, NSF lacks several capabilities of an efficient and integrated system to enhance travel management. We have conveyed our concerns to GSA and EDS, and are currently evaluating a corrective action plan from EDS. The plan is designed to ensure full implementation, provide options, and assess the impact on NSF's travel and financial processes.

Credit Worthiness: The FY 2004 Omnibus Appropriations Act requires agencies to conduct a credit worthiness assessment prior to issuing a government purchase card or government travel card. OMB issued *Circular A-123 Appendix B: Improving Management of Government Charge Card Services* (August 9, 2005). NSF has not fully assessed the guidance and its impact on travel card and purchase card use. Some potential implementation issues include timing of implementation (October 1, 2005), revising processes and procedures, training and communication, monitoring and recordkeeping, union negotiation, and costs.

Limitations of the Financial Statements

In accordance with *OMB Circular No. A-136, Financial Reporting Requirements*, we are disclosing the following limitations of NSF's FY 2005 financial statements, which are contained in NSF's *FY 2005 Performance and Accountability Report*. The financial statements have been prepared to report the financial position and results of operations of NSF, pursuant to the

requirements of 31 U.S.C. 3515(b). While the statements have been prepared from NSF's books and records in accordance with U.S. generally accepted accounting principles (GAAP) for federal entities and the format prescribed by OMB, the statements are in addition to the financial reports used to monitor and control budgetary resources, which are prepared from the same books and records. The statements should be read with the realization that they are for a component of the U.S. Government, a sovereign entity.

PERFORMANCE

EXECUTIVE SUMMARY

This report, prepared pursuant to the Government Performance and Results Act (GPRA) of 1993, covers activities of the National Science Foundation (NSF) during Fiscal Year 2005. A summary discussion of NSF's performance results and general assessment activities also is provided in Management's Discussion and Analysis under "Performance Summary and Highlights," which begins on page I-9.

NSF's annual goals fall into two broad areas: "Strategic Outcome Goals" and "Other Performance Goals."

Strategic Outcome Goals: The NSF's Strategic Plan, adopted in the fall of 2003, included a new programmatic framework that translated into four strategic outcome goals: Ideas, Tools, People and Organizational Excellence. Ideas, Tools and People focus on the long-term results of NSF's grants and programs. These goals represent the outcomes from NSF investments in science and engineering research and education. The strategic outcome goal of Organizational Excellence focuses on the administrative and management activities of the agency, and ensures that NSF is a capable and responsive organization that supports the accomplishment of the three other strategic outcome goals.

Other Performance Goals: These goals include performance measures included in NSF's Program Assessment Rating Tool (PART) evaluation as well as award size, duration and dwell time goals related to agency effectiveness and efficiency.

FY 2005 Performance Results	
Number of Goals Achieved	
Annual Performance Outcome Goals	**4 of 4 (100%)**
Other Annual Performance Goals	**14 of 17 (82%)**
TOTAL	**18 of 21 (86%)**

FY 2005 Results: For FY 2005 NSF met 18 of our 21 goals (86%).[1]

Outcome Goals: NSF was successful for all (100%) of the four strategic outcome goals:

Ideas – Discovery across the frontier of science and engineering, connected to learning, innovation and service to society;

Tools – Broadly accessible, state-of-the-art science and engineering (S&E) facilities, tools, and other infrastructure that enable discovery, learning, and innovation;

People – A diverse, competitive, and globally engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens; and

Organizational Excellence – An agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.

Examples of accomplishments for each of the outcome goals are provided within the body of this chapter.

Other Performance Goals: We were successful for 14 of our other 17 performance goals (82%). Our goals in FY 2005 relative to FY 2004 goals were to:

- Increase the average annualized new award size for research grants to $140,000 (Goal I2). We achieved $144,000 in FY 2005 compared to $140,000 in FY 2004.
- Maintain the percent of Nanoscale Science and Engineering (NS&E) proposals that are multi-investigator proposals at 75% (Goal I4). We achieved 84% in FY 2005 compared to 80% in FY 2004.
- Obtain an external committee finding by ITR Committee of Visitors that the ITR Program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering (Goal I5). External experts found this to be the case.
- Maintain the percent of operational facilities that keep scheduled operating time lost to less than 10% (Goal T3). In FY 2005, the percent of facilities that achieved the goal was 100% compared to the goal of 90%.
- Maintain the number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites at 4000 (Goal T4).
- Maintain the number of nodes that comprise infrastructure (Goal T5). In FY 2005, we had 20 nodes compared to 20 in FY 2004.
- Obtain an external committee finding that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of information technology (Goal T6). External experts found this to be the case.
- Increase the number of U.S. students receiving fellowships through Graduate Research Fellowships and (GRF), Graduate Teaching Fellows in K-12 Education and Integrative Graduate Education and Research Traineeships (IGERT) (Goal P2). The number of students receiving fellowships increased from 4600 in FY 2004 to 4648 in FY 2005.

[1] IBM Business Consulting Services (IBM) provided an independent verification and validation of performance information and data. See page II-87.

- Increase the number of applicants for Graduate Research Fellowships (GRF) from groups that are underrepresented in the science and engineering workforce (Goal P3). Our number of applicants increased from 1009 in FY 2004 to 1013 in FY 2005.
- Increase the number of applications for Faculty Early Career Development Program (CAREER) awards from investigators at minority-serving institutions (Goal P4). We had 92 applications in FY 2005 compared to 82 applications in FY 2004.
- Maintain the percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female PI or Co-PI to 25% (Goal P5). We achieved 31% in FY 2005 compared to 26% in FY 2004.
- For 70% of proposals, being able to inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date, or receipt date, whichever is later (Goal O2). In FY 2005, we achieved 76% compared to 77% in FY 2004.
- For 70% of proposals, being able to inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date, or receipt date, while maintaining a credible and efficient competitive merit review system, as evaluated by external experts for the Nanoscale Science and Engineering Program (Goal O3). In FY 2005 we achieved 73%.
- For 70% of proposals, being able to inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date, or receipt date, while maintaining a credible and efficient competitive merit review system, as evaluated by external experts for the Individuals Program (Goal O4). In FY 2005, we achieved 78%.

We were not successful for 3 of our 17 other performance goals (18%). These were:

- Increase the average duration of awards for research grants (Goal I3). In FY 2005, the average duration was 2.96 years compared to the goal of 3.0 years.
- Maintain at 90% the percentage of facilities construction, acquisition and upgrade projects with negative cost and schedule variances of less than 10% of the approved project plan (Goal T2). In FY 2005, the percent of facilities achieving the goal was 79% compared to 100% in FY 2004.
- Maintain the percent of NS&E proposals with at least one minority principal investigator (PI) or co-principal investigator (Co-PI) at the FY 2003 performance level of 13% (Goal P6). We achieved 12.9% in FY 2005 compared to 12% in FY 2004.

A more detailed discussion of each of these results begins on page II-41.

SUMMARY TABLE OF PERFORMANCE RESULTS

Overall, NSF was successful in achieving 18 of 21 (86%) of the performance goals in FY 2005. Progress towards achievement of NSF's four strategic outcome goals is measured by NSF's performance with respect to annual performance goals for Ideas (Goal I1), Tools (Goal T1), People (Goal P1) and Organizational Excellence (Goal O1).

FY 2001 – FY 2005 Performance Results Number of Goals Achieved					
	FY 2001	FY 2002	FY 2003	FY 2004	**FY 2005**
Annual Performance Outcome Goals	4 of 5 (80%)	4 of 4 (100%)	4 of 4 (100%)	4 of 4 (100%)	**4 of 4 (100%)**
Other Annual Performance Goals	11 of 18 (61%)	14 of 19 (74%)	10 of 16 (63%)	23 of 26 (88%)	**14 of 17 (82%)**
Total	15 of 23 (65%)	18 of 23 (78%)	14 of 20 (70%)	27 of 30 (90%)	**18 of 21 (86 %)**

Note: In FY 2001 through FY 2004, Other Performance Goals include goals that have been previously identified as Investment Process goals or Management Goals.

The table that follows provides a summary of NSF's FY 2005 results for our GPRA and PART goals.

Annual Performance Goals

Performance Area	FY 2005 Annual Performance Goal	Results for National Science Foundation
Ideas Strategic Outcome Goal **Outcome Goal:** Discovery across the frontier of science and engineering, connected to learning, innovation and service to society.	***Performance Goal I1:*** **NSF will demonstrate significant achievement for the majority of the following performance indicators related to the Ideas outcome goal:** **Indicators:** Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering (S&E) knowledge. Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries. Foster connections between discoveries and their use in the service of society. Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities. Provide leadership in identifying and developing new research and education opportunities within and across S&E fields. Accelerate progress in selected S&E areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives. FY 2005 Result: External expert assessment found that NSF has demonstrated significant achievement for each of the performance indicators associated with this goal.	**FY 2001:** NSF successful for related goal. **FY 2002**: NSF successful for related goal. **FY 2003**: NSF successful for related goal. **FY 2004**: NSF successful for goal I1. **FY 2005: NSF is successful for goal I1.** **Indicator Results:** Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. G

Annual Performance Goals
(continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
Award Size	***Performance Goal I2:*** NSF will increase the average annualized award size for research grants to $140,000. FY 2001 Goal $110,000 FY 2001 Result $114,000 FY 2002 Goal $113,000 FY 2002 Result $116,000 FY 2003 Goal $125,000 FY 2003 Result $136,000 FY 2004 Goal $139,000 FY 2004 Result $140,000 FY 2005 Goal $140,000 FY 2005 Result $144,000	**FY 2001:** NSF successful **FY 2002:** NSF successful **FY 2003:** NSF successful **FY 2004:** NSF successful **FY 2005: NSF is successful for goal I2.** G
Award Duration	***Performance Goal I3:*** The average duration of awards for research grants will be 3.0 years. FY 2001 Goal 3.0 years FY 2001 Result 2.9 years FY 2002 Goal 3.0 years FY 2002 Result 2.9 years FY 2003 Goal 3.0 years FY 2003 Result 2.9 years FY 2004 Goal 3.0 years FY 2004 Result 2.96 years FY 2005 Goal 3.0 years FY 2005 Result 2.96 years FY 2005 Result: NSF is not successful for this goal: Progress on reaching this goal is budget dependent. Program Directors must balance competing requirements: increasing award size, increasing duration of awards, and/or making more awards. NSF will continue to focus on increasing award size and duration, together with recovering from recent declines in success rates, as permitted within budget constraints. The performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program or activity performance.	**FY 2001:** NSF not successful **FY 2002:** NSF not successful **FY 2003:** NSF not successful **FY 2004:** NSF not successful **FY 2005: NSF is not successful for goal I3.** R

Annual Performance Goals (continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
Multidisciplinary	***Performance Goal I4:*** Foster collaboration among investigators in Nanoscale Science and Engineering and track this through the percent of Nanoscale Science and Engineering (NS&E) proposals that are multi-investigator proposals. FY 2001 Result 75% FY 2002 Result 75% FY 2003 Goal 75% FY 2003 Result 73% FY 2004 Goal 75% FY 2004 Result 80% FY 2005 Goal 75% FY 2005 Result 84%	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** NSF not successful. **FY 2004:** NSF is successful for goal I4. **FY 2005: NSF is successful for goal I4.** G
Information Technology Research	***Performance Goal I5:*** Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering [Information Technology Research (ITR) Committee of Visitors (COV)] FY 2005 Goal Is Serving the Appropriate Role FY 2005 Result Is Serving the Appropriate Role FY 2005 Result: Based on the ITR COV report NSF is serving the appropriate role for this goal.	**(New Goal)** **FY 2005: NSF is successful for goal I5.** G

Annual Performance Goals (continued)

Performance Area	FY 2005 Annual Performance Goal	Results for National Science Foundation
Tools Strategic Outcome Goal **Outcome Goal:** Broadly accessible state-of-the-art S&E facilities, tools, and other infrastructure that enable discovery, learning and innovation.	***Performance Goal T1:*** **NSF will demonstrate significant achievement for the majority of the following performance indicators related to the Tools outcome goal:** **Indicators:** Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art S&E facilities, tools, databases, and other infrastructure. Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms. Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation. Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation. Support research that advances instrument technology and leads to the development of next-generation research and education tools. FY 2005 Result: External expert assessment found that NSF has demonstrated significant achievement for each of the performance indicators associated with this goal.	**FY 2001:** NSF successful for related goal. **FY 2002**: NSF successful for related goal. **FY 2003**: NSF successful **FY 2004**: NSF successful **FY 2005: NSF is successful for goal T1.** **Indicator Results:** Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. G

Annual Performance Goals (continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
Construction and Upgrade of Facilities	***Performance Goal T2*:** Percent of construction acquisition and upgrade projects with negative cost and schedule variances of less than 10% of the approved project plan. *FY 2005 target is 90%.* FY 2003 Goal 90% FY 2003 Result 88% FY 2004 Goal 90% FY 2004 Result 100% FY 2005 Goal 90% FY 2005 Result 79 % FY 2005 Result: Data collected from Facilities Managers external to NSF indicate that 79% (15 out of 19) of facilities kept both negative cost and schedule variances to less than 10 percent of the approved project plan. The cost and schedule variances were facility specific due to unforeseen delays related to a shipyard contract and the process for soliciting bids; drilling contract delayed due to hurricanes; and delays in approval of contract because of additional testing and coordinating the procurement with international partners.	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** NSF not successful **FY 2004:** NSF is successful **FY 2005: NSF is not successful for goal T2.** 

Annual Performance Goals (continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
Operations and Management of Facilities	***Performance Goal T3:*** Percent of operational facilities that keep scheduled operating time lost to less than 10%. *FY 2004 target is 90%.* FY 2001 Result: Of the 29 reporting facilities, 25 (86 percent) met the goal of keeping unscheduled downtime to below 10 percent of the total scheduled operating time. FY 2002 Result: Of the 31 reporting facilities, 26 (84 percent) met the goal of keeping unscheduled downtime to below 10 percent of the total scheduled operating time. FY 2003 Result: Of the 30 reporting facilities, 26 (87 percent) met the goal keeping scheduled operating time lost to less than 10 percent. FY 2004 Result: Of the 29 reporting facilities, 26 (89.7 percent) met the goal keeping scheduled operating time lost to less than 10 percent. FY 2005 Result: Data collected from Facilities Managers external to NSF indicate that 100% (10 out of 10) facilities kept scheduled operating time lost to less than 10 percent. After several years of tracking this goal, it appears that facility managers are improving on their ability to estimate, and perhaps mitigate against, unscheduled downtime.	**FY 2001:** NSF not successful **FY 2002:** NSF not successful **FY 2003:** NSF not successful **FY 2004:** NSF not successful **FY 2005: NSF is successful.** 

Annual Performance Goals (continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
Number of Users	***Performance Goal T4:*** Number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites. FY 2001 Result 1300 FY 2002 Result 1700 FY 2003 Goal 3000 FY 2003 Result 3000 FY 2004 Goal 4000 FY 2004 Result 6350 FY 2005 Goal 4000 FY 2005 Result 12462 The use of the network far exceeded expectation due, in part, to the great interest in the field of nanotechnology.	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is successful. **FY 2005: NSF is successful for goal T4.** G
Number of Nodes	***Performance Goal T5:*** Number of nodes that comprise infrastructure. FY 2001 Result 5 FY 2002 Result 5 FY 2003 Goal 12 FY 2003 Result 12 FY 2004 Goal 14 FY 2004 Result 20 FY 2005 Goal 14 FY 2005 Result 20	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is successful. **FY 2005: NSF is successful for goal T5.** G
Information Technology Research	***Performance Goal T6:*** Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of Information Technology. FY 2005 Goal Significant Research Contributions FY 2005 Result Significant Research Contributions FY 2005 Result: Based on the Information Technology Research (ITR) Committee of Visitors (COV) report NSF is successful for this goal.	**(New Goal)** **FY 2005: NSF is successful for goal T6.** G

Annual Performance Goals (continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
People Strategic Outcome Goal **Outcome Goal:** A diverse, competitive, and globally engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens.	***Performance Goal P1:*** **NSF will demonstrate significant achievement for the majority of the following performance indicators related to the People outcome goal:** **Indicators:** Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups in NSF activities. Support programs that attract and prepare U.S. students to be highly qualified members of the global S&E workforce, including providing opportunities for international study, collaborations and partnerships. Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics. Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education. Support innovative research on learning, teaching and education that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels. FY 2005 Result: External expert assessment found that NSF has demonstrated significant achievement for a majority of the performance indicators associated with this goal.	**FY 2001:** NSF successful for related goal. **FY 2002**: NSF successful for related goal. **FY 2003**: NSF successful for related goal. **FY 2004**: NSF is successful for goal P1. **FY 2005: NSF is successful for goal P1.** **Indicator Results:** Demonstrated significant achievement Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Did not demonstrate significant achievement. G

Annual Performance Goals (continued)

Performance Area	FY 2005 Annual Performance Goal	Results for National Science Foundation
Fellowships	***Performance Goal P2:*** Number of graduate students funded through fellowships or traineeships from Graduate Research Fellowships (GRF), Integrative Graduate Education and Research Traineeships (IGERT), or Graduate Teaching Fellows in K-12 Education (GK-12) FY 2002 Result 3011 FY 2003 Result 3328 FY 2004 Result 3681 FY 2005 Goal 4600 FY 2005 Result 4648	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004**: NSF is successful for goal P2. **FY 2005: NSF is successful for goal P2.** G
Fellowships	***Performance Goal P3:*** Number of applicants for Graduate Research Fellowships from groups that are underrepresented in the science and engineering workforce. FY 2002 Result 730 FY 2003 Result 820 FY 2004 Goal Increase FY 2004 Result 1009 FY 2005 Goal Increase FY 2005 Result 1013	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is successful for goal P3. **FY 2005: NSF is successful for goal P3.** G
Diversity	***Performance Goal P4:*** Number of applications for Faculty Early Career Development (CAREER) awards from investigators at minority-serving institutions. FY 2002 Result 60 FY 2003 Result 67 FY 2004 Goal Increase FY 2004 Result 82 FY 2005 Goal Increase FY 2005 Result 92	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is successful for goal P4. **FY 2005: NSF is successful for goal P4.** G

Annual Performance Goals (continued)

Performance Area	FY 2005 Annual Performance Goal	Results for National Science Foundation
Diversity	***Performance Goal P5:*** Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female principal investigator (PI) or Co-PI. FY 2001 Result 25% FY 2002 Result 25% FY 2003 Result 22% FY 2004 Goal 25% FY 2004 Result 26% FY 2005 Goal 25% FY 2005 Result 31%	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is successful for goal P5. **FY 2005: NSF is successful for goal P5.** G
Diversity	***Performance Goal P6:*** Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one minority principal investigator (PI) or Co-PI. FY 2001 Result 10% FY 2002 Result 10% FY 2003 Result 13% FY 2004 Goal 13% FY 2004 Result 12% FY 2005 Goal 13% FY 2005 Result 12.9% FY 2005 Result: NSF is not successful for this goal. We will continue our efforts to encourage minorities to submit proposals to this area. The performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program or activity performance.	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is not successful for goal P6. **FY 2005: NSF is not successful for goal P6.** R

Annual Performance Goals (continued)

Strategic Outcome	FY 2005 Annual Performance Goal	Results for National Science Foundation
Organizational Excellence Strategic Outcome Goal **Outcome Goal:** An agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.	***Performance Goal O1:*** **NSF will demonstrate significant achievement for the majority of the following performance indicators related to the Organizational Excellence outcome goal:** **Indicators:** Operate a credible, efficient merit review system. Utilize and sustain broad access to new and emerging technologies for business application. Develop a diverse, capable, motivated staff that operates with efficiency and integrity. Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.	**FY 2001:** N/A **FY 2002:** N/A **FY 2003:** N/A **FY 2004:** NSF is successful. **FY 2005: NSF is successful for goal O1.** **Indicator Results:** Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. Demonstrated significant achievement. G
Time-to-decision	***Performance Goal O2:*** For 70 percent of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date, or receipt date, whichever is later. FY 2000 Goal 70% FY 2000 Result 54% FY 2001 Goal 70% FY 2001 Result 62% FY 2002 Goal 70% FY 2002 Result 74% FY 2003 Goal 70% FY 2003 Result 77% FY 2004 Goal 70% FY 2004 Result 77% FY 2005 Goal 70% FY 2005 Result 76%	**FY 2000:** NSF not successful **FY 2001:** NSF not successful **FY 2002:** NSF successful **FY 2003:** NSF successful **FY 2004:** NSF successful **FY 2005: NSF is successful for goal O2.** G

Annual Performance Goals (continued)

Performance Area	FY 2005 Annual Performance Goal	Results for National Science Foundation
Nanoscale Science and Engineering Program Time-to-decision	***Performance Goal O3:*** Percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system as evaluated by external experts for the Nanoscale Science and Engineering Program in FY2005. FY 2005 Goal 70% FY 2005 Result 73%	**(New Goal for GPRA Reporting)** **FY 2005: NSF is successful for goal O3.** G
Individuals Program Time-to-decision	***Performance Goal O4:*** Percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system as evaluated by external experts for the Individuals Program in FY2005. FY 2005 Goal 70% FY 2005Result 78%	**(New Goal for GPRA Reporting)** **FY 2005: NSF is successful for goal O4.** G

SOME NSF ACHIEVEMENTS

Achievements Noted by the Advisory Committee for GPRA Performance Assessment

NSF is the only agency to invite an external advisory committee, the Advisory Committee for GPRA Performance Assessment (AC/GPA), to perform an analysis of its entire portfolio as part of the agency GPRA assessment process. The material in this section has been taken from the FY 2005 AC/GPA Report available at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05210. The referenced award numbers are links to the NSF web site and provide further information on the awards.

Ideas

Indicator I1. Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge.

The "Biomechanics and Hydrodynamics of Fish Locomotion" research focuses on the analysis of the motion of fish fins and the resulting propulsion and positioning accuracy using techniques from fluid engineering (0316675). One goal of this research is to apply this knowledge to man made vehicles that at present have several limitations. Recent findings show that 1) fish can extract energy from high-speed turbulent flows and thus maintain position using minimal muscular energy; and 2) fish use several fins simultaneously to generate discrete vortex rings allowing them to achieve fine positional control.

After devastating earthquakes in Turkey and Taiwan, the NSF funded several reconnaissance missions including the project, "Ground Improvement Techniques Shown to Mitigate Earthquake Damage" (0085281). This work investigated the performance of sites that had been improved prior to construction to reduce the liquefaction potential of these sites. The study demonstrated that ground improvement was effective in mitigating earthquake-caused damage and in particular was the first to verify that closely spaced jet-grout columns worked well. Although these techniques have been widely used, this work is first to give evidence of the effectiveness in an actual earthquake. This work has immediate application to the design and implementation of these techniques in the U.S. and worldwide.

"How Does the Brain Overcome Obstacles to Successful Memory Performance? Insights from Studies of Prefrontal Cortex and Interference Resolution" has helped to increase our insight on neuroimaging of cognitive and mnemonic control (0401641). When we try to remember a particular piece of information – like the location of our parked car – there can be interference in the brain due to the recalling of memories having been associated with previous parking situations. This work performed several studies using functional magnetic resonance imaging that established a correlation with activity in the left ventrolateral prefrontal cortex and the interference of memory. This research is important in trying to further understand and hopefully improve memory performance.

There has been a long standing mystery in understanding the seismic data that have been collected from the layer between the outer liquid core of the Earth and the inner mantle at a distance of about 2,700 kilometers below Earth's surface. This boundary is called the D'' layer. The "Inner Earth Revealed" team supported by the NSF analyzed x-ray images of perovskite taken at the high pressure and temperature expected in the D'' layer and found a new type of structure that will explain the previous data (0135533, 0215587, and 0230319). This discovery will allow better understanding of the Earth's interior.

Researchers on "Nanotube Membrane Mimics the Functions of the Biological Cell Wall" created a working synthetic membrane made of 8 to 12 nanometer gold nanotubes deposited on a polycarbonate template (9987646). They verified that this membrane did function like cell membranes in recognizing and allowing certain DNA segments to pass more easily than others. This multidisciplinary project uses a chemical model to mimic a biological cell membrane. Such membranes could be useful for DNA separation and/or genomic research.

Indicator I2. Encourage collaborative research and education efforts across organizations, disciplines, sectors and international boundaries.

One outstanding example is the project, "A Sex Pheromone Elicits Distinct Behavior in Male African Elephants," which is multidisciplinary in nature, involving the collaboration of Principal Investigators with different training from three universities across the US (0216862 and 0217062). In terms of education, this project serves not only the graduate students who are about to become professionals in their fields but also creates excellent opportunities for the succeeding group of students, the undergraduates. The project is international in nature, involving the cooperation of international organizations and governments and could not be successful without it. Additionally, this research has the potential for preservation of the African elephant, an endangered species, and therefore maintaining current levels of biodiversity.

Another excellent example is a project, "U.S./Africa Materials Institute" (0231418), in which chemists, materials scientists and biomedical researchers from US universities and organizations join with their counterparts from several African countries to conduct research on improving early cancer detection. Successful treatment of cancer depends in part on its size at detection. Current imaging techniques can resolve tumors a few millimeters in size. So far, the team of scientists working on this project is able to detect tumors that are a fraction of a millimeter. This has untold benefit for the treatment of cancer. The multidisciplinary, collaborative and international nature of the project is clear. One of the interesting (unusual) aspects of this project is that the education is not occurring at the university student level but at the level of the research scientists. And it involves a transfer of information from the African scientists to the US scientists and vice versa. More often the transfer of information is from the US to the lesser-developed region. This research provides opportunities that would be otherwise difficult for the African scientists to access and has beneficial effects on the field of health and medicine in the US and Africa (and potentially the world).

The project, "Beetles and Their Yeast Endosymbionts From Basidiocarp Habitats," is multidisciplinary and collaborative at the U.S. university level but not at the international level (0072741). Although its scientific basis is sound and interesting, it was chosen as an example of a project that has a very strong undergraduate student component, a commitment to entraining minority students, and outreach to elementary and secondary students. Undergraduate students participated in science at field sites, where they identify, collect and preserve biological specimens -- an invaluable experience. The involvement of undergraduates, minority students and students at earlier stages of their education has important long-term benefits for the students in particular and science in general.

The "Puerto Rico Collaborative for Excellence in Teacher Preparation" (PR-CETP) project is different from the mainstream. It does not focus directly on scientific research; rather, it focuses on the training of the teachers who deliver the scientific information to pre-university students (0331998). It involves the cooperation of university and K-12 teachers. This effort is notable because of its focus on improving education at the earlier stages of the learning process. Teachers are better prepared which means that students entering university would be better prepared. This bodes well for the ultimate advancement of science.

The "Children's Research Initiative" (CRI) researches routine tools used by wild Capuchin Monkeys (0125486). It meets each of the goals outlined above. It stands out from the rest of the group because it is an excellent example of research led by a female Principal Investigator and it has the potential for understanding further the links between humans and other primates. This research examines the use of tools by the wild capuchin monkeys and is an opportunity to study the development of this behavior, which was once thought to be peculiar to humans.

Indicator I3. Foster connections between discoveries and their use in the service of society.

The project accomplishments selected to illustrate the impacts of NSF-sponsored research in this area include:

> A Long-Term Ecological Research (LTER) grant, "Plum Island Sound Comparative Ecosystem Study (Pisces) Effects of Changing land Cover, Climate and Sea Level on Estuarine Trophic Dynamics," that involves an investigation of the contribution of dissolved organic matter from living organisms to the overall carbon cycling within deep oceans (9726921);
>
> "Intrusion Detection Techniques for Mobile Ad Hoc Networks," a project involving student participation at many levels, has led to advancements in wireless security technology that have the potential to be developed for use at very low cost (0311024);
>
> The project, "Earthquake Engineering Research Center" had direct applications in improving the ability of the critical infrastructure of the city of San Francisco to withstand significant earthquake activity (8607591);
>
> "Organic Materials of Intermediate Dimensions for Optoelectronic Technologies" is a project that has led to the discovery of new optoelectric capabilities for building sensors for the detection of individual viruses or bacteria, a technology that may prove critical in the area of homeland security (0097611); and
>
> The project, "Dynamic Employer-Household Data and the Social Data Infrastructure," is a sociological and economic analysis of means whereby low-income women, the employment rates of whom have reached all-time highs, can be encouraged by policymakers to pursue strategic job ladders that move them out of poverty (9978093).

Each of these projects has a direct impact on an area or areas that have in recent years been identified as a national and/or regional priority. Indeed, several of these illustrate the global nature and potential effects that research in the areas of critical technologies or sociological imperatives can have.

There is relevance and high risk in each of the examples cited above. The impact of the large, multidisciplinary initiatives such as LTERs and ERCs is unquestionably enhanced well beyond the individual sum of the parts involved. The marriage of life sciences with engineering expertise provides a particularly potent approach to formerly intractable problems and is yielding promising results. Moreover, in the case of the fifth example cited above, the potential impact on society at large of the novel approach of focusing on employer strategies and practices rather than on employee characteristics has the potential to transform how we craft future social policies and manage workforce and workplace issues.

Indicator I4. Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities.

NSF programs such as the Louis Stokes Alliances for Minority Participation (LSAMP), Centers of Research Excellence in Science and Technology (CREST), Alliances For Graduate Education and the Professoriate (AGEP), the Minority Postdoctoral Fellowship Program, and Research Experiences for Undergraduates have historically provided a stimulus and increased opportunities for women and underrepresented minorities to participate in all stages of the research process. These programs have been successful, and now NSF's portfolio contains a number of examples of projects that involve the full participation of underrepresented individuals and institutions in the generation of ideas. Several overarching themes emerge, including: a) improved access to STEM (science, technology, engineering, and math) by disabled persons; b) culturally-based learning projects; c) CAREER awards that have provided the groundwork for highly successful careers of underrepresented minorities; and d) the coupling of outstanding science and strong mentorship.

A number of projects involved the improved access to STEM by visually and hearing-impaired persons, with a cluster of projects addressing the needs of blind persons. Involving a totally blind graduate student researcher, the project "Automated Tactilization of Graphical Images: Full Access to Math, Science, and Engineering for Blind Students" aims to automatically create tactile versions of maps, charts, graphs, diagrams, and other images that are found in math, science, and engineering textbooks (0415273). This is an important problem, as the creation of tactile representations of data is very time and labor intensive.

Another project, "Exploring New Geometry by Touching, Seeing, and Feeling," explores new geometry by touching, seeing, and feeling has similar goals (0430730): it combines computer graphics with 3D computer haptics (which imitates the 3D sense of touch) to enable blind persons to perceive geometric shapes including self-intersecting surfaces. Finally, working under the mentorship of the PIs of the "Engineering Research Center for Biomimetic Microelectronic Systems" at the University of Southern California (0310723), a high-school student won the top prize at the 2004 Orange County Science and Engineering Fair for her project, "Intraocular Camera for Retinal Prostheses: Restoring Vision to the Blind."

Culturally based learning projects are providing a novel approach to the inclusion of underrepresented minorities in competitive research and education activities. A new paradigm is emerging, one that involves the student in STEM by using the student's life experience and culture as a starting point. Examples include:

A project, "Agricultural Science Summer Undergraduate Research Education and Development Project" (ASSURED) (0244179), in which the children of migrant workers, who have spent their youth harvesting onions and chili peppers in the field, are now studying these plants in a laboratory. They are looking at ways to improve yield and to understand fundamental characteristics of the plants at the genomic level. Developed in cooperation with Yup'ik Eskimo elders, another project, **"**Improving Alaska Native Elementary Students' Math Performance" (0138920 and 9618099), produced a culturally based mathematics curriculum for elementary school students. As an example, students learned the mathematical properties of shapes that they made as bookmarks. Students participating in this curriculum had significantly higher test scores than those students in the standard curriculum.

Similarly, there is another project, "Sustainability and Stewardship in Alaska," that addresses Alaskan Natives and is organized along lines parallel to NSF's Integrative Graduate Education and Research Traineeship (IGERT) program but is focused on undergraduate education and research (0331261). This undergraduate to graduate pipeline approach invigorates the students by infusing them with real-world research concepts. They participate in hands-on research involving the integration of natural and social sciences for natural resource conservation. The focus is on sustainability and stewardship of the land.

Women and underrepresented minorities who have received NSF CAREER awards are making significant contributions to STEM and are becoming outstanding mentors, as well. For example, Janice A. Hudgings developed a 2-D thermoreflectance microscopy technique that enables thermal measurement of optoelectronic devices on the nanoscale in the project, "High Performance Thermal Profiling of Photonic Integrated Circuits" (0321449 and 0134228). She established the first engineering and physics research lab at Mount Holyoke College, an ideal context in which to encourage a diverse group of women undergraduates to participate in science and engineering. To date, 19 women have performed independent research in her lab, nine of which are underrepresented minorities.

Kathleen Pickering is using the Pine Ridge Lakota Indian Reservation as a starting point to study how pre-industrial indigenous societies organized economic production on a "subsistence" level, based on the family and different from that of market-based industrial capitalism in "CAREER: Cash and the Social Economy of the Pine Ridge Indian Reservation: Labor Allocations, Consumption, and Economic Development on the Periphery" (0092527). Her research advances theoretical understandings of the subsistence-market distinction, trains students in research design and methods and encourages local Lakota students to consider advanced studies at the university.

CAREER awardee Kim Venn, in collaboration with researchers at University of Texas at Austin and University of Texas, El Paso, has analyzed the chemical composition of stars in a sample of local dwarf galaxies and compared them to published datasets for stars in the Milky Way in the projects, "The First Stellar Abundances in Local Group Galaxies" and "Collaborative Research: Chemical Evolution Beyond the Milky Way" (0306884, 0307534, and 9984073). They find distinctive differences; their results challenge basic ideas about the formation of galaxies.

Finally, CAREER awardee Kristi Anseth of the University of Colorado, Boulder, received the 2004 Waterman Award, which is the highest prize the NSF offers to scientists from all fields who are not more than 35 years old and seven years since their doctorate. In her pioneering work in the field of tissue engineering, "CAREER: Photocrosslinkable Polymers for Fracture Fixation" (9734236), she created polymeric scaffolds that serve as specific templates for the attachment, growth, and proliferation of cells, and has also developed novel polymeric materials for the fixation of fractured bones.

A number of projects illustrate that strong mentorship, especially by and of women and underrepresented minorities, is a very positive by-product of outstanding STEM accomplishments.

For example, Casonya Johnson is a female African-American who, after graduate and post-doctoral work at the Johns Hopkins University, returned to her alma mater, Morgan State University, where she serves as an important role model for her students. Her research involves functional characterization of a novel class of genes, discovered through analysis of the *C. elegans* genome sequence. Her project, "Genetic and Molecular Characterization of Dual HLH Domain Proteins in *C. elegans*" (0212336), supports the integration of quality research and education at a historically black university.

Two of the graduate student researchers in Frank Bates' (winner of the prestigious Turnbull Award of the Materials Research Society) laboratory at the University of Minnesota who contributed to the discovery of a totally new phase in soft matter were African Americans. The project team for "Phase Behavior and Network Morphologies in ABC Triblock Copolymers" (0220460) synthesized tri-block copolymers, in which the three molecular components segregate themselves into continuous nanoscale pathways that are intertwined in a regularly structured way. In this manner they may find unique applications as membranes, templates, or composites. These students now have outstanding careers in industry and academia.

Using nanoparticle-mediated assembly of crystals, Jennifer Lewis at the University of Illinois at Urbana-Champaign has reported, for the first time, a new directed-assembly route that allows for the creation of crack-free, single region (or domain) colloidal crystals of high quality. Her research, "Novel Colloidal Routes to Photonic Band Gap Materials" (0071645), may lead to new optical devices for chemical/biological sensing, optoelectronics, optical computing, and telecommunication networks.

Indicator I5. Provide leadership in identifying and developing new research and education opportunities within and across Science and Engineering fields.

NSF supports a broad array of research projects that promote the identification and development of new research and educational opportunities in science and engineering fields. Many of the projects demonstrate leadership and novelty and represent new and ingenious ways of approaching research. Much of the work in this indicator is interdisciplinary, requiring input by a number of researchers from different areas. Further, many of the studies involved a combination of fundamental and applied research with high potential for practical outcome.

For example, NSF funded, "Renewable and Resource Efficient Composite Materials for Affordable Housing" (0229731), the research of Professor Chandrashekhara at the University of Missouri, Rolla, and his team of mostly undergraduate students to develop new fiberglass-epoxy composite materials from soy products. These materials are suitable for structural use in floors, roofs, and walls and in the form of a foam for use in insulation panels. This project delineates an innovative approach to utilizing a waste

product to form low cost and environmentally friendly construction materials. This creative research involves a multidisciplinary team with backgrounds in polymer chemistry, composite manufacturing, structural mechanics and environmental engineering.

Another project, "Multiscale Virtual Reality of Diffusion-Induced Deformation Processes" (0313346), an Information Technology Research (ITR) project, shows leadership in developing a novel approach to educating today's students for tomorrow's jobs by supporting the development of joint doctoral programs between San Diego State University and the University of California, San Diego (in applied mechanics and materials science) and between San Diego State University and Claremont Graduate University (in computational materials science). These joint doctoral programs provide a link between research universities with those more oriented toward teaching and community service-based education. These programs will produce students who are well versed in the technological challenges of today while being equipped with an extensive background in the fundamental sciences. Both joint programs enhance the flow of innovative ideas that will provide San Diego's booming technology economy with a more creative and inventive workforce.

A project led by Kenneth Beard at the Carnegie Institute, "Investigating the Origin and Early Evolution of Primates in Asia" (0309800), challenges earlier interpretations whereby most or even all of the major events in primate and human evolution were thought to have occurred in Africa. The team has uncovered evidence for a broad range of early primates in Asia, including the oldest and most primitive primates and anthropoids yet to be discovered. This project has attracted a substantial amount of attention from popular media and has fostered international collaborations among American, Chinese, French, Thai, and Burmese scientists. This research demonstrates leadership because it challenges the long-held hypothesis that primate and human evolution took place only in Africa. This work has the potential to change the way we think about where the evolution of humans began.

Research by Caroline Ross and colleagues at Massachusetts Institute of Technology on controlled self-assembly of nanostructures, "Nanostructured Surfaces with Long-Range Order for Controlled Self-Assembly" (0210321), a Nanoscale Interdisciplinary Research Teams (NIRT) project, is hoped to generate a set of methods and processes to impose precise long-range order nanostructure arrays over large areas. These methods are designed to be scaleable and compatible with low-cost, high-volume manufacturing. The educational goals of this work are to contribute to the public understanding of nanotechnology and to the training of skilled researchers.

Another project that demonstrates significant leadership is one that engages diverse students in developing nuclear physics tools for unraveling the mysteries of subatomic particles, **"**Precision Measurements with Pions **"** (0354808, 0245407, and 0114343). This work is a collaboration involving three interactive projects: Research in Intermediate Energy Physics, Study of Electromagnetic Structure of Light Pseudoscalar Mesons via the Primakoff Effect, and Center for the Study of the Origin and Structure of Matter. This collaboration includes several Historically Black Colleges and Universities (North Carolina A&T and Hampton University), as well as scientists from China, Russia, Ukraine, Armenia and Brazil. Undergraduate and graduate students from five different universities have been involved in the project. This effort brings nuclear physics to students often underrepresented in this challenging area.

A team led by S. J. Yoo at UC Davis is working on a project, "Protocol Agile Optical Networking for the Next Generation Internet" (9986665), that explores new research opportunities in high-speed optical networking by creating new switching technologies. This project contributes to knowledge in the area of networking architectures by developing and demonstrating a new optical networking approach. This new networking technology can be integrated with campus networks to form the basis for future cyberinfrastructure. This research group is committed to integrating research and education and has directly trained 14 graduate students and educated 150 graduate and 250 undergraduate students.

Indicator I6. Accelerate progress in selected S&E areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives.

One extremely innovative project fosters cross-disciplinary knowledge by developing a new graduate program in astrochemistry at the University of Hawaii, "Untangling the Energetics and Dynamics of Atom-Radical and Radical-Radical Reactions" (0234461). This project is the first of its kind in the United States and has been spearheaded by Ralf Kaiser, an assistant professor and CAREER awardee. This program features a curriculum that relates chemical dynamics to astrochemistry, planetary sciences, laboratory astrophysics, astrobiology, and combustion chemistry in reaction dynamics and astrochemistry. Participating units include the Department of Chemistry, the Department of Physics & Astronomy, the Institute for Astronomy (IfA), the Hawai'ian Institute of Geophysics and Planetology (HIGP), and the Astrobiology Institute (NAI).

In the interest of fostering highly integrative knowledge exchange, NSF supported a project that utilized a series of workshops aimed at unifying the cross-disciplinary knowledge of complex networks in order to generate a text describing that nascent field, **"**First Crossdisciplinary Text on Optimal Adaptive Management of Complex Systems," (0223696 and 0224592). These workshops, organized by Jennie Si at Arizona State University, brought together experts in neural networks, control theory, operations research, artificial intelligence, electric power and fuzzy logic. The new text focuses on adaptive systems that learn to optimize performance with foresight to manage complex systems prone to unexpected disturbances like power grids, critical infrastructure and financial systems.

William Kaiser from UCLA is building a networked infomechanical systems (NIMS) robotic sensor system to operate continuously in the forest at the James San Jacinto Mountain Reserve that will provide accurate environmental (0331481). NIMS systems have generated the first three-dimensional characterization of solar radiation on the space and time scale of forests, waterways and wetlands. These new robotic sensing systems are suspended on cable infrastructure and may move, sense, draw water samples from a stream, or collect images high in the forest canopy while responding suddenly to events by moving immediately to acquire detailed imaging of compact objects at centimeter ranges. NIMS research is a convergence between the computer science and engineering fields of networked sensing and robotics along with the science application fields of biology and public health that enables fundamental investigations of ecosystem energy, water and carbon budgets critical to global change. The NIMS project includes a summer REU program involving students from universities throughout the U.S.

The Particle Engineering Research Center (PERC) at the University of Florida is developing a major new alternative drug transport technology (9402989). This involves collaboration between chemical engineers, materials scientists, and pharmaceutical researchers. This technology is designed to deliver drugs specifically to diseased cells, thereby greatly reducing doses needed by patients while providing a more effective treatment. Potential applications include drugs used to treat life-threatening human maladies such as cancer, heart disease, and AIDS. This significant new application of nanotechnology is the result of a multi-disciplinary team working in an Engineering Research Center.

NSF is taking the lead on supporting a collaborative research platform of geographically distributed infrastructure that will be connected via information technology to address pressing environmental questions on regional to continental scales. The National Ecological Observatory Network (NEON) will be a large-scale multi-disciplinary effort led by the American Institute of Biological Sciences that involves biologists, engineers, computer scientists, social scientists and educators in a collaborative effort. NEON will generate knowledge of complex environmental processes by applying emerging sensor, analytical, communication and information technologies to investigate the structure and dynamics of ecosystems and to forecast biological change, such as in the project, "Infrastructure for Biology at Regional to Continental Scales" (0229195). Example environmental questions that will be addressed include evaluating the ecological effects resulting from climate-driven changes on global water and carbon cycles and the emergence of infectious diseases and invasive species resulting from anthropogenic activities.

Tools

Indicator T1. Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of the-art S&E facilities, tools, databases, and other infrastructure.

Through FabLab, which is an educational outreach component (0122419), the Center for Bits and Atoms provides outreach facilities to bring the ideas of fabrication and micro-manipulation to the US public and includes modules in Kenya and South Africa. The tools of this large center are made available to the public through these activities and the Fab Lab serves as a model for Centers that are more than the total of all the science that occurs there because the science is disseminated and brought to the public in meaningful, hands-on methods. CBA's laboratory research on technologies for personal fabrication is complemented by the field "Fab Lab" program. The FabLab brings prototype capabilities to under-served communities that have not had access to the reach of conventional and modern technology development and deployment.

"Expanding National Library of Virtual Manipulatives (NLVM) Reaches U.S. and International Audiences of K-8 Math Learners" (0352570) and "National Library of Interactive Web-based Virtual Manipulatives for K-8 Mathematics" (9819107), are projects that enhance the mathematics education in grades K-8 in both the US and abroad. This project provides on-line, web based tools and databases that have more than 1 million hits a day as students access the information on the web. Not only does the program provide state-of the art educational tools for students, but it also provides pre-service teacher training in a field where innovation on a K-8 level that is solid and rigorous is hard to come by. Accessibility will be increased as well as the team is working on creating a version in Spanish. The outreach of this activity is expanding, has free access and can help to increase mathematics literacy by providing manipulatives via the internet that are formal curriculum tools as well as informal learning environments.

Materials Science as a field has developed to the point where scientists are beginning to predict macroscopic properties from atomic or microscopic structure. However, in order to have this capability, the tools of cyberscience—algorithms and computational expertise—are needed. Researchers at the University of Illinois at Urbana Champaign have begun to address this important cyberinfrastructure need by developing software and education cyberinfrastructure (0325939). From a small group award, the seeds of this idea grew to a larger proposal in FY03 awarded through the Information Technology Research solicitation and is funded through the Division of Materials Research with co-funding from the Chemistry Division and the Division of Computing and Communications Foundations in the Computer and Information Sciences and Engineering Directorate. This program has provided software dissemination openly, developed new software tools, and hosted a workshop to promote the exchange of ideas and new advances in algorithms for computational materials research and a computational summer school to help train the next generation of computational materials researchers in state of the art computational methods. This project is an example of the cyberscience tools being developed through the NSF that will enable the forefront science of the next generation.

The Protein Data Bank (0312718) promotes international cooperation and is the authoritative, international repository for 3D structural information for biological macromolecules. Indeed, anyone in the US or abroad looking for the structure and classification of a protein can access all published information on the web. This database not only provides information, but is coupled with tools for visualizing the protein structure as well. In addition, storage of this data, archiving and backup is pushing the frontiers of international collaboration as well as the issues of permanent or long term storage and ownership/responsibility for long term maintenance. Suzanne Richman from Rutgers University writes about her work in Japan on this project "Despite our differing cultures and languages, working at PDB felt like home. We are all working on the same project, half a world apart, but with the same thoughts and feelings about it, and in an annotation room that can be just as eerily quiet, as we all work and concentrate hard." Science can bring people together and break down barriers of language, culture, and geography. The Protein Data Bank provides an excellent example of the unifying force of science.

The Cyber Defense Technology Experimental Research (DETER) Network (0335298) is a facility funded by NSF. The DETER network and test-bed serves as a center for interchange and collaboration among

security researchers, and as a shared laboratory in which researchers, developers, and operators from government, industry, and academia experiment with cyber security technologies under realistic conditions. It provides an infrastructure that would not otherwise exist to both aid in the development of tools for protecting cyberinfrastructure and for training students and the next generation of cyberinfrastructure researchers. This is a unique facility with broad outreach to a diverse community involved in network security evaluation.

Microsystems Packaging is a key component of all consumer electronics, and yet as a field has not yet been developed. This innovative program has developed textbooks and innovative curricula (9402723). Students from the program at Georgia Tech have been highly sought by industry. Two of the largest professional societies, IEEE and IMAPS have helped develop 15 new courses for the Internet that are accessible internationally. This access as well as the adoption of the textbook at 47 universities shows the importance of MSP and the need for the tools and curricular databases provided by this program.

Through a joint collaboration between U.S. and Indian astronomers, a spectroscopic fingerprinting of over 1200 stars has been funded and will be provided openly to the scientific community (0114536). This is a huge undertaking as the current largest star mapping is about 200 stars. This library will include spectral data over the largest wavelength range available as well. The star library is a unique data resource for our international scientific collaborations, as for the whole astronomical community. The scientific potential of the library is that certain spectra can be used as building blocks for analyzing the evolution of galaxies. As a database, this library will be unparalleled in the astronomical community.

Indicator T2. Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms.

The Arctic Ocean is a crucial region determining the present and future state of the world's oceans and climate. The extreme conditions of the Arctic environment have limited scientific observations to a relatively few locations and seasons of the year. The design and implementation of an observational array for Arctic oceanographic measurements through "An Observational Array for High Resolution, Year-round Measurements of Volume, Freshwater, and Ice Flux Variability in Davis Strait" (**0230381**) will provide a highly integrated and interdisciplinary perspective on the role played by the Arctic and sub-Arctic in steering decadal scale climate variability. The observing system will provide the first year-round measurements of the total water volume, influence of freshwater, and ice fluxes across Davis Strait between Greenland and Canada. The ocean, ice, and atmospheric observations from this facility will be essential for understanding and documenting the influence of future climate variability and change on Arctic environments.

In February 2004, the Global Biodiversity Information Facility (GBIF) (0301149) went online with a prototype data portal (www.gbif.net) that provides digital access to data from the world's natural history collections, herbaria, culture collections, and observational databases. Participation in the GBIF consortium is open to any country or relevant international organization. The consortium currently consists of 72 participating institutions. This revolutionary capability for sharing a treasure of unique data collected from important ecosystems across the entire planet will promote scientific collaboration and dramatically improve fundamental understanding of the state of the world's biodiversity. Science and society stand to gain much from the GBIF data. Data mining will turn up gems of insight and understanding that cannot be predicted but are likely to lead to fruitful new directions for both research and commercial applications of natural substances. Such insights are vital to creating better futures for both people and nature.

From the Pacific coast to our nation's interior, more than 75 million Americans in 39 states live in towns and cities at risk for earthquake devastation. While scientists are digging into the origins of seismic waves, engineers are pushing the boundaries of design to create structures that remain safe when an earthquake ultimately occurs. The George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) (0126366, 0117853, and 0402490), integrates 15 experimental facilities, located at academic institutions across the United States, including shake tables, geotechnical centrifuges, a tsunami wave basin, large strong floor and reaction wall facilities with unique testing equipment and mobile and permanently

installed field equipment. A NEESgrid connects these experimental facilities via the Internet2 to form the world's first prototype of a distributed "virtual instrument" for earthquake engineering research (www.nees.org). NEES also provides national resources for developing, coordinating, and sharing new educational programs and materials to excite and support future generations of the earthquake engineering workforce.

Scientists and engineers at the University of Texas at Austin, Center for Space Research (CSR), Mid-American Geospatial Information Center (MAGIC) lead the development of cyberinfrastructure that rapidly integrates and distributes crucial environmental, engineering, economic, and social data necessary to disaster mitigation, response, and recovery in their project "Extensible Terascale Facility (ETF): Enhancing the Capabilities, Scope and Impact of the Extensible Terascale Facility" (0338629). This timely and usable information is quickly provided to state and federal agencies, regional and local governments, academic institutions, and the public. This accomplishment is a stunning example of translating fundamental earth science observations and research into operational uses that will reduce the loss of life and property caused by hurricane winds, storm surges, tsunamis, floods and other disasters. This project involved collaborations with the Texas Advanced Computing Center, Oak Ridge National Laboratory, and Purdue University.

The Cyber Defense Technology Experimental Research (DETER) Network (0335298) is a new center for collaboration among information technology networking and security researchers. This facility encourages collaborative research and education efforts - across organizations and disciplines - by involving six universities and four industrial institutions in an effort that spans both networking and security issues. This project provides leadership in the future networks and computational infrastructure that will be necessary to the emerging knowledge society. This project also expands opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art network security evaluation infrastructure.

Indicator T3. Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation.

Cyberinfrastructure constitutes the research environments that make advanced computation, data acquisition, and collaborative services available through high-speed networks. NSF has built up the country's cyberinfrastructure through a variety of programs, notably the PACI (Partnerships for Advanced Computational Infrastructure) supercomputer centers, the Middleware Initiative, the Information Technology Research (ITR) program, and the Teragrid.

There was significant achievement in the cyberinfrastructure goal through the combination of these facilities, indicated by progress in several funded activities, falling roughly under two headings:

- Successful applications of the existing cyberinfrastructure. Several project accomplishments attest to how the recently developed infrastructure is supporting many scientific projects, from access to astronomical surveys (the National Virtual Observatory), to parallelizing existing useful software, like the Harvard CHARMM code for molecular mechanics. Two nuggets are exemplary in this regard: "Computing dark energy" and "Using Grid platforms to better understand neuro-transmission."

- Development of new tools to extend the reach of the cyberinfrastructure. We highlight two project accomplishments among the several that fall into this category: "Rocks Cluster Management Software" and "Workflow Scheduler for Distributed Computation."

The greatest concern is stable funding and management of these resources in the future.

Successful applications:

The recent conclusion that the expansion of the universe is accelerating likely due to the presence of "dark energy" was initially supported only from supernova data. Now a second line of evidence from the projects "Statistical Data Mining for Cosmology" and "Searching for Correlations in a High Dimensional Space" (0121671 and 0312498) bolsters the same conclusion, based on the so-called Sachs-Wolfe effect. The faster expansion rate of a universe that contains dark energy would leave its mark on photons that gain energy passing by gravitational potentials. This effect has been observed with the help of statistical data mining algorithms developed to search the massive astrophysical surveys.

MCell is a Monte Carlo simulator of cellular microphysiology. It simulates the dynamics of biochemical reactions in 3D microenvironments, and in particular, of neurotransmitters in synapses. Current demands are of the order of 2CPU-months of computation and 35GB of memory. The project, "Virtual Instruments: Scalable Software Instruments for the Grid" (0086092), altered MCell to MCell-K to permit it to run in parallel, distributing the work onto large Grid platforms. Clusters at the San Diego Super Computing Center, the Tokyo Institute of Technology, and the IBM BlueHorizon supercomputer, were all used for large-scale simulations previously unapproachable by serial MCell.

Development of tools:

There is a need to make stable and manageable parallel computing platforms available to a wide range of science and engineering research, as the project "National Partnership for Advanced Computational Infrastructure" (9619020) may demonstrate. An impediment has been the difficulty of setting up a cluster, and then managing it, e.g., ensuring all nodes have a consistent set of software. Rocks addresses this need by making it easy to create, manage, and upgrade a Linux cluster. The basic idea is to make complete OS installation on a node the basic management tool, which is faster and easier than determining the software synchronization of all nodes. Rocks software clusters use a MySQL database for site configuration. The software builds a cluster by installing a Linux suite of software, and provides tools for easy upgrades and extensions. Rocks has quickly developed an extensive worldwide user base, and won several awards at the 2004 Supercomputing Conference.

Scheduling the flow of work in a distributed computation is a critical issue for heterogeneous tasks, which are more challenging than tightly-coupled parallel computations. This new workflow scheduler (0331645) seeks to minimize the "makespan" (overall job completion time). It creates a task graph, and ranks each eligible resource against subtasks, incorporating information (some automatically estimated) about communication and memory costs. Optimization heuristics then choose a mapping of components to nodes. Experiments indicate significant improvement over randomized scheduling.

Indicator T4. Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation.

NSF's SRS unit gathers a great deal of data on Research and Development (R&D) which forms the statistical basis for the familiar volume *Science and Engineering Indicators*, published every other year under the imprimatur of the National Science Board. Surveys cover such topics as Industrial R&D, Federal Funds for R&D, Federal science and engineering support to universities, colleges, and nonprofit institutions, academic R&D, and science and engineering research facilities. SRS works with other units of the Federal Government, most particularly the Census Bureau, in developing these data.

A committee, convened in 2002 by the National Academy of Sciences, reviewed the performance of SRS and issued a report in 2005. This report contains 32 separate recommendations that largely deal with ways in which SRS could improve and/or extend the kinds of data, which it does collect (Brown, Plewes, and Gerstein 2005). Given the scope of this group's review and the integrity of the National Academy review process, our subcommittee chose to simply accept the positive review by the National Academy committee at face value and did not make our own independent evaluation of SRS.

The second way that the NSF supports the development of useful policy data is to support projects that include as all or part of their mission the development of websites that either contain some data themselves or have links to websites that contain data. We cite here three examples of such projects that came to the committee's attention as being examples of particularly noteworthy endeavors.

The Math and Science Partnership program (MSP), developed in conjunction with the President's "No Child Left Behind" education initiative, has generated among other things a pooled database of successful practices that will be very useful both to people within the MSP community and beyond it, for example, in the project "Program Evaluation for the Math and Science Partnership" (0456995, 0335334, and 0445398). Exploration of one of the many websites supported by this project (http://hub.mspnet.org/) revealed that already, only a few years after the MSP projects began, there are a considerable number of papers presenting results which are of interest to practicing science teachers. The links were easy to follow and information on particular areas of interest was easy to find.

Scientists and science instructors occasionally find themselves interested in some very specific areas that suddenly come on to their radar screen. For example, a university scientist who has been asked to visit a school for deaf children would do well to visit the website of the NSF-funded project COMETS (Clearinghouse on Mathematics, Engineering, Technology, and Science). The COMETS website, developed at the National Technical Institute of the Deaf, aims to contain virtually everything ever published that is related to deaf education in STEM fields (0095948). This website (http://www.rit.edu/~comets/pages/featurespages/biblio/bibliopage.html) has information on a great deal of individual investigations, and a complete list of scientists who were deaf or hard of hearing.

Another example deals with a particular environmental niche, the cold regions of our planet. A scientist who had a need for information on the work that had been done in arctic and sub-arctic regions of the planet, and who was not already familiar with the network of literature and investigators in this area, could simply go to http://www.coldregions.org/. This website, prepared with NSF support (9909727) apparently contains links to almost everything published on these parts of the planet.

A third way that the Foundation supports policy studies is to support basic research projects which not only have significant policy implications but which seem to be influenced by the need to develop data with policy implications. For example, Dr. Robbie Luliucci at Washington & Jefferson College studies the aging of silica-reinforced polymers used in weapons systems (9909727). The materials that age are not the materials that explode, but the plastic and rubber-like materials that are equally important to the integrity of a weapon. Undergraduate students develop skills that can be used in industry, particularly as is related to homeland security. As another example, Marina Alberti of the University of Washington led an interdisciplinary study of urban development, land-cover change, and bird diversity, a study that could certainly be useful to any land-use planner who was interested in the relationship between environmental integrity and the intensity of urban or suburban development in any particular area (0120024).

Indicator T5. Support research that advances instrument technology and leads to the development of next-generation research and education tools.

In evaluating the various research nuggets for 2005, it is clear that there are many NSF-funded programs producing results for putting in place new instruments that can and will provide opportunities for great advancements in the fields of biology, medicine, materials, and computer technology.

> For example, at the Center for Bits and Atoms at MIT, scientists are developing new methods that fundamentally will change the way a computer works integrating both "living" software and hardware that changes to meet the computational needs at hand. This program is innovative in that it seeks to fundamentally revisit the notion of what a computer is, and what a computation is. By taking a more

holistic approach and a radically new view of the process, the program seeks to revolutionize the computing process. If successful, this program has the potential of creating a new foundation for much more advanced computing and management of much larger amounts of information at higher speeds than ever before possible. This program expands the narrow "hardware" focus of current computational techniques and methods. The vision is to include in the computational approach "context" information. The goal is to overcome the very real scaling limits of "data crunching only" that creates an obstacle to designing and managing very large-scale data and information systems. The program is high risk, multidisciplinary, and has already achieved some positive results, one of which is a new type of analog to digital converter. Under NSF funding for "Center for Bits and Atoms" (0122419), Neil Gershenfeld and his team have produced an extremely energy-efficient version of the versatile analog-to-digital converter. Conversion of analog readings to digital signals is becoming extremely important, not only in technology advancement, but also in everyday life. This device applies new methods to increase speed of conversion and energy efficiency over previous technology. This instrument has an array of applications in the computer, automotive and communications industries.

As another example, NSF has taken a leadership role in developing nanotechnology and instrumentation. In the project "Nanotechnology Moves into Production at IBM" (0213618 and 0213695), Curtis Frank of Stanford University and Thomas Russell of University of Massachusetts Amherst have developed a new tool for high-density lithography. Collaboration with IBM scientists has led to the application of this technology to increasing the lifetime of flash memory over 100-fold, compared to previous technology. As with the analog-to-digital converter, this application of nanotechnology is important in technological research as well as improving everyday life.

Carl Wieman and Thomas Perkins, at the University of Colorado at Boulder, in their project "Watching Proteins Bend DNA with Subnanometer Resolution" (0404286 and 0096822), have created another breakthrough nano-scale instrumentation as a tool, which allows biologists to follow the motion of a single molecule. Until this advancement, scientists needed to rely on the average of a set of measurements on a group of molecules in order to study molecular behavior. Now, molecular motion can be measured with ten-fold greater resolution at times on the millisecond level. This project opens up the opportunity to measure the motion of enzymes replicating.

Another new tool in the field of biology and medicine allows for early detection of esophageal cancer. Adam Wax of Duke University in the research project, "Low Coherence Light Scattering for Biophotonics" (0348204), developed a method, which has been proven successful in experiments with rats, using the scattering of light to detect an enlarged nucleus, one of the earliest signs of pre-cancerous cells. Measurements of light scattering can be taken in 40 milliseconds, making diagnosis possible in less than a second (compared to the many minutes it takes using current methods). Time is of the essence in cancer diagnosis, so shorter diagnosis times combined with earlier detection capabilities are great strides in instrument technology for cancer treatment. Not only is this a valuable platform tool, but also extension from rats to humans, if successful, could save many lives.

At Carnegie-Mellon University, "Synchronized Transatlantic Synchrotron Research" (0079996) has yielded a new tool that can increase our ability to predict and control the properties of ceramic and metallic materials. The instrument developed in this program uses x-rays that can penetrate through centimeters of solid samples, allowing scientists to measure the shapes and orientations of grains in the material and how they change with time. An increased understanding of material structures and properties can lead to improvements in fabrication of products from bridges to microscopes to prosthetics.

The Materials Research and Science Engineering Center (0079996), as well as the previous four projects described, advances in instrument technology are creating opportunities to better understand and improve products and processes in the fields of biology, medicine, materials, and computer technology. Thus, through achieving success in Indicator T5, NSF-funded programs are enabling "discovery, learning and innovation," one of the National Science Foundation's five main goals.

People

Indicator P1. Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities.

Within EHR, there are numerous programs that are relevant and contribute directly toward this indicator. In total, the estimation was that 134,050, 113,890, and 86,050 individuals were or will be involved in each of FY2004, 2005, and 2006 respectively. In addition, there are programs distributed across all directorates that support this indicator. Examples include selected projects in the Research Experiences for Undergraduates (REU) (0244221) and CAREER programs. The portfolio of the funded activities is broad.

> Projects such as the "Valle Imperial Project" and the "University of California Alliance for Graduate Education" range from professional development of K-6 teachers in one of the poorest counties in the country (9731274) to graduating more minority doctoral recipients in STEM fields (0450366), and from increasing ethnic minority student participation at the college level through projects in the REU and Model Institutions for Excellence (MIE) programs ("Research Experiences for Undergraduates in Environmental Sciences at Northern Arizona University," 0244221 and "University of Texas at El Paso's MIE-Supported Academic Center for Engineers and Scientists," 9550502) to reaching out to young women in middle and high schools through the Research on Gender in Science and Engineering program (0080386). Due to adverse funding trends in most of the EHR programs, the level of achievement is expected to decline unless funding in other programs is increase sufficiently to compensate for the EHR reduction.

Some of the ongoing projects address the "pipeline" issue by focusing on K-12 students.

> Consider the Valle Imperial Project in Science (9731274) conducted by the El Centro School District located in the Imperial County in southeast California. It involves 14 other school districts in the county and the Imperial Valley Campus of San Diego State University. Most of the K-12 students are underrepresented minorities and from low-income families. The project has increased the number of students taking college prep STEM classes and led to tripling the percentage of graduates eligible for enrollment in the University of California system. The Techbridge project conducted by a collaborative partnership based at the Chabot Space and Science Center (0080386), focuses entirely on encouraging more women to pursue science and engineering in a girls-only environment. The approach taken involves exposing the students to experiences and opportunities that are otherwise not available to them. The curriculum developed has been found to produce positive results and is available online (http://www.chabotspace.org/visit/programs/techbridge.asp).

At the college level, there are many projects that aim to increase participation of ethnic minorities in science and engineering. Examples include:

> The "REU: Environmental Science Summer Program at Northern Arizona University" (0244221) and the "University of Texas at El Paso's MIE-Supported Academic Center for Engineers and Scientists" (ACES) (9550502). Due to its location, Northern Arizona University is able to attract a significant number of American Indians to participate in the program. In 2003 and 2004, there were 8 and 10 students, respectively, that attended the program: among the 18 were 14 Native American and 2 Hispanic students. Likewise, the University of Texas at El Paso serves an area with a large Hispanic population. Two-thirds of the STEM students at the university are participating in the MIE-ACES program, which has contributed to a 9 percent increase in undergraduate STEM degrees.
>
> Targeted at the post-baccalaureate level, the "University of California Alliance for Graduate Education and the Professoriate (AGEP) Phase II" (0450366) was initiated in 2004. It involves all 10 UC campuses. Impressive results were achieved in Phase I of this project. There was an average of 131 new minority graduate students enrolled in STEM during 1997-1999. By 2003, the number had increased to 237, yielding an 80 percent increase. Phase II of this AGEP will build upon prior success and has the potential

to pose a new model for recruiting, retaining, and graduating STEM minority doctoral degree recipients and assisting with postdoctoral placements.

Indicator P2. Support programs that attract and prepare U.S. students to be highly qualified members of the global science and engineering (S&E) workforce, including providing opportunities for international study, collaborations and partnerships.

The Boulder School for Condensed Matter and Materials Physics (0437903) brings together large numbers of graduate students (60 this year) from around the world for summer coursework and lectures. Not only is the student body international, so is the team of presenters brought to the campus. This program meets students at a high level to forge new partnerships, understandings, and research agendas at the frontier juncture of optic, atomic, and condensed matter physics. Another highly interdisciplinary program, PRIME (Preparing Undergraduates for the Global Workforce in Cyberinfrastructure) of University of California, San Diego (UCSD) (0407508), brings together a smaller number of students at an earlier career stage and across a broader level of engagement. Nine students, 3 of them from the US, studied and worked together on research while immersed in the international environment generated by UCSD partners in the Cybermedia Center of Osaka University (Japan), the National Center for High-Performance Computing in Hsinchu (Taiwan), and the Department of Computer Science at Monash University (Australia). Admission to both these programs is competitive, and PRIME requires participants to return to UCSD in the fall for at least one quarter in order to continue their project work and share their experiences with potential new PRIME students.

Graduate students in the University of Alaska, Fairbanks IGERT program, "Regional Resilience and Adaptation: Planning for Change," (0114423) have done research and helped develop related international policy and legislation with scientific bodies of other governments, namely the Swedish Royal Academy of Agriculture and Forestry and the Alaska Native Science Commission. Graduate students in another University of Alaska, Fairbanks, program have participated in a U.S.-Russia International Volcanological Field School at sites in Alaska and Kamchatka, developing professional relationships with each another as they study the relationships between the two major areas of volcanic activity (0429155). And in yet another variant of this indicator theme (0096097), graduate students at the University of Kentucky and MIT have been able to carry out research in the Japanese university system known worldwide for its leadership in carbon science, as part of a U.S.-Japan collaborative research project that's paid off in numerous publications, conferences, and advancements in carbon science.

The 2002 COV report for OISE (still designated as INT at that time) stated: "INT clearly enjoys a level of impact that goes far beyond its very modest budget. It is exciting to imagine how much greater the impact could be if INT had resources more commensurate with its level of responsibility, particularly for project funding and travel for INT personnel." Given the importance of the P2 indicator in achieving the NSF's strategic People goals, we note with approval that OISE has been given a role as a crosscutting "agent of change" within NSF. OISE's new organizational position should enhance its success in stimulating international activities across the Foundation.

Indicator P3. Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics.

Some projects connect K-12 teachers with university STEM faculty members through active research collaborations. For example:

"The Alaska Lake Ice and Snow Observatory Network (ALISON): A Statewide K-12 and University Science Education and Research Partnership" (0326631) at the University of Alaska, Fairbanks Campus, provides teachers at 17 schools around the state with a professional development experience and with researcher mentors, as well as connecting them with other teachers throughout the state of Alaska. This experience with science and professional networks can help alleviate the feelings of isolation common to

teachers in rural Alaska, where teacher turnover is high and student populations are largely Alaska Native. Another approach that gives teachers opportunities to do STEM research is seen in "RET Site: Research Experience for Teachers in Areas of Innovative and Novel Technologies in Philadelphia" (RETAIN Technologies in Philadelphia) (0227700) at Drexel University. Providing K-12 teachers with hands-on research and education experiences demonstrated the power of experiential learning in science and engineering. The project also helped participants bridge the gap between technology and curriculum by providing workshops and resources to support curriculum development. Finally, the project has led to a number of other related projects throughout Philadelphia schools.

Other projects are providing a foundation for professional development opportunities.

The National Science Teachers Association (NSTA) has a conference grant (0442722) sponsored by the Teacher Professional Continuum program, that is testing a strategy that assembles experts supported by NSF to disseminate their findings that address important questions in K-12 science and mathematics education. The first prototype conference, "Linking Science and Literacy in the Classroom," was offered at the NSTA Regional Meeting in Seattle in November 2004. A total of 375 teachers, administrators and professional development providers participated. Presenters included leading scholars, researchers, and practitioners who described NSF-funded work on the multiple aspects of literacy in K-8 science classrooms. The 30 presenters were Principal Investigators (PIs) or participants in TPC, Local Systemic Change, Teacher Enhancement, Instructional Materials Development, or other related NSF programs that have been researching this high profile topic. Another approach is the Lesley/TERC Science Education Master project (9911770), a national, on-line Master's program for K-8 STEM educators that merges the expertise of scientists and educators, and is carrying out research on the effectiveness of on-line learning. Its enrichment curricula should be flexible to accommodate busy schedules and geographical challenges and must be relevant to the classroom. A total of 380 teachers from 33 states and three countries have participated in one or more courses since the program's inception in Summer 2000. The first graduates were in Spring 2003; 47 teachers have graduated from the program, and currently there are 114 M.Ed. candidates. Leadership is the focus of a third example, the Fulcrum Institute for Education in Science (0412456) at Tufts University, where teachers prepare for roles as school-based intellectual leaders in their fields and catalysts for reforming the mathematics and science programs in their schools. Their schools and districts commit to providing the time and resources commensurate with the positions of increased responsibility that the emerging teacher-leaders are expected to assume upon completion of an Institute program that deepens and updates their content knowledge, instructional strategies and leadership skills.

The Southeast Center for Networking and Information Technology Education, (0071047) located at the Daytona Beach Community College, is an example of faculty development in higher education. The center established a framework for community colleges to collaborate in the delivery of advanced technology faculty development workshops that helps colleges offer courses in the key high demand IT curriculum areas. Based on data from the Florida Community College System, the project's 105 faculty development workshops supported instruction across 557 different course titles within the system since the fall of 2000, benefiting 914 community college faculty members, who in turn teach over 20,000 students annually in the region.

Indicator P4. Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education.

One set of channels for informal science education is popular media: television, radio, movies, and the Web. An example of using these routes effectively is the "Magic School Bus," the most successful children's science series in history, with more than 54 million books in print and 52 television episodes (9153967). NSF supported the original development of the series, and more recently funded development of associated bilingual traveling exhibits for children aged 5 to 12 (9627162). The traveling exhibit, which has visited 36 cities in a six-year tour, allows students to explore the dynamics of weather. Other examples of the broad outreach of informal science education include the "Pulse of the Planet" series (heard over 309 broadcast outlets worldwide) (0337143), TV411, for adult math education (0104712), *Under Antarctic Ice*, a program in the PBS Nature series (0000373), "Peep and the Big Wide World," a television series for 3 to

5 year olds that was rated second in viewing audience in its time slot (0104700); and web access to news from Antarctica (0000373). NSF is supporting evaluation of the effectiveness of its informal science education work. For example, visitor impact evaluation of learning outcomes from the Magic School Bus tour indicates that 80 percent of the children who tour the exhibit gain new knowledge about weather dynamics or learn a new weather concept. Follow-up telephone interviews indicated that the children stay interested in the weather several months after their visit. Likewise, evaluation has shown that children who watch *Peep* are much more likely to ask questions and solve problems than those who do not.

Museums also provide an opportunity to engage the public. For example, Martin Luther King Day at the Cleveland Museum of Natural History (0133164) was advertised broadly to 54 municipal schools, plus youth groups, church groups, and recreation facilities. NSF-supported polymer researchers, with their graduate students, put together mini-lectures, displays, demonstrations, and hands-on experiments for the more than 4,000 visitors. Attendance was up 50% from the previous year. Other examples of informal science education through museums include "Go Figure," an exhibit at the Minnesota Children's Museum to engage parents and children in mathematics learning, particularly in underserved communities (9725857); the CAREER program's courses involving undergraduate students in independent historical research at science museums (0134482); engaging the public in botanical gardens through studies of the vanilla orchid (0108100); and an exhibit on "Strange Matter," produced by materials scientists and visited by tens of thousands at New Jersey's Liberty Science Center (0213706).

Science education goes two ways, especially when it moves into communities with special knowledge of the environment. An example is the project "Fire-Mediated Changes in the Arctic System: Inter … and Human Activities" (0328282). The community of Huslia, Alaska, has been teaching university researchers about how fire affects their community and researchers share what they know about future changes in climate and fire regime. The mutual learning workshops are turned into teaching materials, which are shared with local schools after approval by the Huslia Tribal Council. The elders view the project as one of few opportunities they have to talk to students about traditional knowledge. Other community-based mutual learning projects include the Community Collaborative Rain, Hail, and Show Network on the Great Plains (0229723); *Math in the Garden*, a set of activities that teach math to children and adults in relation to gardening topics (9909764); and a project on well water quality on the Navajo Reservation [0348873].

NSF programs also move into the classroom to spread interest and confidence in science, and move students from classrooms into the laboratory. An example is Project SERVE (Science Enrichment using Retired Volunteer Educators) (0412101), which links senior citizens with young students. A Discovery Corps Senior Fellowship supported the investigator to train senior citizens in age- and pedagogically-appropriate general chemical principles. The senior citizens then volunteer in elementary and middle school classrooms as teacher's aides, tutors, mentors, and resource persons for under-performing students. Other classroom enrichment projects include EdGCM, a global climate model that is run on inexpensive desktop computers (0231400); glassblowing demonstrations for K-12 students at the University of Iowa (9972466); nanoscience made simple for junior-high school students in southeastern Ohio (0304314; femtosecond laser systems at Michigan State for middle school students (0135581); safe racer competitions in Baltimore that involve elementary students in engineering design (9731748); and demonstrations on nanostructured materials and interfaces for K-12 students in Wisconsin (0079983). NSF's outreach in informal science education is even becoming international. The Fab Lab project (0122419) goes into the field to allow participants to fabricate objects at micron size and microsecond speed. This gives participants a hands-on experience with manufacturing components for information technologies, not just with using the technologies themselves. The exhibit has reached many under-served communities, including in rural India, northern Norway, Boston, and Costa Rica. In the past year, it has engaged the public in Ghana, and is working on a collaborative exhibit in South Africa. The worldwide public is also able to participate in LIGO, the Laser Interferometer Gravitational wave Observatory, searching LIGO data through Project Einstein@home (0200852) and web access to real-time Mars exploration (0104589).

Indicator P5. Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education on all levels.

As the following five projects show, activity in this indicator area is found within current NSF-sponsored programs. However, these projects were the only ones found within the set of nuggets proposed to satisfy this indicator (56 in the Primary set, 88 in the Secondary). Thus, we conclude that this does not constitute a body of work sufficient to determine that NSF has met the "significant achievement" threshold with respect to this important indicator. Though one relevant COV report (ROLE) from 2002 suggested significant achievement in this area, the paucity of current nuggets seems to contradict this. This lack of relevant nuggets may be due to confusion on the part of program directors as to what exactly this indicator means. The following programs, significant in their own right in terms of quality, relevance, and multi-disciplinarity, are involved in the study of individual learning, group/collaborative learning, the assessment of learning, the dissemination of the results of learning research, and the mentoring of STEM faculty.

> The work of Robert Sternberg of Yale University (9979843) is focused on the methods or "modalities" of individual learning through triarchic instruction and assessment. Sternberg's work suggests that individuals learn through a combination of three approaches: creative, analytic, and practical thinking. By training elementary school teachers in this "Triarchic" theory, Sternberg is helping them to recognize the learning patterns of their students and to tailor their lessons to the individual student' needs. Work is also being carried out to better understand how STEM students learn in groups. Gerry Stahl of Drexel University (0325447) is studying how math students utilize the Internet to work together to solve problems. By collecting and analyzing records of student problem-solving chat groups, Stahl hopes to develop a theory for how students best learn in such situations and to disseminate this information to mathematics teachers world wide.
>
> A fundamental problem in pedagogical research is that of assessment. It is crucial to the scientific study of learning that new and innovative teaching techniques be assessed. One NSF-funded project aims to improve upon current assessment techniques. Tiffany Koszalka of Syracuse University (0335644) is leading an attempt to understand and assess how practitioners of a field move from novice toward expert-level problem solving abilities. By discerning the thinking and decision making methodologies followed by experienced practitioners, the "Enhanced Evaluation of Learning in Complex Domains" (DEEP) project hopes to improve the methods of assessing the learning of novice and intermediate-level practitioners. However, individual results from pedagogy research can only be useful to the teaching community at large if they are efficiently disseminated. This is the goal of the project, "Program Evaluation for the Math and Science Partnership" (0456995). This partnership of related programs, known as the MSP Learning Network, is developing a community of connected researchers, allowing them to quickly and easily share their results. Through the building of electronic communities and digital databases, the results of learning and pedagogy research are being made available to K-12 teachers, college faculty, and the technical/scientific community at large.
>
> Lastly, it is important to the success of new pedagogical initiatives that those involved in the teaching be actively mentored. The project, "SOMAS: Support of Mentors and their Students in the Neurosciences," led by Julio Ramirez of Davidson College (0426266) has received funding to both allow junior STEM faculty to involve undergraduate students in their research activities and to bring these students together with mentors to help the mentors make the most of their pedagogical opportunities. The SOMAS project aims to assist junior faculty in integrating students into their scholarly activities thereby improving the students' oral, written, and cognitive skills and making them much more likely to succeed in their programs.

PERFORMANCE REPORTING REQUIREMENTS

To accomplish the NSF mission to promote the progress of science, NSF invests in the most capable people, supporting their creative ideas, and providing them with cutting-edge research and education tools. Within NSF, the agency strives to maintain a diverse, agile, results-oriented cadre of NSF knowledge workers and leadership in state-of-the-art business processes, tools and technologies.

NSF has four strategic outcome goals. These are:

IDEAS – *Discovery across the frontier of science and engineering, connected to learning, innovation and service to society.*

Investments in *Ideas* are aimed at the frontiers of science and engineering. They build the intellectual capital and fundamental knowledge that drive technological innovation, spur economic growth, and increase national security and welfare. They also seek answers to the most fundamental questions about the origin and nature of the universe and humankind.

TOOLS – *Broadly accessible, state-of-the-art Science and Engineering (S&E) facilities, tools, and other infrastructure that enable discovery, learning and innovation.*

State-of-the-art tools and facilities boost the overall productivity of the research and education enterprise. NSF's strategy is to invest in a wide range of instrumentation, multi-user facilities, distributed networks, digital libraries and computational infrastructure that add unique value to research and are accessible and widely shared among researchers across the nation.

PEOPLE – *A diverse, competitive, and globally engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens.*

Leadership in today's knowledge economy requires world-class scientists and engineers and a national workforce that is scientifically, technically and mathematically strong. Investments in *People* aim to improve the quality and reach of science, engineering, and mathematics education and enhance student achievement. Each year, NSF supports almost 200,000 people – teachers, students, and researchers at every educational level and across all disciplines in science and engineering. Embedded in all NSF programs are efforts to build a more inclusive, knowledgeable, and globally engaged workforce that fully reflects the strength of the nation's diverse population.

ORGANIZATIONAL EXCELLENCE – *An agile, innovative organization that fulfills its mission through leadership in state-of the-art business processes.*

Excellence in managing NSF underpins all of the agency's activities. Most importantly, this leadership depends on maintaining a diverse, agile, results-oriented NSF workforce that operates in a continuous learning environment. NSF's strategy focuses directly on the agency's leadership in core business processes, such as E-government and financial management. NSF's investments in administration and management must respond both to the growing complexity of its workload and to new requirements for accountability and transparency in its processes.

NSF also has an additional 17 performance goals associated with the Program Assessment Rating Tool (PART) developed by the Office of Management and Budget. Information concerning the PART process

can be found at www.whitehouse.gov/omb/part/. The performance goals and achievement with respect to these goals are found following the strategic outcome goal with which they are most closely associated.

NSF assessment activities are based on an OMB-approved alternative-reporting format that utilizes external experts for qualitative, retrospective evaluations of Foundation outcome results. In years prior to FY 2002, NSF used external independent assessments of NSF's outcome goal indicators provided by Committees of Visitors and Directorate Advisory Committees[2]. These committees provided assessment at program, divisional, or directorate levels.

In FY 2002, NSF created a new external advisory committee – the Advisory Committee for GPRA Performance Assessment (AC/GPA) – to provide advice and recommendations to the NSF Director regarding the Foundation's performance under the Government Performance and Results Act (GPRA) of 1993.

In FY 2004, Organizational Excellence (OE) became a specific NSF strategic outcome goal. This goal was included as a strategic outcome goal at the urging of NSF's Advisory Committee for Business and Operations (AC/B&O) since it is a key enabling tool for the outcome goals of Ideas, Tools, and People.

In its FY 2003 report, the AC/GPA recommended that NSF should consider an approach that involved a significant component of "self study." They envisioned that this would involve a greater number of NSF staff, would be based on NSF's strategic goals and indicators, would be data driven, and would provide key information at multiple levels of detail. NSF adopted this approach for the Organizational Excellence goal. Early on, it was determined that the AC/B&O would provide an assessment of three of the indicators for the OE goal: Human Capital, Technology-Enabled Business Processes, and Performance Assessment. The AC/GPA would conduct an assessment of the Merit Review indicator.

The charge to the NSF AC/GPA asked for development and transmittal to NSF of a report that included:

- An assessment of results for indicators associated with the strategic outcome goals of Ideas, Tools, and People, and with the merit review indicator for the Organizational Excellence goal. (The other three indicators for this goal were assessed by the Advisory Committee on Business and Operations – see above);
- Comments on the quality and relevance of award portfolios; and
- Comments on transformative/bold/innovative-high risk research and education.

The format of Section III is the following:

- An NSF assessment of performance with respect to each strategic outcome goal;
- Comments by the AC/GPA concerning the strategic outcome goal;
- For each indicator associated with a strategic outcome goal:
    - Comments by the AC/GPA; and
    - An NSF assessment of performance with respect to related PART performance goals.

The following AC/GPA comments concerning the quality and relevance of NSF-supported research as well as AC/GPA comments on transformative/bold/innovative-high risk research and education supported by NSF are excerpted from the AC/GPA Report. The report is available at www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05210.

[2] See Section IV for further details on these committees.

AC/GPA Comments on Quality and Relevance

The Committee concluded that the quality of the NSF portfolio was high in the three outcome goals of Ideas, Tools, and People and that the Organizational Excellence goal demonstrated quality and innovativeness in its activities. The diversity of projects in the research portfolio is remarkable, representing a spectrum of approaches, methods, ideas, and award types. This diversity enables NSF to support a wide variety of performers including individuals, teams of all sizes, and large centers as well as facilities and other infrastructure (defined broadly).

NSF continues to make important contributions toward the achievement of key national goals. It also provides important service to its constituents in the scientific community as well as serving the broader needs of science, engineering and education as human endeavors. In addition, NSF is recognized as a high-performing organization. Its focus on organizational excellence as a strategic outcome goal is a necessary complement to the other goals and will enable NSF to continue to use the nation's investments wisely and efficiently in support of science, engineering, mathematics, and education.

The Committee wants to reiterate again that the synergy of the four outcome goals is a major source of their power. Discoveries at the frontiers of knowledge are both supportive of and dependent on progress in effectively linking education and research, the development of new instrumentation, facilities, and other tools, and the education and training of a highly qualified cadre of individuals motivated and excited by science, engineering, and mathematics. Organizational excellence in people, processes, and assessment enables all three. The Committee felt that it was important to continue to make this point, as it has done previously.

The Committee concluded that the high quality, relevance, and performance of the NSF portfolio are principally due to NSF's use of a rigorous process of competitive merit review in making awards. NSF has continued to make progress in implementing its two principal review criteria – intellectual merit and broader impacts with over 90 percent of all reviews now addressing both criteria. NSF also continues to provide a heightened focus on the use of both criteria by proposers, reviewers, and program officers. The Committee notes that this will continue to be a "work in progress," that is, an ongoing effort that will require constant vigilance by the NSF program staff and further education for the proposing and reviewing community as to the importance of addressing both criteria adequately. Competitive merit review is a key process for ensuring the quality and relevance of research and in maintaining US leadership in many areas of science and technology. NSF and its external stakeholders, both within and outside the Federal government, should work together to resist the corrosive influence of forces that are inimical to merit review. The National Science Board should use its influence to advocate for expanded competitive merit review across the Federal government's research portfolio.

AC/GPA Comments on Transformative/Bold/Innovative-High Risk Research and Education

With regard to transformative/bold/innovative-high risk research and education, the Committee saw evidence of accomplishment. NSF itself has sought to clarify the definition of such research using an "operational" approach. NSF asked its program staff to identify projects they believed reflected transformative/bold/innovative-high risk research and education. The agency then attempted to organize the 150 nuggets so identified into a definitive framework with guidance or rubric. The Committee compared this rubric against the proposals and also reviewed comments in the Committees of Visitors reports on this topic. Based on that analysis, the Committee concluded that there is still work to be done in defining what constitutes transformative research. A complete discussion of this issue is found in the Organizational Excellence section of this report. The Committee appreciates the work of the National Science Board on this issue over the past year and looks forward to its efforts to initiate a dialogue with the research and education community.

No matter how much time is spent to carefully and thoughtfully craft a rubric to define transformative research, there is still no empirical way to determine what fraction of the portfolio should be the farthest out on the frontier. This difficulty is complicated by the fact that researchers (particularly academic researchers) don't typically think of their research in terms of its "riskiness" in the sense we are using that word here.

Clearly, the nation benefits and the research enterprise advances when transformative research is part of the equation. However, when COVs were asked to comment on this issue, their responses raised the very issues that we know to be the toughest to address, namely, how do you know this research when you see it?; how much should be funded in a constrained environment?; and, how should the very necessary flexibility of NSF program staff be balanced against what might appear to be a rather conservative merit review process in making investment decisions in favor of such research?

This AC/GPA process looks retrospectively at a year, or two or three, of research progress (as evidenced through the accomplishments). The determination about whether an investment in a proposal has yielded results that could fundamentally transform our understanding of the physical or natural world may take decades. All of NSF's stakeholders, internal and external, would do well to keep that in mind.

NSF GPRA PERFORMANCE GOALS – IDEAS

IDEAS STRATEGIC OUTCOME GOAL: Discovery across the frontier of science and engineering, connected to learning, innovation and service to society.

✓ Goal I1 Achieved

Investments in IDEAS support cutting-edge research that yields new and important discoveries and promotes the development of new knowledge and techniques within and across traditional boundaries. These investments enable the Foundation to meet its mission of promoting the progress of science – while at the same time helping to maintain the nation's capacity to excel in science and engineering, particularly in academic institutions. The results of NSF-funded research projects provide a rich foundation for broad and useful applications of knowledge and the development of new technologies. Support in this area also promotes the education and training of the next generation of scientists and engineers by providing them with an opportunity to participate in discovery-oriented projects.

Annual Performance Goal I1: NSF's performance is successful when, *in the aggregate*, results reported in the period FY 2005 demonstrate significant achievement in the majority of the following indicators:

- Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge.
- Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries.
- Foster connections between discoveries and their use in the service of society.
- Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities.
- Provide leadership in identifying and developing new research and education opportunities within and across S&E fields.

- Accelerate progress in selected S&E areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives.

RESULT: NSF achieved this goal. External experts provided examples of significant achievement during FY 2005 reporting. Comments by the AC/GPA and examples they selected are presented for each of the performance indicators for this goal.

IMPLICATIONS FOR THE FY 2005 PERFORMANCE PLAN[3]: This goal will be continued in FY 2006.

[3] The Performance Plan has now been integrated within the Performance Budget.

IDEAS: Comments by the Advisory Committee for GPRA Performance Assessment

The following statements concerning NSF achievement with respect to the indicators for the IDEAS goal are excerpted from the AC/GPA Report on NSF's IDEAS portfolio. Additional comments as well as examples in support of significant achievement for each indicator are available at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05210.

The Committee concluded that there has been significant achievement in all indicators of the IDEAS strategic outcome goal, which is to foster "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society." The Committee concluded that NSF had met the goal for each indicator in making investments in discovery, collaborative research and education, connections between discoveries and their use in society, increased opportunities for underrepresented individuals and institutions, developing new research and education opportunities, and creating new integrative and cross-disciplinary knowledge and tools. It is worth noting that our determination of "significant achievement" is, in large part, a reflection of the fact that the ideas embodied in the projects in this portfolio are themselves significant – that is, of high quality and relevance.

Whether we consider engineering, life sciences, physical sciences, social sciences, or information technology, it is apparent that NSF-sponsored research is having a significant impact on our nation and world today and shows every indication of continuing this into the future. The challenge for the Committee in this strategic outcome goal was in selecting a relatively few nuggets from the vast array of very fine projects from which to choose. For each of the six indicators, the accomplishments were chosen to illustrate the breadth and depth of NSF's portfolio with special emphasis placed on the important objective of broadening participation.

IDEAS in themselves are the essence of the research and education mission of NSF. Themes emerged in the arena of IDEAS many of which involve enhanced interaction between scientists and engineers, especially across broad areas within the life sciences. For example, the potential of nanotechnology coupled with the biological sciences is generating research projects that hold significant potential for understanding and improving the human condition. Applications of engineering principles and practices to the environment are now yielding new ways in which we can temper the effects of natural forces such as earthquakes. These themes illustrate the power that multidisciplinary research can have on approaches to answer questions that could not previously be addressed.

Perhaps one of the most powerful illustrations of the potency and efficacy of NSF sponsorship comes from an analysis of funding for Nobel Prize winners. In 2004, Kydland and Prescott won the Nobel Prize in Economics. Both were beneficiaries of NSF support throughout their careers, such as "Studies in Aggregate Analyses" (0422539), and winning a Nobel Prize is further validation of the quality and relevance of NSF-sponsored research. Remarkably, within economics, the NSF has sponsored research for 32 winners of Nobel Prizes.

To broaden participation, the Foundation has supported international collaborations, often involving cross-cultural and crosscutting experiences for investigators and students in particular. For example, there are large and important societal benefits as well as scientific benefits that have been gained from NSF support to send teams of investigators to Africa to investigate ways to preserve and propagate endangered wild animal species. NSF has also significantly increased opportunities for underrepresented individuals to participate fully in the research enterprise embodied in the IDEAS portfolio. Several themes emerged, including projects to improve the access to STEM by disabled persons; culturally-based learning projects that utilize the student's life experience and culture as jumping-off points for hands-on learning; CAREER awards that provide the groundwork for highly successful careers; and the strong coupling between outstanding science and thoughtful mentorship in NSF projects.

Thus, NSF's portfolio of accomplishments in the IDEAS strategic outcome goal exhibits both exceptional quality and high relevance to important national goals. In addition, the Committee found numerous

examples of "transformative/bold/innovative-high risk" research in the IDEAS portfolio. A more in-depth discussion of this topic is found in the section on the Organizational Excellence strategic outcome goal.

INDICATOR I1: Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge.

RESULT: *Demonstrated significant achievement.*

The NSF was established as the "patron of pure science." Therefore, researchers who work at the forefront of discovery are the best candidates for NSF support and are the most likely to receive it. We find that NSF support has been critical to enabling researchers to be in the vanguard of those at the frontier. There are numerous examples of major results and below we summarize a few examples that give a sense of the wide breadth and significance of NSF support.

INDICATOR I2: Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries.

RESULT: *Demonstrated significant achievement.*

Examples were provided by the AC/GPA.

INDICATOR I3: Foster connections between discoveries and their use in the service of society.

RESULT: *Demonstrated significant achievement.*

One of the goals of the NSF is to build and foster connections between research that leads to new discoveries and the societal benefits of these discoveries. What is truly impressive about the breadth of research sponsored by the NSF in this regard is that it is both broad and deep, from large-scale studies that examine carbon cycling in our oceans to improvement of cities at risk for massive earthquake damage.

INDICATOR I4: Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities.

RESULT: *Demonstrated significant achievement.*

NSF programs such as the Louis Stokes Alliances for Minority Participation (LSAMP), Centers of Research Excellence in Science and Technology (CREST), Alliances For Graduate Education and the Professoriate (AGEP), the Minority Postdoctoral Fellowship Program, and Research Experiences for Undergraduates have historically provided a stimulus and increased opportunities for women and underrepresented minorities to participate in all stages of the research process. These programs have been successful, and now NSF's portfolio contains a number of examples of projects that involve the full participation of underrepresented individuals and institutions in the generation of ideas. Several

overarching themes emerge, including: a) improved access to STEM (science, technology, engineering, and math) by disabled persons; b) culturally-based learning projects; c) CAREER awards that have provided the groundwork for highly successful careers of underrepresented minorities; and d) the coupling of outstanding science and strong mentorship."

INDICATOR I5: Provide leadership in identifying and developing new research and education opportunities within and across S&E fields.

RESULT: *Demonstrated significant achievement.*

NSF supports a broad array of research projects that promote the identification and development of new research and educational opportunities in science and engineering fields. Many of the projects demonstrate leadership and novelty and represent new and ingenious ways of approaching research. Much of the work in this indicator is interdisciplinary, requiring input by a number of researchers from different areas. Further, many of the studies involved a combination of fundamental and applied research with high potential for practical outcome.

INDICATOR I6: Accelerate progress in selected S&E areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives.

RESULT: *Demonstrated significant achievement.*

The NSF supports a wide variety of projects that create new integrative and cross-disciplinary knowledge while providing researchers with new skills and multi-disciplinary perspectives.

Annual Performance Goal I2: NSF will increase the average annualized award size for research grants to $140,000.

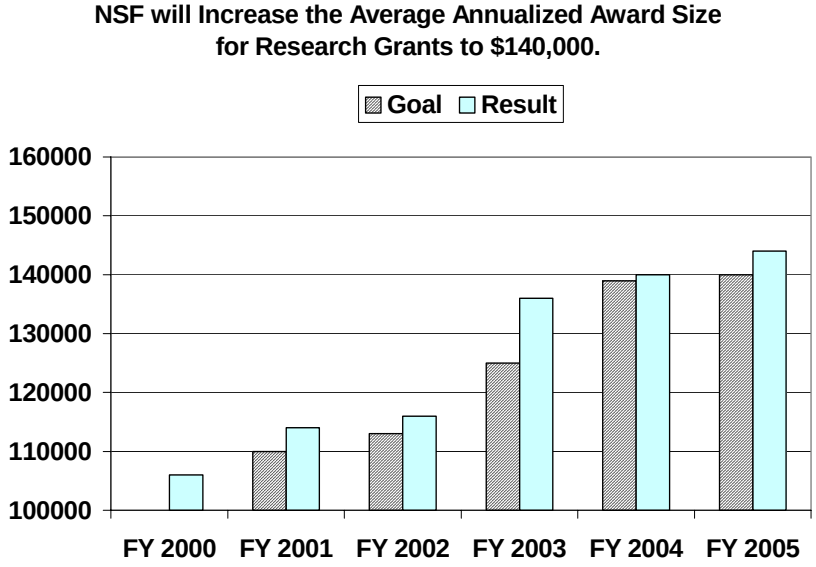
✓ Goal I2 Achieved

NSF is continuing its goal of increasing award size[4]. Our long-term goal is to reach an average annualized award size of $250,000.

Adequate award size is important both for attracting high-quality proposals and for ensuring that proposed work can be accomplished as planned. Larger awards increase the efficiency of the system by allowing scientists and engineers to devote a greater portion of their time to actual research rather than to proposal writing and other administrative work.

NSF WILL INCREASE THE AVERAGE ANNUALIZED AWARD SIZE FOR RESEARCH GRANTS to $140,000.

	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	$110,000	$113,000	$125,000	$139,000	$140,000	NA
Result	$114,000	$116,000	$136,000[5]	$140,000	**✓$144,000**	NA



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This will not be a goal in FY 2006 as time-to-decision with a quality measure is used as an efficiency measure across most PART programs.

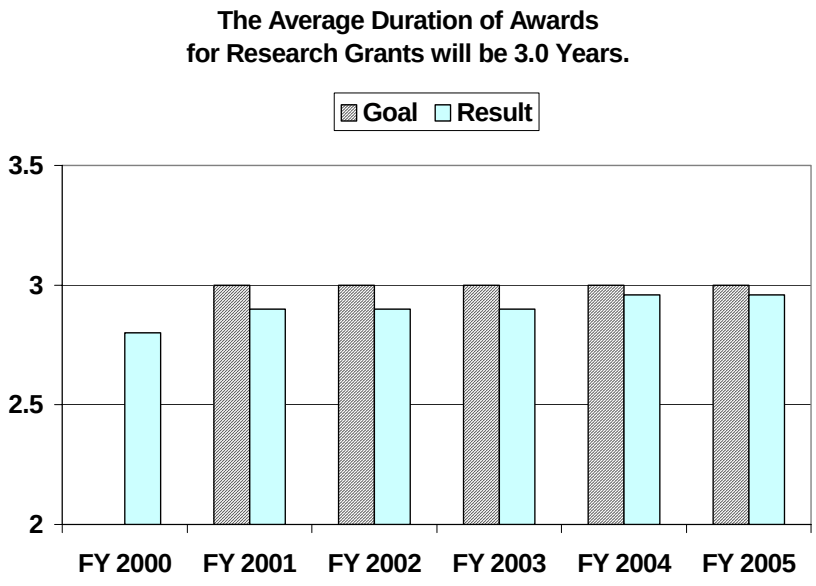
[4] The award size and duration performance goals are applicable only to competitive research grants (a subset of awards that focuses on awards to individual investigators and small groups).

[5] Beginning in FY 2003 collaborative proposals submitted as individual proposals from the collaborating institutions were counted as a single proposal as NSF treats them as a single proposal for review and award/decline decisions. If such collaborative proposals are counted individually, the average annualized award size for FY 2003 is $121,380.

Annual Performance Goal I3: The average duration of awards for research grants will be 3.0 years.

✕ Goal I3 Not Achieved

THE AVERAGE DURATION OF AWARDS FOR RESEARCH GRANTS					
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**
Goal	3.0 years	3.0 years	3.0 years	3.0 years	3.0 years
Result	2.9 years	2.9 years	2.9 years	2.96 years	**✕2.96 years**



WHY WE DID NOT ACHIEVE THIS GOAL: Progress on this goal is budget dependent. The performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program or activity performance.

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This will not be a goal in FY 2006 as time-to-decision with a quality measure is used as an efficiency measure across most PART programs.

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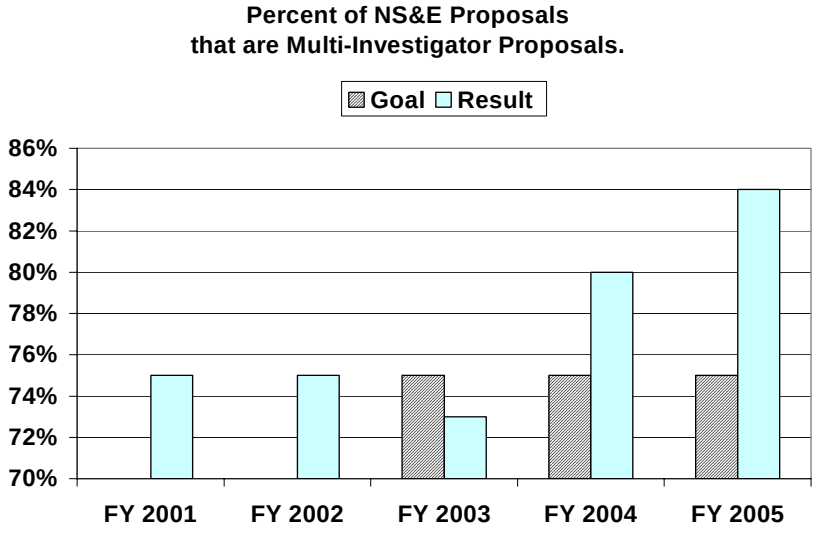
Annual Performance Goal I4: Foster collaboration among investigators in Nanoscale Science and Engineering.

✓ Goal I4 Achieved

The Nanoscale Science and Engineering (NS&E) priority area encompasses the systematic organization, manipulation and control of matter at atomic, molecular and supramolecular levels. Novel materials, devices, and systems – with their building blocks on the scale of nanometers – shift and expand possibilities in science, engineering and technology. A nanometer (one-billionth of a meter) is to an inch what an inch is to 400 miles. With the capacity to manipulate matter at this scale, science, engineering and technology are realizing revolutionary advances, in areas such as individualized pharmaceuticals, new drug delivery systems, more resilient materials and fabrics, catalysts for industry and order-of-magnitude faster computer chips.

Nanoscale science and engineering research promises a better understanding of nature, a new world of products beyond what it is now possible, high efficiency in manufacturing, sustainable development, better healthcare and improved human performance. The NSF NS&E priority area strives to foster collaborations among investigators that may not have otherwise occurred.

PERCENT OF NS&E PROPOSALS THAT ARE MULTI-INVESTIGATOR PROPOSALS.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	N/A	N/A	75%	75%	75%	75%
Result	75%	75%	73%	80%	**✓84%**	



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[6]: This goal will be continued in FY 2006.

[6] The Performance Plan has now been integrated within the Performance Budget.

Annual Performance Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering (ITR COV).

✓ Goal I5 Successful

The following is taken from the Information Technology Research (ITR) Committee of Visitors report of their review conducted March 8-10, 2005 (Question 2[7], page 11). The report will be available at www.nsf.gov/od/gpra/COV/start.htm in early November 2005.

"Yes, NSF did serve an appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering.

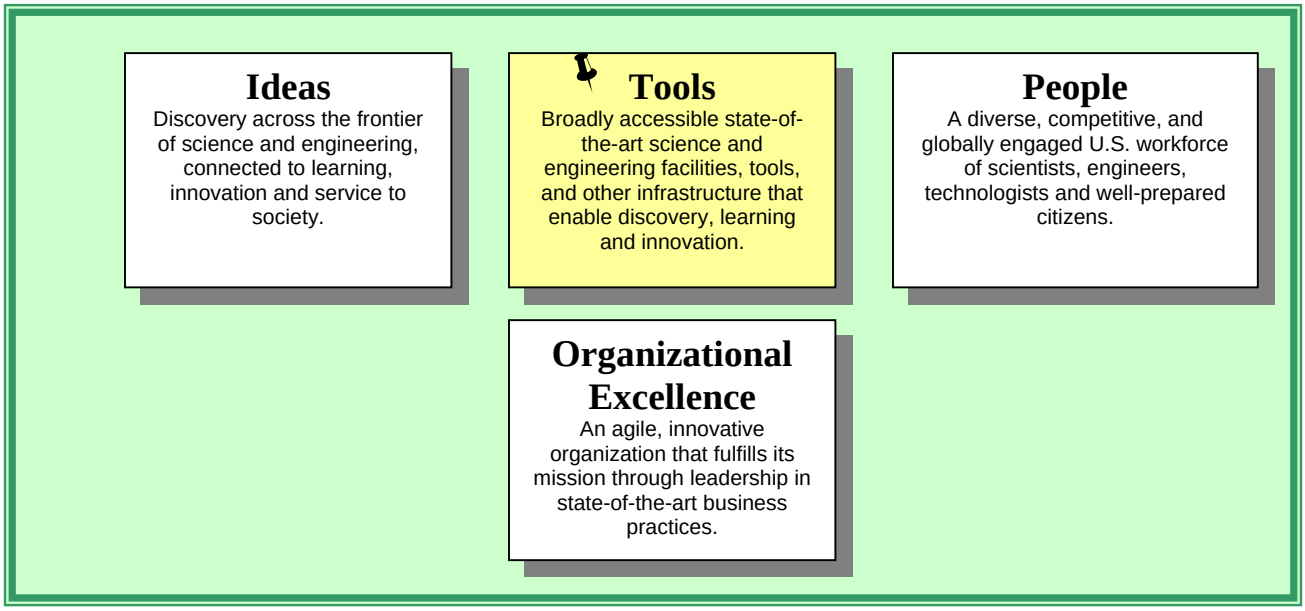
One of the broadest contributions that ITR has made has been to develop interdisciplinary interactions between and across disciplines. These are partnerships that would likely not have spontaneously formed without the infusion of money that ITR brought, and many of these collaborations will last far beyond the duration of the ITR program.

Medium and large ITR grants were daunting management challenges. Large proposals were always allowed extra pages for a management plan. By 2002, NSF was encouraging investigators to provide a management plan, including their plan for coordinating across sites for both medium and large proposals. Panels were asked to assess management plans as part of their overall review."

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: The ITR initiative has been completed. The goal will not appear in FY 2006.

[7] 2. *Has the ITR program served an appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering?*

NSF GPRA PERFORMANCE GOALS – TOOLS



TOOLS STRATEGIC OUTCOME GOAL: Broadly accessible state-of-the-art Science and Engineering facilities, tools, and other infrastructure that enable discovery, learning and innovation.

✓ Goal T1 Achieved

As the issues researchers face increasingly involve phenomena at or beyond the limits of our measurement capabilities, their study requires the use of new generations of powerful tools. Examples of such tools include instrumentation and equipment needed by individual investigators in the conduct of their research, multi-user facilities, digital libraries, accelerators, telescopes, research vessels, and aircraft and earthquake simulators. In addition, funding devoted to the TOOLS strategic outcome area provides resources needed to support large surveys and databases as well as computational and computing infrastructures for all fields of science, engineering, and education.

NSF provides support for large multi-user facilities that meet the need for state-of-the-art, world-class research platforms vital to new discoveries and the progress of research. NSF support may include construction, upgrades, operations, maintenance, and personnel needed to assist scientists and engineers in the conduct of research at such facilities. NSF consults with other agencies and international partners to avoid duplication and optimize capabilities for American researchers.

All of these investments enable the Foundation to meet its mission of promoting the progress of science, while responding specifically to direction in the NSF Act of 1950 to foster and support the development and use of computer and other scientific and engineering methods and technologies, primarily for research and education in the sciences and engineering.

Annual Performance Goal T1: Our performance is successful when, *in the aggregate*, results reported in the period FY 2005 demonstrate significant achievement in the majority of the following indicators:

- Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of the-art S&E facilities, tools, databases, and other infrastructure.
- Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms.
- Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation.
- Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation.
- Support research that advances instrument technology and leads to the development of next-generation research and education tools.

RESULT: External experts provided examples of significant achievement during FY 2005 reporting. Comments by the AC/GPA and examples they selected are presented for each of the performance indicators for this goal.

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This goal will be continued in FY 2006.

TOOLS: Comments by the Advisory Committee for GPRA Performance Assessment

The following statements concerning NSF achievement with respect to the Indicators and Areas of Emphasis for the TOOLS goal are excerpted from the AC/GPA Report on NSF's TOOLS portfolio. Additional comments as well as examples in support of significant achievement for each indicator are available at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05210.

The Committee concluded that there has been significant achievement in all indicators of the TOOLS strategic outcome goal. The Committee also concluded that the projects contained in the TOOLS portfolio exhibit both high quality and high relevance to important national goals.

Innovative/High-Risk /Bold Research: A more thorough discussion of this issue is found elsewhere in this report. However, the Tools subgroup endorses the definitional efforts of the Organizational Excellence Subgroup on this topic. Additionally, we offer three observations:

- First, it may be useful to look at NIST's ATP (Advanced Technology Program) risk rating system, which has been developed over years of experience.

- Second, one of the mechanisms used by NSF to encourage "bold" research, Small Grants for Exploratory Research (SGERs) is not, in our view, effectively addressing the innovative research issue. Although program officers have considerable latitude to employ SGER grants to foster innovative research to counter what might be unwarranted caution in review panels, in fact SGERs are used relatively rarely. Foundation-wide, divisions may use up to 5 percent of their budget on SGER grants, but in reality only 0.4 percent of these budgets are used in this way. In our view, SGER grants are not a significant fraction of the overall portfolio therefore, they may not be playing a significant role in increasing the amount of highly innovative research. The reason(s) for this is (are) unclear. We encourage NSF to re-examine the purpose and use of SGER grants.

- Third, it does not appear that clear data exist which demonstrate that NSF either does or does not fund enough innovative research. With respect to the TOOLS portfolio, we found that many of our nuggets indeed reflected bold/innovative research efforts. On the other hand, some directorates that use a number of different mechanisms may not be making such awards with a full understanding of the implications for the entire portfolio, or, conversely, may not be using the full suite of mechanisms available to them to encourage and fund innovative research efforts. The bottom line is that it is important to have a clear definition in hand as the necessary precursor to collecting reliable data to form a more accurate picture of the portfolio mix with respect to innovative or transformative research.

Multidisciplinary Research Projects: More and more, forefront science sits between traditional disciplines, and some of the more innovative ideas involve investigators from very different fields collaborating on "terra incognita." NSF has a structure that, for the most part, has been established to fund single principal investigators. While many of the new, targeted solicitations and priority areas encourage or require multidisciplinary activities, these are often short-lived programs (e.g., Information Technology Research, Nanoscale Science and Engineering, and Biocomplexity in the Environment). We encourage NSF to develop ways to encourage and fund multi- and/or inter-disciplinary activities through its ongoing programs.

We point out the difficulty of parsing projects to fit into a single indicator "box". Many of the large, NSF-funded centers and networks impact many indicators not only in the TOOLS strategic goal, but sometimes including indicators from the IDEAS and PEOPLE strategic goals. The Network for Earthquake Engineering Simulation (NEES) is an example. Since we will refer to it several times, to minimize repetition in the text, we describe it here, before we turn to the individual indicators.

From the Pacific coast to our nation's interior, more than 75 million Americans in 39 states live in towns and cities at risk for earthquake devastation. While scientists are digging into the origins of seismic

waves, engineers are pushing the boundaries of design to create structures that remain safe when an earthquake ultimately occurs. The George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) (0126366, 0117853, and 0402490) integrates 15 experimental facilities located at academic institutions across the United States, including shake tables, geotechnical centrifuges, a tsunami wave basin, large strong floor and reaction wall facilities with unique testing equipment, and mobile and permanently installed field equipment.

NEES is a major state-of-the-art facility and important for the discipline (Indicator T1). Indeed, it goes beyond the state of the art in developing the prototype of next-generation ways of doing science (Indicator T2). It is a distributed "virtual instrument" for earthquake engineering research (www.nees.org). It has enabled a large community of earthquake engineers, computer scientists, and other disciplinary specialties to share resources in a unique way. It provides the necessary tools for remote data acquisition, for sharing data through metadata management software, for remote simulations, virtual laboratories, even for telepresence. The interface is friendly enough to support K-12 teachers and be usable by the general public. This effort is serving as a model for other distributed scientific instrumentation. As such, it demonstrates the potential for cyberinfrastructure (Indicator T3) to transform the way that researchers do research and that teachers teach.

Other Important Issues

Expanding the NSF community beyond research-focused institutions: In the past, research-focused institutions have stood out as being the primary recipients of NSF funds. In order to meet the future needs of the nation for scientists, engineers, and technically trained people, NSF must redouble its efforts to expand its constituency to include predominantly undergraduate institutions (typically teaching-intensive) and minority-serving institutions as well as research-focused institutions. NSF has made significant progress on building infrastructure capacity at many of these other types of institutions. However, it is clear that a primary barrier to making continuing progress towards enhancing the research capacity at institutions educating a large percentage of underrepresented groups is the high teaching workload of faculty at these institutions. The NSF should examine the relative balance of its investments aimed at enhancing infrastructure, encouraging student pursuit of STEM fields, and supporting the professional development of faculty in the community colleges, predominantly undergraduate, and minority-serving institutions.

Sustainability: We continue to be concerned about the sustainability of a number of the tools developed with NSF funding. This issue was also raised by several COV reports that we reviewed. For example, databases whose collection, organization and initial presentation, often on web sites, must be maintained after the duration of the grant or upon departure of a PI, graduate student or other technical staff from the institution that hosts that database. Another example would be facilities that are funded and built to provide access to a user community, but then the funding is reduced or eliminated either due to termination of the program (for example, large projects funded by Information Technology Research) or funding cycle. The accomplishment descriptions of the various projects mentioned in our report do not provide any indication about what the institution will do when the NSF funding runs out. We suggest that merit review panels should, where appropriate, consider the quality of the proposer's plan for the long-term sustainability of the site or facility.

INDICATOR T1: Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of the-art S&E facilities, tools, databases, and other infrastructure.

RESULT: *Demonstrated significant achievement.*

NSF supports and provides a wide variety of accessible, state-of-the-art science and education facilities, tools and infrastructure, and in most cases is the only support for such instrumentation in academia. These tools provide opportunities for researchers, educators, students, citizens and policymakers. NSF supports large state of the art facilities, and nearly all of the US's land based astrological facilities, and tools that push the forefront of science and engineering. It supports databases and acquisition/analysis software that present and synthesize large amounts of data collection by numerous researchers around the US and the world. Through a variety of funding mechanisms on different scales, NSF addresses both the needs of researchers to have and develop facilities and infrastructure that enables scientific discovery and educators to develop innovative means of disseminating science to students and the public. NSF has made a significant achievement with respect to indicator T1.

INDICATOR T2: Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms.

RESULT: *Demonstrated significant achievement.*

The development, construction, and operation of major, next-generation research facilitates many essential discoveries that advance fundamental knowledge and enhance the American economy. Innovative facilities and research tools often open unique opportunities for collaborative research across institutions, nations, and disciplines. Facilities and other large research and education platforms provide the long-term infrastructure for creating new knowledge that serves society. The NSF has made significant achievement in providing leadership in the development, construction, and operation of major, next-generation facilities and other large research and education facilities.

INDICATOR T3: Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation.

RESULT: *Demonstrated significant achievement.*

There was significant achievement in the cyberinfrastructure goal through the combination of these facilities, indicated by progress in several funded activities, falling roughly under two headings:

- Successful applications of the existing cyberinfrastructure, and
- Development of new tools to extend the reach of the cyberinfrastructure.

INDICATOR T4: Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation.

RESULT: ***Demonstrated significant achievement.***

Our examination of the nuggets and other background information indicates that the NSF and its grantees contribute to a great extent to the national need for information needed to inform policies and budgets. This information is produced in three basic ways, which we will discuss in turn. First, the NSF's division of Science Resources Statistics (SRS) and its contractors collect and interpret a great deal of information themselves. Second, a variety of programs within the NSF make grants that result in a number of databases that scientists, educators, and citizens can use. Third, some grants made by the NSF either deliberately or accidentally produce policy-related information that is useful for dealing with specific issues. We find that that the NSF program merits the designation of "significant achievement" in the T4 area.

INDICATOR T5: Support research that advances instrument technology and leads to the development of next-generation research and education tools.

RESULT: ***Demonstrated significant achievement.***

An important part of NSF's research strategy is to provide new and advanced tools as a "backbone" that can position our nation to investigate and develop "next-generation" research programs further advancing science and technology. Perhaps of equal significance is the training and development of students and academia to new methods and processes that enable us to do things tomorrow that are just being imagined today thus leading to “development of next generation research and education.” We find that the NSF efforts in this area are worth describing as ‘significant achievements.’

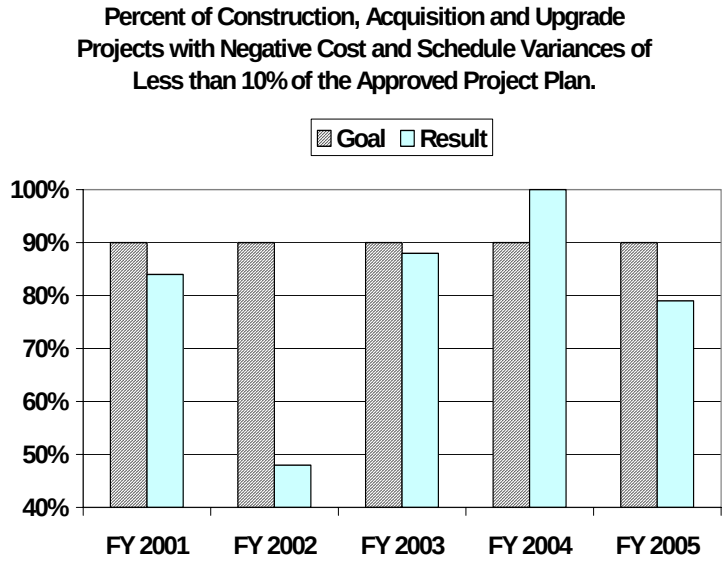
Annual Performance Goal T2: Percent of construction, acquisition and upgrade projects with negative cost and schedule variances of less than 10% of the approved project plan.

✕ Goal T2 Not Achieved

Investments in development and construction of state-of-the-art facilities and platforms are implemented consistently with planned cost and schedule. In FY 2001 and FY 2002, NSF undertook a comprehensive internal review of the facilities goals. In FY 2003, NSF improved the construction goals by combining cost and schedule performance into a single goal. The revised goal assesses performance based on the Earned Value technique, a widely accepted project management tool for measuring progress that recognizes that cost or schedule data alone can lead to distorted perceptions of performance. Beginning in FY 2004, Polar facilities were included in a separate Program Assessment Rating Tool (PART) evaluation and are not included under this goal for the Facilities PART.

PERCENT OF CONSTRUCTION, ACQUISITION AND UPGRADE PROJECTS WITH NEGATIVE COST AND SCHEDULE VARIANCES OF LESS THAN 10% OF THE APPROVED PROJECT PLAN[8]

	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	90%	90%	90%	90%	90%	90%
Result	84%	48%[9]	88%	100%	**×79%**	



WHY WE DID NOT ACHIEVE THIS GOAL: The cost and schedule variances were facility specific due to unforeseen delays related to a shipyard contract and the process for soliciting bids; drilling contract delayed due to hurricanes; and delays in approval of contract because of additional testing and coordinating the procurement with international partners.

STEPS WE WILL TAKE TO ACHIEVE THIS GOAL: NSF will continue to work with project managers to help avoid obstacles to successful performance by requiring all MREFC projects to provide quarterly financial reporting comparing budgeted expenditures to actual expenditures for

[8] Through FY 2002, there were three interrelated but separate GPRA goals for schedule and cost for construction/upgrade projects. For FY 2003 and beyond, these goals were combined into the single goal. While annual and total cost targets were all met in FY 2001 and FY 2002, scheduling milestones were not. The goals and actual performance shown (*) for FY 2001 and FY 2002 reflect the schedule goal only.

[9] Success in FY 2002 required all milestones within the year to also be met.

each Work Breakdown Schedule (WBS) identified in their construction project as described in the approved Project Execution Plan and also provide quarterly status reports with a graph of cumulative earned value for the construction of the overall project. NSF will include language in the Cooperative Agreement for each MREFC Awardee to be completed by end of fiscal year 2006.

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This goal will be continued in FY 2006.

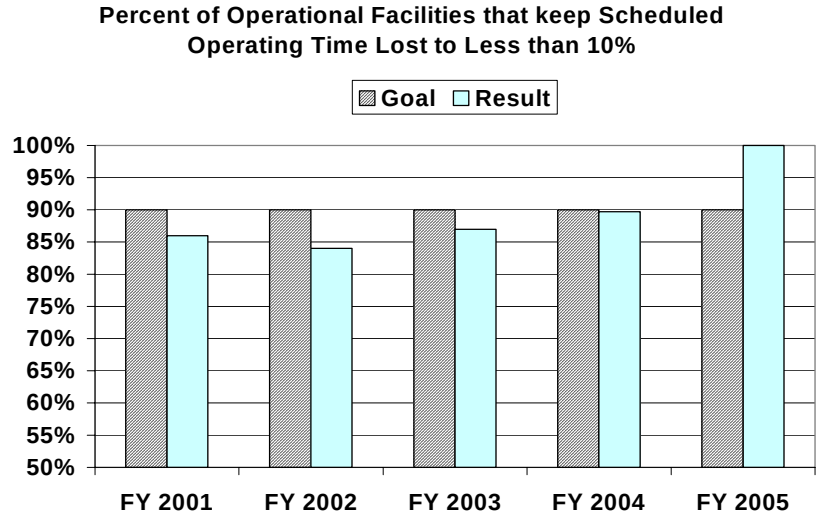
Annual Performance Goal T3: Percent of Operational Facilities that keep Scheduled Operating Time Lost to Less than 10%.

✓ Goal T3 Achieved

To provide the flexibility necessary for NSF to report realistic goals, we maintained the level deemed "successful" at 90% of the facilities. Measure in FY 2001 and 2002 was based on keeping operating time greater than 90%; results reported here are in terms of present measure. Beginning in FY 2005, the threshold for reporting was raised to $8M per year, to provide consistent definitions of "large facilities." After several years of tracking this goal, it appears that facility managers are improving on their ability to estimate, and perhaps mitigate against, unscheduled downtime.

PERCENT OF OPERATIONAL FACILITIES THAT KEEP SCHEDULED OPERATING TIME LOST TO LESS THAN 10%

	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	For 90% of facilities, keep operating time lost due to unscheduled downtime to less than 10% of the total scheduled operating time.	For 90% of facilities, keep operating time lost due to unscheduled downtime to less than 10% of the total scheduled operating time.	For 90% of operational facilities, keep scheduled operating time lost to less than 10%.	For 90% of operational facilities, keep scheduled operating time lost to less than 10%.	For 90% of operational facilities, keep scheduled operating time lost to less than 10%.	For 90% of operational facilities, keep scheduled operating time lost to less than 10%.
Result	25 of 29 (86%) reporting facilities met goal.	26 of 31 (84%) reporting facilities met goal.	26 of 30 (87%) reporting facilities met goal.	26 of 29 (89.7%) reporting facilities met goal.	**✓10 of 10 (100%) reporting facilities met goal.**	



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This goal will be continued in FY 2006.

Annual Performance Goal T4: Number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites.

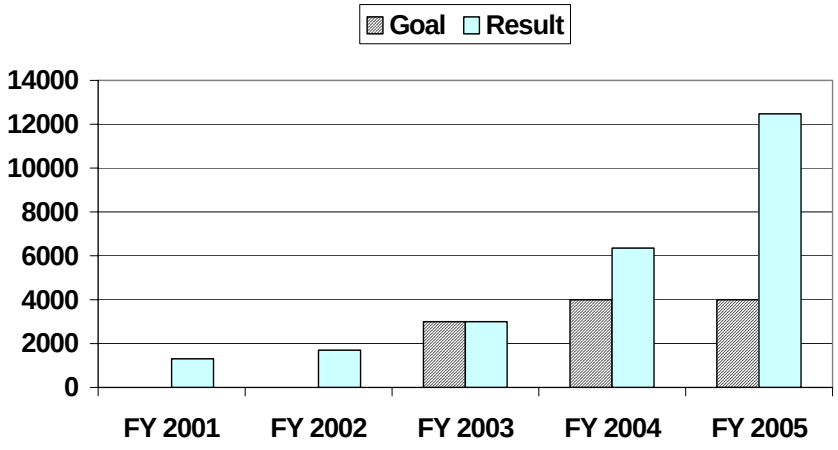
✓ Goal T4 Achieved

The National Nanotechnology Infrastructure Network (NNIN) is an integrated national network of user facilities that supports the future infrastructure needs for research and education in the burgeoning nanoscale science and engineering field. The facilities comprising this network are diverse in capabilities, research areas, and geographic locations, and the network will have the flexibility to grow or reconfigure as needs arise. The NNIN broadly supports nanotechnology activities outlined in the National Nanotechnology Initiative investment strategy. It provides users across the nation access to leading-edge fabrication and characterization tools and instruments in support of nanoscale science and engineering research. The NNIN supersedes the National Nanofabrication Users Network (NNUN), initiated in 1994 and for which NSF support concluded at the end of 2003. The use of the network far exceeded expectation due, in part, to the great interest in the field of nanotechnology.

NUMBER OF USERS ACCESSING NATIONAL NANOFABRICATION USERS NETWORK/NATIONAL NANOTECHNOLOGY INFRASTRUCURE NETWORK (NNUN/NNIN) AND NETWORK FOR COMPUTATIONAL NANOTECHNOLOGY (NCN) SITES

	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	N/A	N/A	3000	4000	4000	12500
Result	1300	1700	3000	6350	**✓12462**	

Number of Users Accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites.



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[10]: This goal will be continued in FY 2006.

[10] The Performance Plan has now been integrated within the Performance Budget.

Annual Performance Goal T5: Number of nodes that comprise infrastructure.

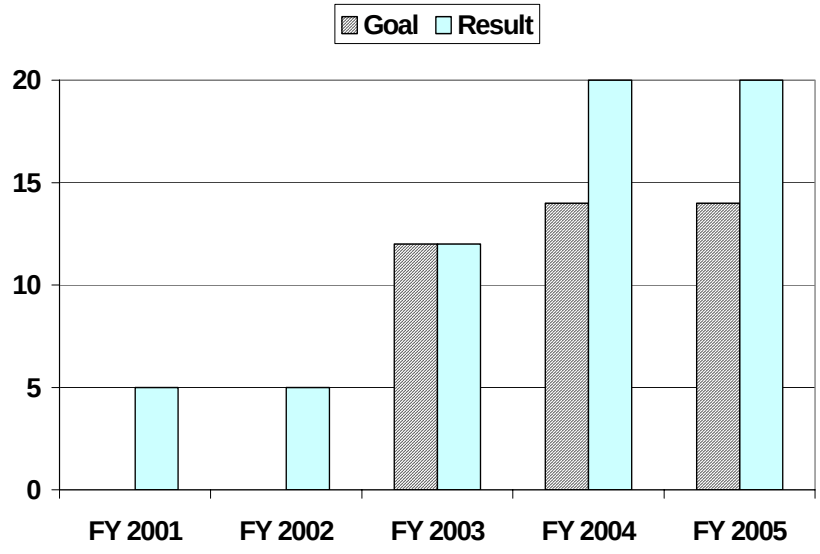
✓ Goal T5 Achieved

The National Nanotechnology Infrastructure Network (NNIN) is an integrated national network of user facilities that supports the future infrastructure needs for research and education in the burgeoning nanoscale science and engineering field. The facilities comprising this network are diverse in capabilities, research areas, and geographic locations, and the network will have the flexibility to grow or reconfigure as needs arise. The NNIN broadly supports nanotechnology activities outlined in the National Nanotechnology Initiative investment strategy. It provides users across the nation access to leading-edge fabrication and characterization tools and instruments in support of nanoscale science and engineering research. The NNIN supersedes the National Nanofabrication Users Network (NNUN), initiated in 1994 and for which NSF support concluded at the end of 2003.

NNIN nodes are defined as both large and small individual user facilities, geographically distributed and with diverse and complementary capabilities to design, create, characterize, and measure novel nanoscale structures, materials, devices, and systems.

NUMBER OF NODES THAT COMPRISE INFRASTRUCTURE.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	N/A	N/A	12	14	14	17
Result	5	5	12	20	**✓20**	

Number of Nodes that Comprise Infrastructure.



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[11]: This goal will be continued in FY 2006.

[11] The Performance Plan has now been integrated within the Performance Budget.

Annual Performance Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT (ITR COV).

✓ Goal T6 Successful

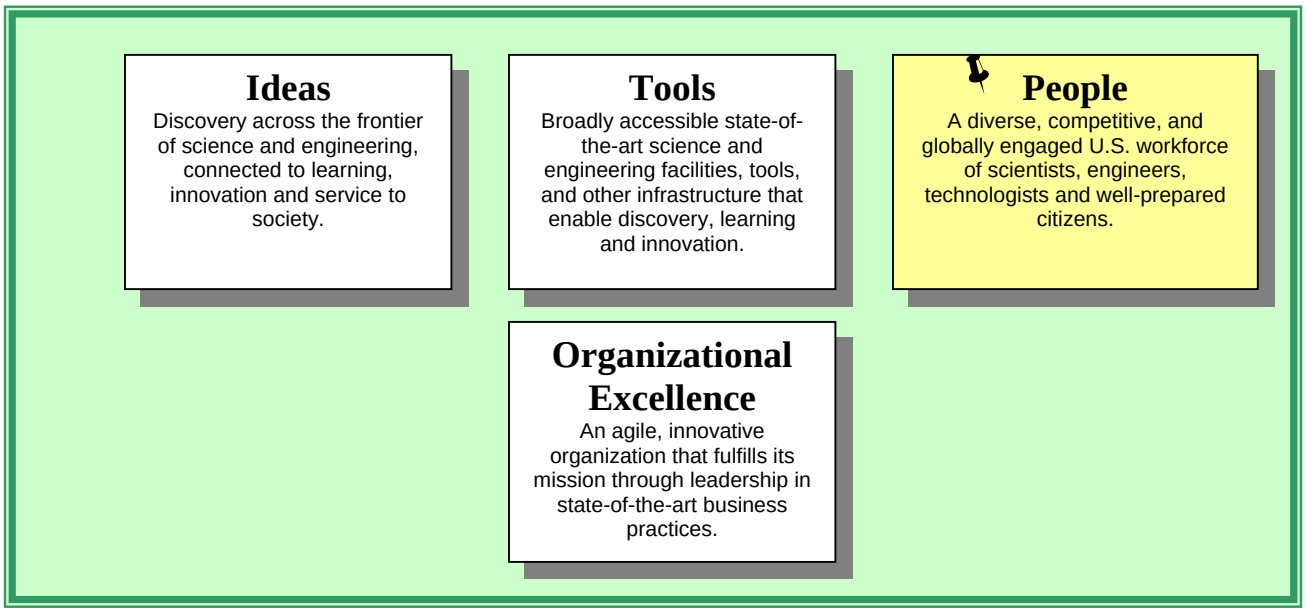
The following is taken from the Information Technology Research (ITR) Committee of Visitors report of their review conducted March 8-10, 2005 (Question 1[12], page 11). The report will be available at www.nsf.gov/od/gpra/COV/start.htm in early November.

> Yes, the ITR program has made significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT.
>
> It has supported innovative projects that would not otherwise be supported from the disciplinary programs. The scope of the programs was broad, and has opened up new subfields of computer science including bio-informatics, human-robot interaction and computational medicine for example.
>
> The scale of the grants enables researchers to mine, visualize and model huge datasets, to tackle large problems ranging from global warming, to economic recession, to traffic jams and encouraged faculty and students from diverse backgrounds to cross-train for new fields and positions using IT. The program has supported many projects bringing computer science and information technology to K-12 schools and to the public both through hands-on projects and through tools to assess learning and teaching.

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: The ITR initiative has been completed. The goal will not appear in FY 2006.

[12] 1. *Has the ITR Program made significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT?*

NSF GPRA PERFORMANCE GOALS – PEOPLE



PEOPLE STRATEGIC OUTCOME GOAL: A diverse, competitive, and globally engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens.

✓ Goal P1 Achieved

Leadership in today's knowledge economy requires world-class scientists and engineers and a national workforce that is scientifically, technically and mathematically strong. Investments in *People* aim to improve the quality and reach of science, engineering, and mathematics education and enhance student achievement. Each year, NSF supports almost 200,000 people – teachers, students, and researchers at every educational level and across all disciplines in science and engineering. Embedded in all NSF programs are efforts to build a more inclusive, knowledgeable, and globally engaged workforce that fully reflects the strength of the Nation's diverse population.

Annual Performance Goal P1: Our performance for this goal is successful when, *in the aggregate*, results reported in the period FY 2005 demonstrate significant achievement in the majority of the following indicators:

- Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities.
- Support programs that attract and prepare U.S. students to be highly qualified members of the global S&E workforce, including providing opportunities for international study, collaborations and partnerships.
- Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics.

- Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education.
- Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels.

RESULT FOR PERFORMANCE GOAL P1: NSF achieved this goal. External experts provided examples of significant achievement during FY 2004 reporting. Comments by the AC/GPA and examples they selected are presented for each of the performance indicators and areas of emphasis for this goal.

Implications for the FY 2006 Performance Plan: This goal will be continued in FY 2006.

PEOPLE: Comments by the Advisory Committee for GPRA Performance Assessment (AC/GPA)

The following statements concerning NSF achievement with respect to the indicators for the PEOPLE goal are excerpted from the AC/GPA Report on NSF's PEOPLE portfolio. Additional comments as well as examples in support of significant achievement for each indicator are available at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05210.

The Committee found significant achievement for PEOPLE indicators 1, 2, 3 and 4. However, based on evidence provided, the Committee did not find significant achievement for indicator P5.

Quality and relevance: Based on the review of COV reports and project accomplishments (nuggets), the overall quality of projects was determined to be high and relevant to the People strategic outcome goal. Delivery methods and application of research findings were also found to contribute to the high quality of projects reviewed. Many of the projects reviewed have high relevance to the development of a strong workforce and public understanding of science.

Transformative/Bold/High risk-Innovative projects: Projects contributing to the People goal were found across NSF as evidenced by the breadth of nuggets selected to illustrate significant achievement. Overall, the Committee found ambitious projects that we would consider "bold." One general observation was that high risk or bold projects seemed to be less likely to be funded under the PEOPLE strategic goal.

Other Comments:

Reduced funding: The Committee members reviewing this strategic goal expressed serious concern about the significant decrease in funding for programs that focus on the People Goal. Funding levels for this goal have declined from $1,146,880,000 in 2004 to the FY 2006 Request of $978,770,000. In addition, the number of people involved in or impacted by NSF activities has declined from an estimated 215,350 in 2004 to 168,280 in 2006. This trend should be monitored carefully by the AC/GPA because it could have an adverse impact on NSF's ability to demonstrate significant achievement in the future. The principal organizational unit within NSF for meeting the PEOPLE outcome goal is the Education and Human Resources (EHR) directorate. This directorate has borne the brunt of the funding reductions noted above. This may have long-term implications for meeting the objectives in the People goal. The Committee recognizes that other directorates within NSF are making major contributions to this goal. However, delegating yet more responsibility for meeting these objectives to other parts of NSF because of budgetary realignments may result in lack of experience and expertise in K-12 education, particularly in programs that sustain high-quality, high-commitment engagement of scientists and mathematicians with students and teachers in classroom settings.

Data Collection and Assessment: Effective assessment should be, at its heart, data-driven. Thus, it is very important to develop simple but effective metrics and to provide data that enable both qualitative and quantitative analyses of progress toward the People goal. This will be critical to establishing a context for future evaluations by this Committee or others of NSF's level of achievement. The Committee on Equal Opportunity in Science and Engineering (CEOSE) recommended in its 2004 report, *"Broadening Participation in America's Science and Engineering Workforce*," that NSF should expand its systematic and objective evaluation efforts by continuing to "obtain, refine and disaggregate data and factors related to the participation and advancement of persons from underrepresented groups in STEM education and careers" (Executive Summary, p. 7-8; CEOSE 04-02). We support that recommendation and urge NSF to increase its focus on this issue and to strive to identify those data elements (particularly those collected over a long period) that are the most critical to assessing program impact.

Broadening Participation: It is important for NSF to emphasize that "broadening the participation of underrepresented groups" is not an issue of simple demographics, but of increasing the diversity of *paradigms, ideas, methods, and perceptions* brought to the Foundation's programs. In particular, NSF must develop strategies to ensure that activities aimed at broadening participation are carried out with rigor and attention to high-quality research.

P5 Designation: P5, "Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education on all levels," is a research goal that contributes to building a workforce. NSF is encouraged to review whether or not it would be more appropriate under the 'Ideas' goal.

INDICATOR P1: Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups in NSF activities.

RESULT: *Demonstrated significant achievement.*

Based on the accomplishments provided, NSF devotes a substantial amount of resources to fund projects that contribute to the attainment of the PEOPLE strategic outcome goal as articulated under Indicator P1. Collectively, the projects demonstrate significant achievement toward producing a workforce with strong representation of under-represented groups and women in science and engineering.

INDICATOR P2: Support programs that attract and prepare U.S. students to be highly qualified members of the global S&E workforce, including providing opportunities for international study, collaborations and partnerships.

RESULT: *Demonstrated significant achievement.*

The success of NSF in meeting the P2 indicator is largely due to the activities of one foundation-wide program, OISE (Office of International Science and Engineering, and its earlier incarnation INT). Of the 46 nuggets listed under "primary indicator" for P2, only 13 -- less than 30 percent -- met both the stated criteria for selection, namely that the program attract and prepare US students to science **and** that part of preparing them to be highly qualified members of the global workforce includes providing opportunities for international collaboration. Six of those were produced by OISE, with a range of other divisions represented. Exemplary activities recruited and trained students in science and offered them significant opportunities for international collaborative learning. The collaborative elements of these opportunities superseded standard international field practices of the past, in which researchers collected specimens or data abroad, brought them to the U.S., and published without consulting, conferring with, or including colleagues from the host nations.

INDICATOR P3: Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics.

RESULT: ***Demonstrated significant achievement.***

NSF invests in developing the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics. Development opportunities are funded over a wide range of programs, and evidence from outcomes reported by projects funded in FY 2005 demonstrate significant achievement in taking a variety of approaches to engage teachers and faculty in quality development experiences across STEM disciplines. Research Experiences for Teachers (RET), the CAREER awards, and the Teacher Preparation Continuum (TPC) are examples at the program level that help achieve NSF's goals.

INDICATOR P4: Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education.

RESULT: ***Demonstrated significant achievement.***

The range of accomplishments reported under Indicator P4 show that NSF is investing in effective informal science education materials and incorporating public outreach and dialog into many programs and projects. The accomplishments indicate that NSF-supported activities are reaching large numbers of people of all ages with insights from many fields, including biology, the earth and atmospheric sciences, engineering mathematics, and psychology. The portfolio of work shows a willingness to push the envelope, and is highly multidisciplinary. NSF has reached a level of significant achievement in this area.

INDICATOR P5: Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels.

RESULT: ***Did not demonstrate significant achievement.***

…we conclude that this does not constitute a body of work sufficient to determine that NSF has met the "significant achievement" threshold with respect to this important indicator.

Annual Performance Goal P2: Number of U.S. students receiving fellowships through Graduate Research Fellowships (GRF) and Integrative Graduate Education and Research Traineeships (IGERT) or Graduate Teaching Fellows in K-12 Education (GK-12).

✓ Goal P2 Achieved

NSF) seeks to ensure the vitality of the human resource base of science, mathematics, and engineering in the United States and to reinforce its diversity. A competition is conducted for Graduate Research Fellowships, with additional awards offered for women in engineering and computer and information science. NSF Graduate Fellowships offer recognition and three years of support for advanced study to outstanding graduate students in the mathematical, physical, biological, engineering, and behavioral and social sciences, including the history of science and the philosophy of science, and to research-based Ph.D. degrees in science education.

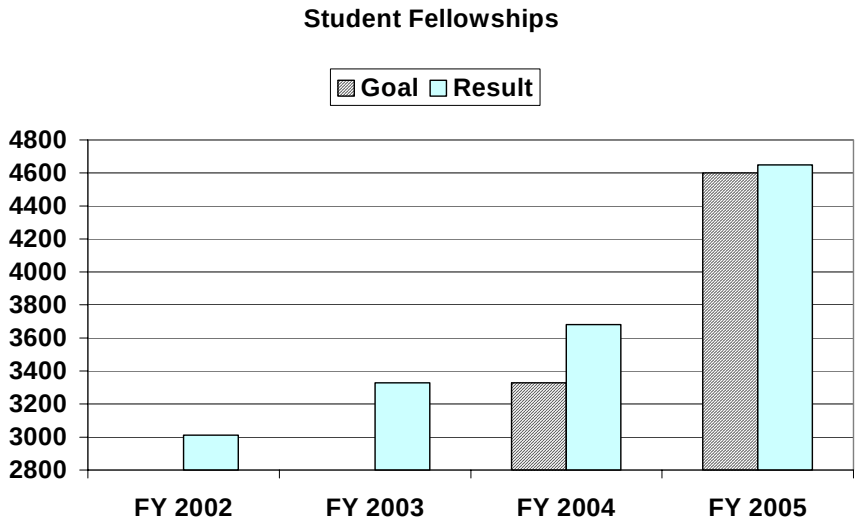
The Integrative Graduate Education and Research Traineeships (IGERT) program has been developed to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become in their own careers the leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries. It is also intended to facilitate greater diversity in student participation and preparation, and to contribute to the development of a diverse, globally-engaged science and engineering workforce.

The Graduate Teaching Fellows in K-12 Education (GK-12) program supports fellowships and associated training that enable graduate students in NSF- supported science, technology, engineering, and mathematics (STEM) disciplines to acquire additional skills that will broadly prepare them for professional and scientific careers in the 21st century. Through interactions with teachers in K-12 schools, graduate students can improve communication and teaching skills while enriching STEM instruction in K-12 schools. In addition, the GK-12 program provides institutions of higher education with an opportunity to make a permanent change in their graduate programs by including partnerships with K-12 schools in a manner that is of mutual benefit to their faculties and students. Expected outcomes include improved communication, teaching and team building skills for the Fellows; professional development opportunities for K-12 teachers; enriched learning for K-12 students; and strengthened partnerships between institutions of higher education and local school districts.

NUMBER OF U.S. STUDENTS RECEIVING FELLOWSHIPS THROUGH GRF AND TRAINEESHIPS THROUGH IGERT, OR THROUGH GK-12

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	N/A	N/A	increase	4600	4468
Result	3011	3328	3681[13]	**✓4648**	

[13] For FY 2002 - 2004, NSF is only including funded GRF and IGERT recipients and has revised FY 2002 and FY 2003 accordingly. Prior numbers in FY 2002 and FY 2003 had also included active students in these programs even if they were not currently funded.



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This goal will be continued in FY 2006.

Annual Performance Goal P3: Number of applicants for Graduate Research Fellowships from groups that are underrepresented in the science and engineering workforce.

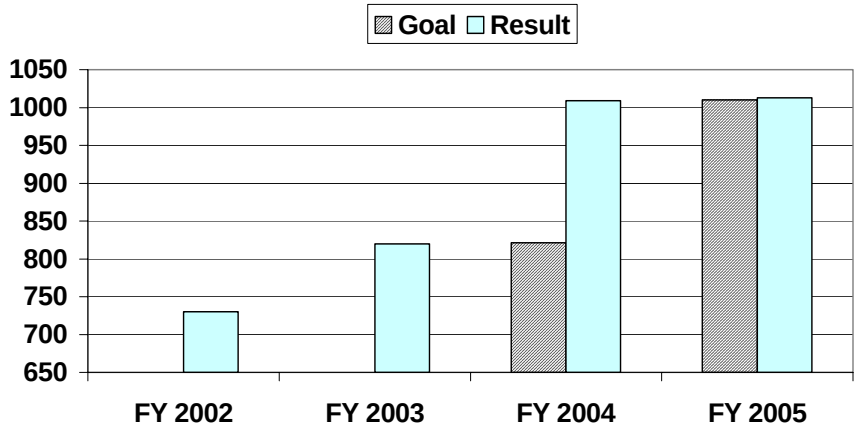
✓ Goal P3 Achieved

Graduate Research Fellowships are NSF's flagship investment in graduate education and training, and outreach efforts to increase the number of applicants from underrepresented groups are an ongoing priority. As with all demographic goals, the data come from voluntary self-reporting. Therefore, the number of applicants from underrepresented groups may actually be higher.

NUMBER OF APPLICANTS FOR GRADUATE RESEARCH FELLOWSHIPS FROM GROUPS THAT ARE UNDERREPRESENTED IN THE SCIENCE AND ENGINEERING WORKFORCE.

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	N/A	N/A	821	1010	increase
Result	730	820	1009	**✓1013**	

Number of Applicants for Graduate Research Fellowships from Groups that are Underrepresented in the Science and Engineering Workforce.



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[14]: This goal will be continued in FY 2006.

[14] The Performance Plan has now been integrated within the Performance Budget.

Annual Performance Goal P4: Number of applications for Faculty Early Career Development ProgCAREER) awards from investigators at minority-serving institutions.

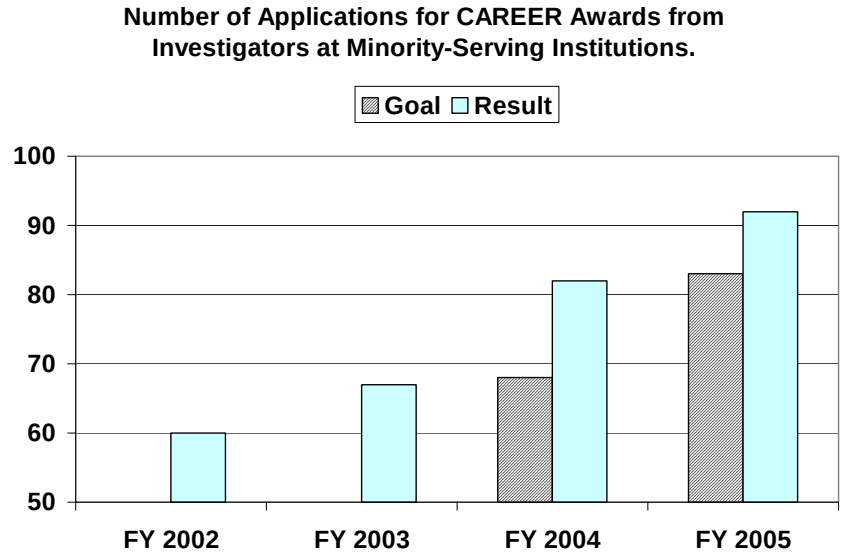
✓ Goal P4 Achieved

The Faculty Early Career Development (CAREER) Program is an NSF-wide activity that supports junior faculty within the context of their overall career development. It combines in a single program the support of research and education of the highest quality and in the broadest sense. This premier program emphasizes the importance the Foundation places on the early development of academic careers dedicated to stimulating the discovery process in which the excitement of research is enhanced by inspired teaching and enthusiastic learning. Each year NSF selects nominees for Presidential Early Career Awards for Scientists and Engineers (PECASE) from among the first-year awardees supported by the CAREER Program. PECASE awards recognize outstanding scientists and engineers who are in the early stages in their careers, and show exceptional potential for leadership at the frontiers of knowledge.

CAREER is NSF's flagship investment in the development of young faculty, and broadening the institutional base of applicants to the program is a continuing priority. Outreach efforts have specifically focused on attracting faculty from minority-serving institutions and from a broader geographic base.

NUMBER OF APPLICATIONS FOR CAREER AWARDS FROM INVESTIGATORS AT MINORITY-SERVING INSTITUTIONS

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Goal	N/A	N/A	68	83	increase
Result	60	67	82	**✓92**	



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[15]: This goal will be continued in FY 2006.

[15] The Performance Plan has now been integrated within the Performance Budget.

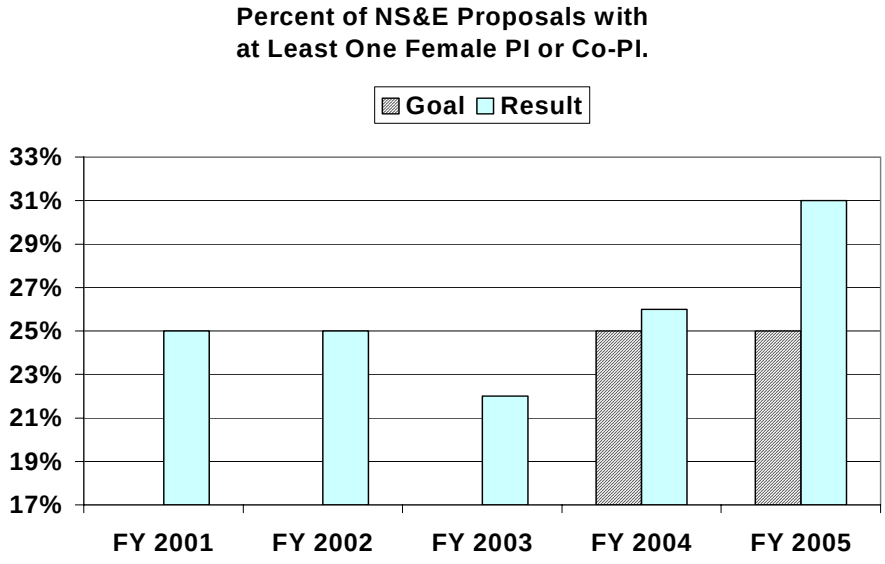
Annual Performance Goal P5: Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female PI or Co-PI.

✓Goal P5 Achieved

The Nanoscale Science and Engineering (NS&E) priority area encompasses the systematic organization, manipulation and control of matter at atomic, molecular and supramolecular levels. Novel materials, devices, and systems – with their building blocks on the scale of nanometers – shift and expand possibilities in science, engineering and technology. A nanometer (one-billionth of a meter) is to an inch what an inch is to 400 miles. With the capacity to manipulate matter at this scale, science, engineering and technology are realizing revolutionary advances, in areas such as individualized pharmaceuticals, new drug delivery systems, more resilient materials and fabrics, catalysts for industry and order-of-magnitude faster computer chips.

NS&E research promises a better understanding of nature, a new world of products beyond what is now possible, high efficiency in manufacturing, sustainable development, better healthcare, and improved human performance. NSF has a continued commitment to increasing participation of female investigators in this priority area.

PERCENT OF NS&E PROPOSALS WITH AT LEAST ONE FEMALE PI OR CO-PI.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	N/A	N/A	N/A	25%	25%	25%
Result	25%	25%	22%	26%	**✓31%**	



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[16]: This goal will be continued in FY 2006.

[16] The Performance Plan has now been integrated within the Performance Budget.

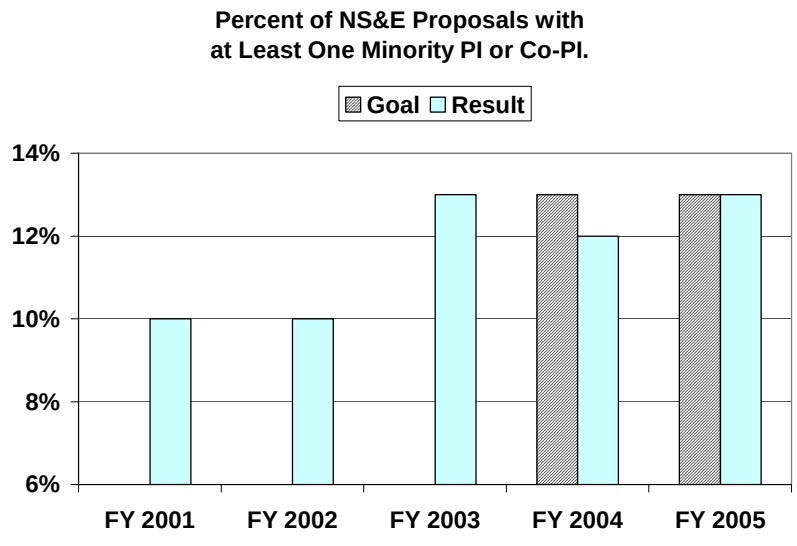
Annual Performance Goal P6: Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one minority principal investigator (PI) or co-principal investigator (Co-PI).

✖ Goal P6 Not Achieved

The Nanoscale Science and Engineering (NS&E) priority area encompasses the systematic organization, manipulation and control of matter at atomic, molecular and supramolecular levels. Novel materials, devices, and systems – with their building blocks on the scale of nanometers – shift and expand possibilities in science, engineering and technology. A nanometer (one-billionth of a meter) is to an inch what an inch is to 400 miles. With the capacity to manipulate matter at this scale, science, engineering and technology are realizing revolutionary advances, in areas such as individualized pharmaceuticals, new drug delivery systems, more resilient materials and fabrics, catalysts for industry and order-of-magnitude faster computer chips.

Nanoscale science and engineering research promises a better understanding of nature, a new world of products beyond what is now possible, high efficiency in manufacturing, sustainable development, better healthcare, and improved human performance. NSF has a continued commitment to increasing participation of female investigators in this priority area.

PERCENT OF NS&E PROPOSALS WITH AT LEAST ONE MINORITY PI OR CO-PI.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	N/A	N/A	N/A	13%	13%	13%
Result	10%	10%	13%	12%	**×12.9%**	



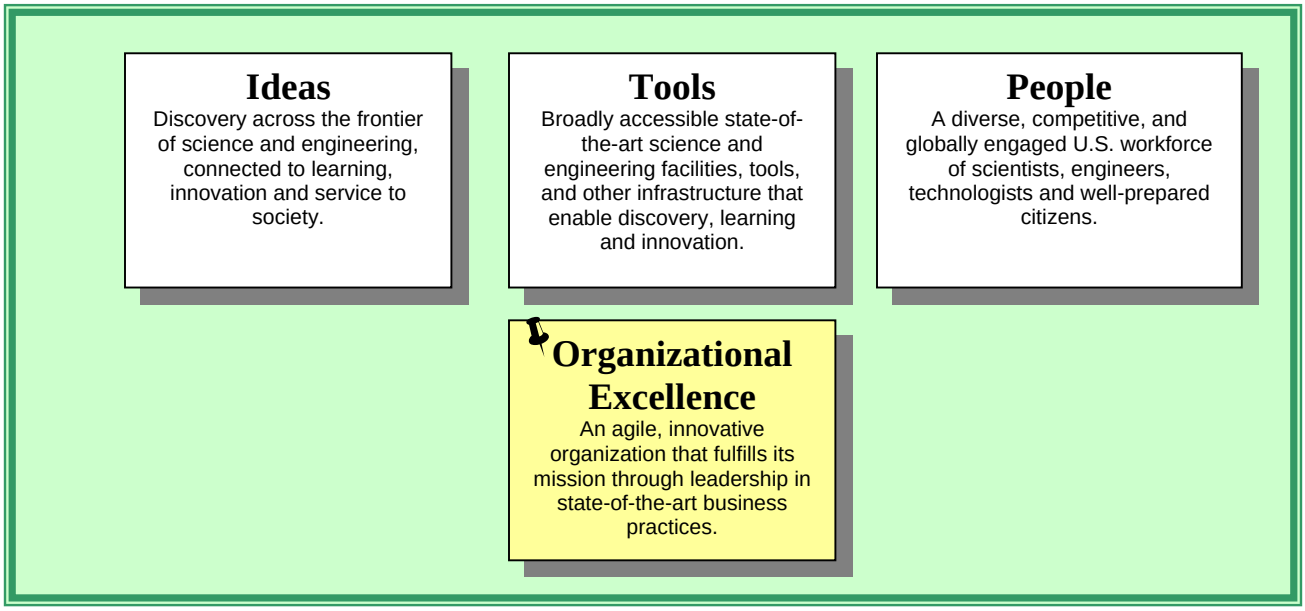
WHY WE DID NOT ACHIEVE THIS GOAL: NSF is committed to its goal of increasing participation by minorities. While there was an increase, it was not adequate to meet the goal. The performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program or activity performance.

STEPS WE WILL TAKE TO ACHIEVE THIS GOAL: We will continue our efforts to encourage minorities to submit proposals to these areas.

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[17]: This goal will be continued in FY 2006.

[17] The Performance Plan has now been integrated within the Performance Budget.

NSF GPRA PERFORMANCE GOALS – ORGANIZATIONAL EXCELLENCE



ORGANIZATIONAL EXCELLENCE STRATEGIC OUTCOME GOAL: An agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.

✓ Goal O1 Achieved

Excellence in managing NSF's activities is critical to achievement of the Foundation's mission-oriented outcome goals. Long-term investment categories include *human capital*, which produces a diverse, agile, results-oriented cadre of knowledge workers committed to enabling the agency's mission and to constantly expanding their abilities to shape the agency's future; *business processes*, which produce effective, efficient, strategically-aligned business processes that integrate and capitalize on the agency's human capital and technology resources; and *technologies and tools*, which produce flexible, reliable, state-of-the-art business tools and technologies designed to support the agency's mission, business processes, and customers.

Annual Performance Goal O1: Our performance is successful when, *in the aggregate*, results reported in the FY 2005 period demonstrate significant achievement in the majority of the following indicators:

- Operate a credible, efficient merit review system.
- Utilize and sustain broad access to new and emerging technologies for business application.
- Develop a diverse, capable, motivated staff that operates with efficiency and integrity.
- Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

RESULT: External experts provided examples of significant achievement during FY 2005 reporting. Comments by the AC/GPA and examples they selected are presented for each of the performance indicators for this goal.

IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN: This goal will be continued in FY 2006.

ORGANIZATIONAL EXCELLENCE: Comments by the Advisory Committee for GPRA Performance Assessment

The following statements concerning NSF achievement with respect to the Indicators for the ORGANIZATIONAL EXCELLENCE goal are excerpted from the AC/GPA Report at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05210.

> The 2005 Advisory Committee for Business and Operations (AC/B&O) assessment supports NSF's conclusion that the agency has demonstrated significant achievement for the three indicators it considered (human capital, business processes, and performance assessment). The AC/GPA agrees with this conclusion. The AC/B&O also made a number of comments to improve the approach, methodology and analysis for the assessment of performance in subsequent years. The AC/B&O report can be found in an Appendix to this report. For our part, we conclude that the Merit Review Process (MRP) is effective in the processing and reviewing of a large and increasing volume of proposals and in the engagement of a broad and diverse segment of talent in the NSF's science and engineering enterprises. While the MRP will always, in our view, require vigilance and a commitment to continuous improvement, when taken as a whole and when one looks at the results as illustrated in the Ideas, Tools, and People portfolios, clearly, the process remains a major positive force in advancing the frontiers of science, mathematics, and engineering. From this review, we concluded that NSF has demonstrated significant achievement for this OE indicator.

Additional comments can be found in the AC/GPA Report.

INDICATOR 1: Operate a credible, efficient merit review system.

RESULT: *Demonstrated significant achievement.*

It was the unanimous judgment of the Committee that NSF has demonstrated significant achievement for all indicators in the Ideas and Tools goals and also for the merit review indicator of the Organizational Excellence outcome goal.

For our part, we conclude that the Merit Review Process (MRP) is effective in the processing and reviewing of a large and increasing volume of proposals and in the engagement of a broad and diverse segment of talent in the NSF's science and engineering enterprises. While the MRP will always, in our view, require vigilance and a commitment to continuous improvement, when taken as a whole and when one looks at the results as illustrated in the Ideas, Tools, and People portfolios, clearly, the process remains a major positive force in advancing the frontiers of science, mathematics, and engineering. From this review, we concluded that NSF has demonstrated significant achievement for this OE indicator.

INDICATOR 2: Utilize and sustain broad access to new and emerging technologies for business application.

RESULT: *Demonstrated significant achievement.*

Evaluated by the AC/B&O.

INDICATOR 3: Develop a diverse, capable, motivated staff that operates with efficiency and integrity.

RESULT: *Demonstrated significant achievement.*

Evaluated by the AC/B&O.

INDICATOR 4: Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

RESULT: *Demonstrated significant achievement.*

Evaluated by the AC/B&O.

The 2005 AC/B&O assessment supports NSF's conclusion that the agency has demonstrated significant achievement for the three indicators it considered (human capital, business processes, and performance assessment). The AC/GPA agrees with this conclusion.

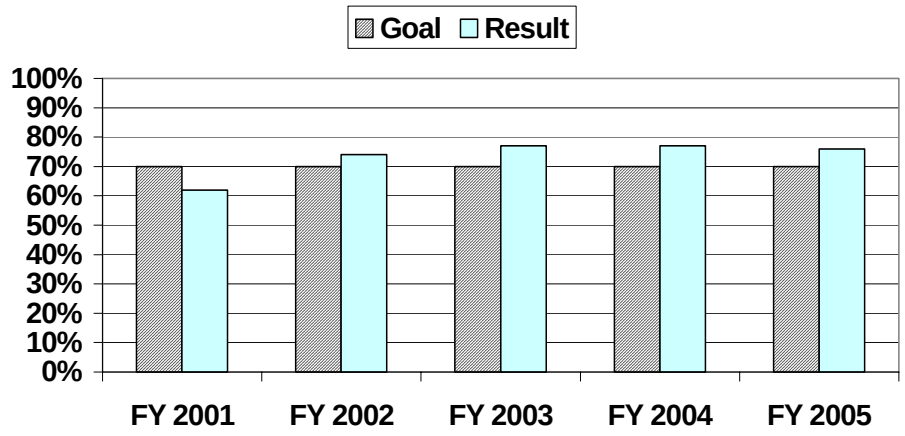
Annual Performance Goal O2: For 70 percent of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date, or receipt date, whichever is later.

✓ Goal O2 Achieved

One of the most significant issues raised in customer satisfaction surveys is the amount of time it takes us to process proposals. We recognize the importance of this issue.

FOR 70 PERCENT OF PROPOSALS, BE ABLE TO INFORM APPLICANTS WHETHER THEIR PROPOSALS HAVE BEEN DECLINED OR RECOMMENDED FOR FUNDING WITHIN SIX MONTHS OF DEADLINE OR TARGET DATE, OR RECEIPT DATE, WHICHEVER IS LATER.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	70%	70%	70%	70%	70%	70%
Result	62%	74%	77%	77%	**✓76%**	

For 70 Percent of Proposals, Make Information Available to Applicants on whether their Proposals have been Declined or Recommended for Funding within Six Months of Deadline or Receipt Date, Whichever is Later.



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[18]: This goal will be continued in FY 2006.

[18] The Performance Plan has now been integrated within the Performance Budget.

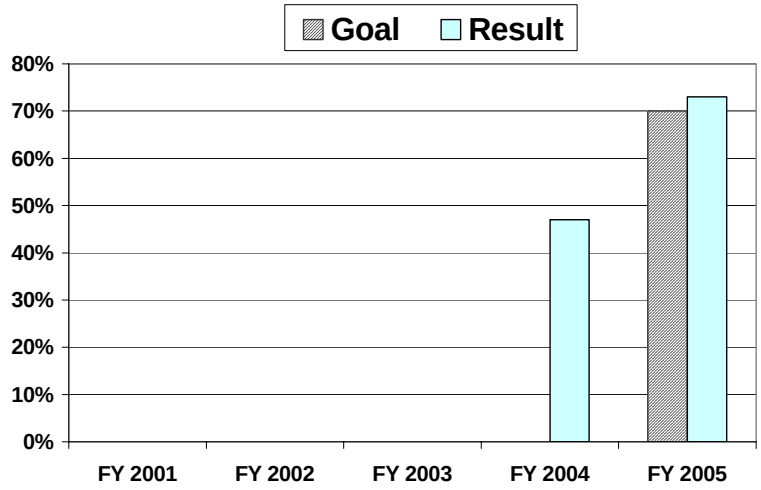
Annual Performance Goal O3: For the Nanoscale Science and Engineering Program, percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system, as evaluated by external experts.

✓ Goal O3 Achieved

One of the most significant issues raised in customer satisfaction surveys is the amount of time it takes us to process proposals. We recognize the importance of this issue.

FOR THE NANOSCALE SCIENCE AND ENGINEERING PROGRAM, PERCENT OF AWARD DECISIONS MADE AVAILABLE TO APPLICANTS WITHIN SIX MONTHS OF PROPOSAL RECEIPT OR DEADLINE DATE, WHILE MAINTAINING A CREDIBLE AND EFFICIENT COMPETITIVE MERIT REVIEW SYSTEM, AS EVALUATED BY EXTERNAL EXPERTS.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	N/A	N/A	N/A	N/A	70%	70%
Result	N/A	N/A	N/A	46%	**✓73%**	

Percent of Award Decisions Made Available to Applicants within Six Months of Proposal Receipt or Deadline Date for the Nanoscale Science and Engineering Program



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[19]: This goal will be continued in FY 2006.

[19] The Performance Plan has now been integrated within the Performance Budget.

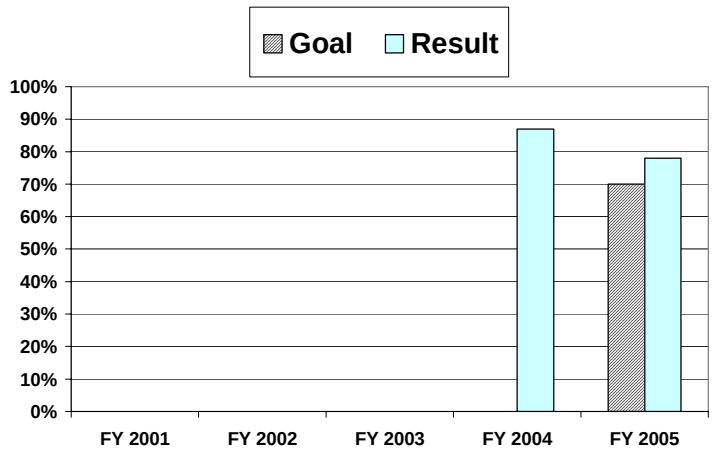
Annual Performance Goal O4: For the Individuals Program, percent of award decisions made available to individuals within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system, as evaluated by external experts.

✓ Goal O4 Achieved

One of the most significant issues raised in customer satisfaction surveys is the amount of time it takes us to process proposals. We recognize the importance of this issue.

FOR THE INDIVIDUALS PROGRAM, PERCENT OF AWARD DECISIONS MADE AVAILABLE TO APPLICANTS WITHIN SIX MONTHS OF PROPOSAL RECEIPT OR DEADLINE DATE, WHILE MAINTAINING A CREDIBLE AND EFFICIENT COMPETITIVE MERIT REVIEW SYSTEM, AS EVALUATED BY EXTERNAL EXPERTS.						
	FY 2001	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**
Goal	N/A	N/A	N/A	N/A	70%	70%
Result	N/A	N/A	N/A	87%	**✓78%**	

Percent of Award Decisions Made Available to Applicants within Six Months of Proposal Receipt or Deadline Date for the Individuals Program



IMPLICATIONS FOR THE FY 2006 PERFORMANCE PLAN[20]: This goal will be continued in FY 2006.

[20] The Performance Plan has now been integrated within the Performance Budget.

ASSESSMENT AND EVALUATION PROCESS

Measuring NSF's Ability to Meet Mission-Oriented Goals

The National Science Foundation's Advisory Committee for GPRA Performance Assessment (AC/GPA) was established in June 2002 to provide advice and recommendations to the NSF Director regarding the Foundation's performance under the Government Performance and Results Act (GPRA) of 1993. The Committee of 20-25 scientists, engineers and educators review NSF's broad portfolio in their analysis of annual progress toward NSF's four strategic outcome goals of Ideas, Tools, People, and Organizational Excellence.

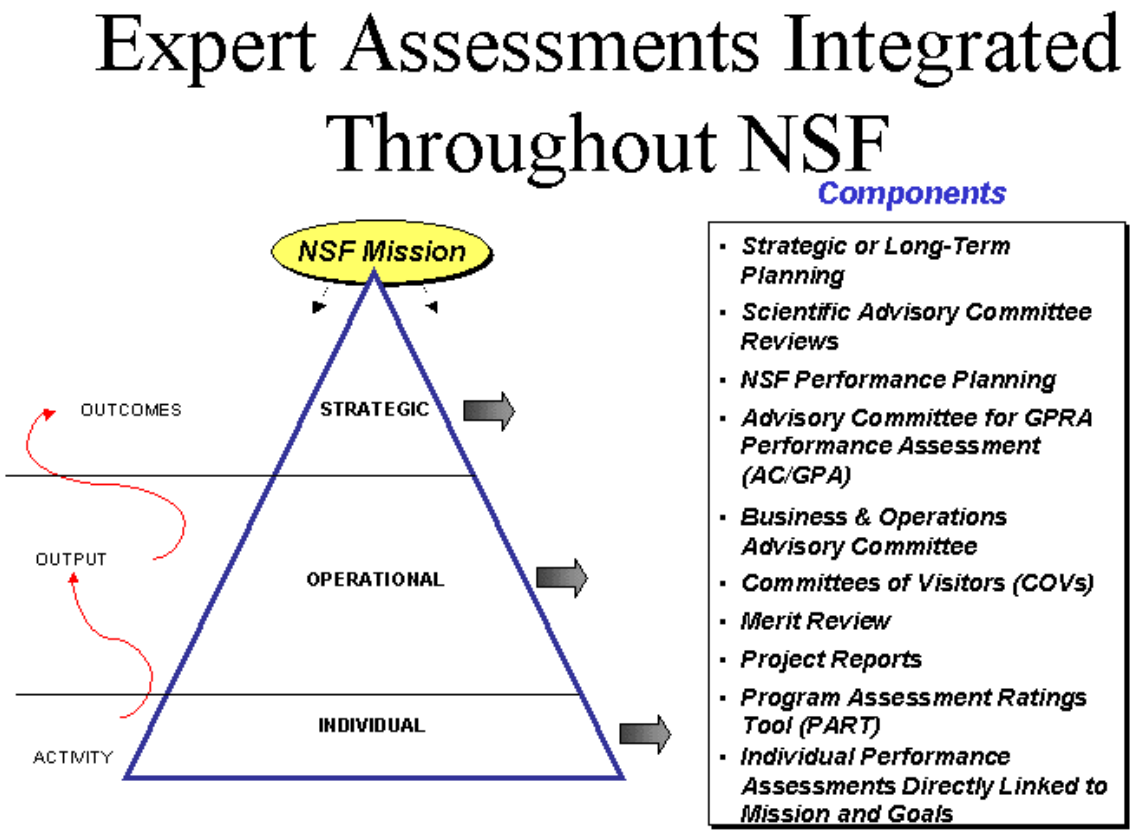
Indicators are used by the Foundation to assess annual progress toward attainment of its long-term outcome goals. For each outcome goal, NSF judges itself successful when, in the aggregate, results reported demonstrate significant achievement for the majority of associated indicators. The AC/GPA's assessment of whether NSF has demonstrated significant achievement with respect to individual performance indicators is based on the collective experience and expertise of the Committee using input from "nuggets" (exemplary outcomes from NSF-funded research), COV reports, PI project reports and input from NSF and the Business and Operations Advisory Committee regarding Organizational Excellence activities. These sources cover NSF's entire portfolio. After its meetings, the AC/GPA provides NSF with a report concerning NSF performance with respect to the indicators associated with each annual performance goal. The recommendations developed by the AC/GPA are used, along with other qualitative information and quantitative management results, to prepare NSF's Performance and Accountability Report.

Project Assessment During NSF Merit Review

Applicants provide results from previous NSF support, information about existing facilities and equipment available to conduct the proposed activity, biographical information on the Principal Investigator(s), other sources of support, federally required certifications, and certifications specific to NSF. Such information is required at the time of application, and in annual and final project reports. It is reviewed by NSF staff, is utilized during merit review, and is available to external committees (COVs and the AC/GPA) conducting performance assessment. The merit review process provides a rigorous, first phase of assessment of NSF's research and education portfolio. Thus, from the onset, less than one-fourth of the most competitive proposals submitted for consideration are selected (down from one-third in FY 2001).

Program Officers review the annual progress of awards. The project reports include information on significant accomplishments, progress achieved in the prior year, and point out issues that may impact progress or completion of the project on schedule and within budget. On approval of this report by the Program Officer, NSF releases funds for the ensuing year for continuing grants.

All materials associated with the review of a proposal as well as subsequent annual reports are available to Committees of Visitors. NSF staff also prepare materials (reports, evaluations, highlights) for use by COVs and the AC/GPA in developing their reports and making their assessments.



The schematic above shows the components and the value of expert evaluations performed at NSF.

Program Assessment by Committees of Visitors

NSF's Committees of Visitors (COV) provide program assessments that are used both in program management and in annual GPRA reporting. Each COV typically consists of five to 20 external experts who review one or more programs over a two or three day period. These experts are selected to ensure independence, programmatic coverage, and balanced representation. They typically represent academia, industry, government, and the public sector. Approximately one-third of NSF activities are assessed each year.

All COVs are asked to complete a report template with questions addressing how programs contribute to NSF's goals. Questions to COVs include: (A) the integrity and efficiency of the *processes* involved in proposal review; and (B) the results, including quality, of NSF's investments.

The FY 2005 COVs were asked to comment on program activities as they relate to NSF's strategic outcome goals. COVs are asked to justify their assessment and provide supporting examples or statements.

COVs are subcommittees of NSF directorate advisory committees. As such, their reports, along with NSF responses to the recommendations made by the COVs, are submitted to the parent advisory committee.

Advisory Committee (AC) Reporting on Directorate/Office Performance

Advisory Committees advise the seven directorates and the Office of Polar Programs. They are typically composed of 18-25 external experts in the respective fields who have broad experience in academia, industry, and government. ACs are chartered and hence are subject to Federal Advisory Committee Act (FACA) rules. The role of the ACs is to provide advice on priorities, address program effectiveness, and review COV reports and directorate responses to COV recommendations.

In FY 2001 and previous years, directorate advisory committees assessed directorate progress in achieving NSF-wide GPRA goals. With the advent of the AC/GPA, advisory committees no longer assess directorate progress towards these goals.

Advisory Committee for Business and Operations

In FY 2001, NSF established the Advisory Committee for Business and Operations. The committee is composed of 15 members selected from the research administration, education management and business communities, including business professionals and academics in the field. The committee is charged with providing advice on issues related to NSF's business practices and operations, including innovative approaches to the achievement of NSF's strategic goals. This committee provided significant input to the formulation of NSF's Organizational Excellence strategic outcome goal and provided an assessment of NSF performance with respect to three of the four indicators associated with this goal.

Agency GPRA and PART Reporting

NSF has integrated its GPRA and PART reporting. For the third straight year, all performance goals in the Performance and Accountability Report were verified and validated by an external third party. This year, that includes both GPRA and PART goals. A discussion of our verification and validation (V&V) process can be found on page II-87.

The COV and AC/GPA reports prepared by external experts are integral to the evaluation of NSF performance and address a broad set of issues ranging from staffing and quality of merit review to specifics of a scientific project. The GPRA components of these reports are used in assessing NSF's progress toward achieving its Ideas, Tools, People and Organizational Excellence outcome goals.

The criterion for success for each of the annual performance goals for the strategic outcome goals of Ideas, Tools, People and Organizational Excellence can be stated:

"*NSF is successful when, in the aggregate, results reported in the period demonstrate significant achievement in the majority of the associated indicators.*"

NSF staff examines statements of significant accomplishment in the AC/GPA to ensure that ratings for the qualitative outcome goals and indicators are justified.

NSF plan for improving and strengthening project management, including monitoring performance against performance targets, includes annual reviews of progress and plans, including external reviewers or consultants, as well as NSF staff, site visits on mutually agreed dates and locations to review project status, technical topics critical to the success of the project, cost and schedule performance, and management. In addition, MREFC projects will provide quarterly financial reporting comparing budgeted expenditures to actual expenditures for each Work Breakdown Schedule (WBS) identified in their construction project as described in the approved Project Execution Plan and also provide quarterly

status reports with a graph of cumulative earned value for the construction of the overall project. NSF will include language in the Cooperative Agreement for each MREFC Awardee to be completed by end of fiscal year 2006.

VERIFICATION AND VALIDATION

NSF used a verification and validation (V&V) process similar to the one used in FY 2004 to verify and validate all FY 2005 GPRA performance information. For FY 2004 data verification and analyses, NSF engaged IBM Business Consulting Services (IBM) to document the processes we follow to collect, process, maintain, and report all performance data. They identified relevant controls and commented on their effectiveness. Based on Government Accountability Office (GAO) guidance, they provided an assessment of the validity and verifiability of the data, policies, and procedures we used to report results for the FY 2004 goals. We engaged IBM again in FY 2005. For the outcome goals, IBM reviewed the processes NSF used to obtain external assessment of NSF activities with respect to these goals. IBM also provided high-level review of NSF's information systems based on GAO standards for application controls[21].

In their October 2005 report[22], IBM states: *"Overall, we conclude that NSF continues to make a concerted effort to report its performance results accurately and has effective systems, policies, and procedures to promote data quality. NSF relies on sound business policies, internal controls, and manual checks of system queries to report performance and maintains adequate documentation of processes and data for an effective verification and validation review."*

The Foundation has both qualitative and quantitative GPRA and PART goals. Its qualitative goals include annual performance goals that support the strategic outcome goals of Ideas, Tools, People, and Organizational Excellence. These outcome goals are presented in a format that requires expert assessment of achievement. These assessments are based largely on information included in reports prepared by committees of independent, external experts (*e.g.* Committees of Visitors and the Advisory Committee for GPRA Performance Assessment) who assess the quality of program results based on their collective experience-based norms. NSF's quantitative goals provide insight into management activities, enabling assessment of progress toward goal achievement. Assessment for these goals is primarily based on data collected with NSF's central data systems.

Types and Sources of Performance Data and Information

Most of the data that underlie achievement assessments for strategic outcome goals (with the exception of the Organizational Excellence goal) originate outside the agency and are submitted to NSF through the Project Reporting System, which includes annual and final project reports for all awards. Through this system, performance information/data such as the following are available to program staff, third party evaluators, and other external committees:

- Information on Ideas – published and disseminated results, including journal publications, books, software, audio or video products created; contributions within and across disciplines; organizations of participants and collaborators (including collaborations with industry); contributions to other disciplines, infrastructure, and beyond science and engineering; use beyond the research group of specific products, instruments, and equipment resulting from NSF awards; and role of NSF-sponsored activities in stimulating innovation and policy development.
- Information on Tools – published and disseminated results; new tools and technologies, multidisciplinary databases; software, newly-developed instrumentation, and other inventions; data,

[21] The executive summary of the IBM V&V report can be found on page II-92.
[22] Page 1 of the IBM report.

samples, specimens, germ lines, and related products of awards placed in shared repositories; facilities construction and upgrade costs and schedules; and operating efficiency of shared-use facilities.

- Information on People – student, teacher and faculty participants in NSF activities; demographics of participants; descriptions of student involvement; education and outreach activities under grants; demographics of science and engineering students and workforce; numbers and quality of educational models, products and practices used/developed; number and quality of teachers trained; and student outcomes including enrollments in mathematics and science courses, retention, achievement, and science and mathematics degrees received.
- Information on Organizational Excellence – information provided by NSF on diversity initiatives, diversity statistics, the NSF Academy and the government-wide eTraining Initiative; information on performance management system improvements, employee recognition activities, innovative capital studies within NSF, the development and implementation of a human capital management plan, and eGovernment human resource initiatives; information on technology enabled business processes, government-wide grants management initiatives, the ePayroll initiative, compliance with the FY 2003 Federal Information Security Management Act (FISMA) Compliance, Greater IT Security Awareness Training Throughout Foundation, and activities associated with GPRA performance assessment.

Most of the data supporting quantitative goals can be found in NSF's central systems. These central systems include the Enterprise Information System (EIS); FastLane, with its Project Reporting System and its Facilities Performance Reporting System; the Online Document System (ODS); the Proposal and Reviewer System (PARS); the Awards System; the Electronic Jacket; and the Financial Accounting System (FAS). These systems are subject to regular checks for accuracy and reliability.

Data / Information Limitations

For outcome goals, the collection of qualitative data during assessment may be influenced by factors such as a lack of long-term data/information to assess the impact of outcomes, the potential for self-reporting bias, the unpredictable nature of discoveries, and the timing of research and education activities. For the quantitative management goals, the assessment may be influenced by factors such as accuracy of data entry into central computer systems, lack of experience in using new reporting systems or modules, or individual non-responsiveness (e.g., self-reporting of diversity information; workplace surveys).

Finally, external expert assessments (presented in COV and AC/GPA reports) may lack sufficient justification or may provide incomplete information. To address this issue NSF is continuing to modify its reporting templates and improve guidance to committees and staff in order to improve the completeness and consistency of the reports. This will aid in compiling qualitative information.

Judgmental Sampling

With respect to Ideas, Tools, and People outcome goals, the AC/GPA is provided with access to recent Committee of Visitor (COV) reports and program assessments conducted by external programmatic expert panels, Principal Investigator project reports, award abstracts, and, since it is impractical for an external committee to review the contributions to the associated performance goals by each of the over 25,000 active awards, NSF Program Officers provided the Committee with nearly 900 summaries of notable results relevant to the performance indicators. Collections obtained from expert sampling of outstanding accomplishments ("nuggets") from awards, together with COV reports and project reports, formed the primary basis for determining, through the recommendations of the external Advisory Committee for GPRA Performance Assessment, whether or not NSF demonstrated significant achievement in its Strategic Outcome Goals for Ideas, Tools and People. The approach to nugget collection is a type of non-probabilistic sampling, commonly referred to as "judgmental" or "purposeful" sampling, that is best designed to identify notable examples and outcomes resulting from NSF's

investments. It is the aggregate of collections of notable examples and outcomes that can, by themselves, demonstrate significant agency-wide achievement in the Strategic Outcome Goals. Nevertheless, the combination of COV reports, project reports, award abstracts and notable accomplishments cover the entire NSF portfolio.

ADDITIONAL INFORMATION

Information On Use Of Non-Federal Parties

This GPRA performance report was prepared solely by NSF staff.

Non-Federal external sources of information we used in preparing this report include:

- Reports from awardees demonstrating results.
- Reports prepared by evaluators – Committees of Visitors (COV) and Advisory Committees – in assessing our programs for progress in achieving Outcome Goals.
- Reports prepared by a consulting firm to assess the procedures we use to collect, process, maintain, and report performance goals and measures.
- Reports from facilities managers on construction/upgrade costs and schedules and on operational reliability.

Specific examples:

Highlights or sources of examples shown as results may be provided by Principal Investigators who received support from NSF.

We use external committees to assess the progress of our programs toward qualitative goal achievement. External evaluators provide us with reports of programs, and provide feedback to us on a report template we prepare. Examples are COV and AC reports that provide an independent external assessment of NSF's performance.

We engaged an independent third-party, IBM, to conduct a review of data and information used in performance reporting. IBM reviewed NSF's performance data and information pertaining to our outcome goals, and management goals. This additional independent review helped to eliminate potential reporting bias that can develop in self-assessments. It also provides assurance of the credibility of performance reporting information and results.

Classified Appendices not Available to the Public

None

Analysis of Tax Expenditures

None

Waivers of Administrative Requirements

None

IBM Performance Measurement Validation and Verification
FY 2005 Final Report
(Executive Summary)

National Science Foundation

Government Performance and Results Act (GPRA) and Program Assessment Rating Tool (PART)

Performance Measurement Validation and Verification

FY 2005 Final Report

October 2005

1 Executive Summary

For the sixth consecutive year, IBM Business Consulting Services (IBM) is pleased to present the results of our verification and validation review of the National Science Foundation's annual performance goals. Once again, we have assessed the Foundation's data, processes, and results reported under the Government Performance and Results Act (GPRA) and Office of Management and Budget's Program Assessment Rating Tool (PART). In this report, we present the results of our FY 2005 review, which took place after the third quarter and after the end of the fiscal year.

The Government Accountability Office (GAO) requires Federal agencies to provide confidence that the policies and procedures underlying performance reporting are complete, accurate, and consistent. As such, NSF asked IBM to assess the validity of the data and reported results of its performance goals and to verify the reliability of the methods used to collect, process, maintain and report data.[1] We did not consider the appropriateness of NSF's performance goals or indicators in our assessment. Rather, our validation is based strictly on whether NSF achieved or did not achieve its performance goals based on the accuracy of the performance data and the reliability of NSF's processes.

NSF measures its annual performance against four Strategic Outcome Goals of People, Ideas, Tools and Organizational Excellence and 17 other performance goals. As of the end of FY 2005, NSF reported achieving all four of its Strategic Outcome Goals and 14 out of the 17 other performance goals. For each of these goals, we were able to verify the reliability of the processes used to collect, process, maintain and report data and validate the accuracy or reasonableness of the results.

Overall, we conclude that NSF continues to make a concerted effort to report its performance results accurately and has effective systems, policies, and procedures to promote data quality. NSF relies on sound business policies, internal controls, and manual checks of system queries to report performance and maintains adequate documentation of processes and data for an effective verification and validation review.

1.1 Assessment Approach

The goals we assessed fall under three categories of review:

- Two qualitative performance goals being reviewed for the first time in FY 2005
- Fifteen quantitative performance goals receiving an update review
- Four qualitative Strategic Outcome Goals receiving an update review

We describe our assessment approach for each category as follows:

1.1.1 Qualitative Performance Goals Receiving First Review in FY 2005

The two goals being reviewed for the first time this year are related to the Information Technology Research (ITR) Program. Because these goals are qualitative, the results are determined by the ITR Committee of Visitors (COV), a group of external science experts who met in FY 2005 to assess the ITR program's performance over the three-year period from FY 2001-2003.

In our review, we analyzed performance data given to the COV; held discussions with NSF staff and COV members; documented and assessed the COV process; and validated the ITR COV's conclusions based on a series of criteria. These criteria included the effectiveness of the COV meeting coordination; the quality of the performance data; the

[1] GAO defines "verification" as a means to check or test performance data in order to reduce the risk of using data that contains significant errors. GAO defines "validation" as a way to test data to ensure that no error creates significant bias.

expertise of the COV membership; the independence of the COV from NSF influence; the standards used by the COV to reach its conclusions; and the documentation and transparency of the overall process.

1.1.2 Quantitative Performance Goals Receiving a Limited Update Review

Fifteen of the goals under review are quantitative[2] and involve data sources, systems and processes that we reviewed in prior years. For these goals, NSF requested a limited update review, focusing on changes since our last assessment. Also, because these goals are quantitative, our review focused on the data, systems, and algorithms associated with determining the goals' results. Specifically, we:

- Documented any changes to processes or data since our last review[3].
- Reviewed system and other internal controls to confirm that quality input results in quality output.
- Verified the reliability of the processes NSF used to collect, process, maintain, and report data.
- Validated the accuracy of NSF's performance data and reported outcomes of performance goals and indicators.

We applied GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/GGD-10.1.20) to guide our review. Based on this guidance, we assessed whether NSF's processes to collect, process, maintain and report data meet the following criteria:

- Does the process provide for periodic review of collection, maintenance, and processing procedures to ensure they are consistently applied and continue to be adequate?
- Does the process provide for periodic sampling and review of data to ensure completeness, accuracy, and consistency?
- Does the process rely on independent audits or other established procedures for verifying and validating financial information when performance measures require the use of financial information?
- Does NSF address problems in verification and validation procedures, known to GAO or the agency?
- Does the agency recognize the potential impacts of data limitations should they exist?

1.1.3 Update Review of Qualitative Strategic Outcome Goals and AC/GPA Process

A key component of NSF's assessment of its Strategic Outcome Goals (People, Ideas, Tools, and Organizational Excellence) is the Advisory Committee for GPRA Performance Assessment (AC/GPA), a group of independent experts who meet annually to review NSF's performance and advise the NSF Director on the Foundation's achievement on a series of indicators associated with the Strategic Outcome Goals.

FY 2005 is the third year that we have observed and assessed the AC/GPA process. Our purpose is to verify and validate the reliability of the AC/GPA's assessment based on the strength of the review process and the performance information used to support the Committee's conclusions. To conduct our review, we reviewed background and performance information; attended the AC/GPA meeting; documented and assessed the review process focusing on changes since FY 2004; and validated the AC/GPA conclusions.

Our assessment of the AC/GPA process was based on a series of criteria that we have used in prior year reviews. These criteria include the effectiveness of the meeting preparation; the scope of review; the expertise of the committee membership; quality of the performance information; independence of the committee; the AC/GPA's

[2] Two of the quantitative goals (O3 and O4) contained a qualitative component, related to the effectiveness of NSF's merit review system, which was evaluated separately by the Advisory Committee for GPRA Performance Assessment (AC/GPA). We validated the results for this qualitative component as part of our review of the AC/GPA process and Strategic Outcome Goals.

[3] Detailed process descriptions and process maps can be found in the Appendix to this report.

determination of achievement; documentation and transparency of the process; and NSF's response to the AC/GPA's prior-year recommendations.

1.2 Assessment Results by Performance Goal

Based on our review, we verified the adequacy of the processes and data to yield valid and reliable results for all 21 goals under review. We summarize the results of our review for each performance goal in the following tables. In the "Process Verified" column, a "yes" indicates that we were able to verify the reliability of NSF's processes to collect, process, maintain and report data. In the "Result Validated" column, a "yes" indicates that we were able to validate the accuracy or reasonableness of NSF's reported results for the corresponding performance goal. In the "Comments" column, we summarize any significant issues concerning the goal that we feel NSF should address for next year. The full results of our review are discussed in greater detail in the balance of this report.

Qualitative Performance Goals Reviewed for the First Time in FY 2005

Goal	Target	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT	Achieved	No results	Achieved	Yes	Yes	We recommend that NSF revise the COV report template to include a section for PART assessments when appropriate.
Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering	Achieved	No results	Achieved	Yes	Yes	We recommend that NSF revise the COV report template to include a section for PART assessments when appropriate.

Quantitative Performance Goals Receiving an Update Review in FY 2005

Goal	Target	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal P2: Number of U.S. students receiving fellowships through Graduate Research Fellowships (GRF), Integrative Graduate Education and Research Traineeships (IGERT) and Graduate Teaching Fellows in K-12 Education (GK-12)	Increase from 3,681	No results	Achieved 4,648	Yes	Yes	NSF should consider instituting a standard procedure for contractors to provide Q3 and Q4 snapshots of GRF, IGERT and GK-12 data, including a list of all students, funding duration, and any supporting award information for verification and validation purposes.
Goal P3: Number of applicants for Graduate Research Fellowships from groups that are underrepresented in the science and engineering workforce	Increase from 1,009	1013	Achieved 1,013	Yes	Yes	None
Goal P4: Number of applicants for Faculty Early Career Development Program (CAREER) awards from investigators at minority-serving institutions	Increase from 82	89	Achieved 92	Yes	Yes	None
Goal P5: Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female principal investigator (PI) or co-principal investigator (co-PI)	25%	30%	Achieved 31%	Yes	Yes	None
Goal P6: Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one minority PI or co-PI	13%	12%	Not Achieved 12.9%	Yes	Yes	None
Goal I2: NSF will increase the average annualized award size for research grants to $140,000	$140,000	$127,343	Achieved $144,000	Yes	Yes	None
Goal I3: The average duration of awards for research grants will be 3.0 years	3.0	3.09	Not Achieved 2.96	Yes	Yes	None
Goal I4: Percent of NS&E proposals that are multi-investigator proposals	75%	82%	Achieved 84%	Yes	Yes	None
Goal T2: Percent of construction acquisition and upgrade projects with negative cost and schedule variances of less than 10% of the approved project plan	90%	No Results	Not Achieved 79%	Yes	Yes	None

Goal	Target	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal T3: Percent of operational facilities that keep scheduled operating time lost to less than 10%	90%	No Results	Achieved 100%	Yes	Yes	None
Goal T4: Number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites	4000	10,110	Achieved 12,462	Yes	Yes	None
Goal T5: Number of nodes that comprise infrastructure	14	20	Achieved 20	Yes	Yes	None
Goal O2: For 70% of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt or deadline date	70%	80%	Achieved 76%	Yes	Yes	None
Goal O3: For 70% of nanoscale proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt or deadline date, while maintaining a credible and efficient competitive merit review system, as evaluated by external reviewers	70%	87%	Achieved 73%	Yes	Yes	None
Goal O4: For 70% of proposals for the Individuals program, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt or deadline date, while maintaining a credible and efficient competitive merit review system, as evaluated by external reviewers	70%	79%	Achieved 78%	Yes	Yes	None

Strategic Outcome Goals and Indicators Receiving an Update Review in FY 2005

Goal	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal P1: People – A diverse, competitive, and globally-engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens ▪ Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities ▪ Support programs that attract and prepare U.S. students to be highly qualified members of the global science and engineering workforce, including providing opportunities for international study, collaborations and partnerships ▪ Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics ▪ Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education ▪ Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels	Achieved	Achieved	Yes	Yes	None
Goal I1: Ideas – Discovery across the frontier of science and engineering, connected to learning, innovation, and service to society ▪ Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge ▪ Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries ▪ Foster connections between discoveries and their use in the service of society ▪ Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities ▪ Provide leadership in identifying and developing new research and education opportunities within and across science and engineering fields ▪ Accelerate progress in selected science and engineering areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives	Achieved	Achieved	Yes	Yes	None

Goal	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal T1: Tools Goal – Broadly accessible, state-of-the-art science and engineering facilities, tools and other infrastructure that enable discovery, learning and innovation ▪ Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art science and engineering facilities, tools, databases, and other infrastructure ▪ Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms ▪ Develop and deploy an advanced cyber-infrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation ▪ Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation ▪ Support research that advances instrument technology and leads to the development of next-generation research and education tools	Achieved	Achieved	Yes	Yes	None
Goal O1: Organizational Excellence Goal – An agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices ▪ Operate a credible, efficient merit review system ▪ Utilize and sustain broad access to new and emerging technologies for business application ▪ Develop a diverse, capable, motivated staff that operates with efficiency and integrity ▪ Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness	Achieved	Achieved	Yes	Yes	None

2 Introduction and Background

In 1993, Congress passed the Government Performance and Results Act (GPRA) to improve accountability and performance in the federal government. GPRA requires federal agencies to prepare five-year strategic plans that set the direction for their agencies and to develop annual performance plans that link daily managerial responsibilities to long-term strategic goals. Agencies must report annually on their success in meeting their annual performance goals. In addition to GPRA, the Office of Management and Budget (OMB) developed the Program Assessment Rating Tool (PART) process in 2002 to provide a consistent approach to rating federal agency programs. Together, GPRA and PART serve to measure the performance of federal agencies and provide justification for annual budget requests.

U.S. Government Accountability Office (GAO) standards require a federal agency to "provide confidence that its performance information will be credible."[4] This report constitutes NSF's satisfaction of that requirement. We applied GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/GGD-10.1.20) to guide our verification and validation assessment. Our responsibility was to:

- Assess whether NSF has provided sufficient information to permit an informed judgment by the reader of whether the performance data will be sufficiently free of bias and other significant error.
- Determine whether the verification and validation procedures and the data used by the agency are credible.

In this report, verification entails assessing the reliability of the systems, processes and controls that underlie performance reporting. Validation entails recalculating or reconfirming performance results from the available data. Based on GAO guidance, we assessed whether NSF's processes to collect, process, maintain and report data meet the following criteria:

- Does the process provide for periodic review of collection, maintenance, and processing procedures to ensure they are consistently applied and continue to be adequate?
- Does the process provide for periodic sampling and review of data to ensure completeness, accuracy, and consistency?
- Does the process rely on independent audits or other established procedures for verifying and validating financial information when performance measures require the use of financial information?
- Does NSF address problems in verification and validation procedures, known to GAO or the agency?
- Does the agency recognize the potential impacts of data limitations should they exist?

2.1 Scope

Our assessment was a focused review of selected NSF processes that support GPRA and PART reporting. This assessment was not an audit and, therefore, was not conducted in accordance with generally accepted government auditing standards. Rather, we followed GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/GGD-10.1.20) to conduct an independent verification and validation review of NSF's performance reporting processes and reported results as of the third quarter and at the end of FY 2005. Specifically, this report:

- Defines performance goals and performance indicators.
- Assesses processes and procedures used to collect, process, maintain, and report on data used for the performance goals.
- Highlights procedural and organizational changes from FY 2004 to FY 2005.

[4] GAO/GGD-10.1.20 Guide to Assessing Agency Annual Performance Plans

- Describes steps management has taken to improve its processes and procedures.
- Validates the accuracy of NSF's reported results for its performance goals as of the third quarter (when available).

We did not consider the appropriateness of NSF's performance goals or indicators in our assessment of the validity of NSF's reported results. Rather, our validation is based strictly on whether NSF achieved or did not achieve its performance goals based on the accuracy of the performance data and the reliability of NSF's processes. In accordance with GAO's assessment guide, we relied on previously conducted work and on agency sources to determine whether there were any known limitations with the data or data sources that would create doubt regarding the credibility of the information.

The FY 2005 goals under our review fall under three categories:

2.1.1 Qualitative Performance Goals Being Review for the First Time in FY 2005

- Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering (ITR COV).
- Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT.

2.1.2 Quantitative Performance Goals Receiving a Limited Update Review

- Goal P2: NSF will increase from 3681 the number of graduate students funded through fellowships or traineeships from Graduate Research Fellowships (GRF), Integrative Graduate Education and Research Traineeship (IGERT), and Graduate Teaching Fellows in K-12 Education (GK-12).
- Goal P3: NSF will increase from a baseline of 1009 the number of applicants for Graduate Research Fellowships (GRFs) from groups that are underrepresented in the science and engineering workforce.
- Goal P4: NSF will increase from baseline of 82 the number of applicants for Faculty Early Career Development program (CAREER) awards from investigators at minority-serving institutions (MSIs).
- Goal P5: NSF will increase the percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female Principal Investigator (PI) or Co-PI to 25 percent.
- Goal P6: NSF will increase the percent of Nanoscale Science and Engineering (NS&E) proposals with at least one minority PI or Co-PI to 13 percent.
- Goal I2: NSF will increase the average annualized award size for research grants to a level of $140,000.
- Goal I3: NSF will maintain the FY 2004 goal for 3.0 years for the average duration of awards for research grants.
- Goal I4: NSF will increase the percent of Nanoscale Science and Engineering (NS&E) proposals that are multi-investigator to 75 percent.
- Goal T2: For 90 percent of construction, acquisition, and upgrade projects, keep any negative cost and schedule variances to less than 10 percent of the approved project plan.
- Goal T3: For 90 percent of operational facilities, keep scheduled operating time lost to less than 10 percent.
- Goal T4: NSF will increase the number of users accessing the National Nanofabrication User Network/ National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) facility sites to 4000 registered users totaled from both networks.

- Goal T5: NSF will increase the number of nodes that comprise the infrastructure of the National Nanofabrication User Network/ National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) to 14.
- Goal O2: For 70 percent of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt.
- Goal O3: NSF will increase to 70 the percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system (for Nanoscale Science and Engineering Program).
- Goal O4: NSF will increase to 70 the percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system (for Individuals Program).

2.1.3 Qualitative Strategic Outcome Goals and Indicators Receiving an Update Review

- Goal P1: People—providing a diverse, competitive, and globally-engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens.
  - Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities.
  - Support programs that attract and prepare U.S. students to be highly qualified members of the global science and engineering workforce, including providing opportunities for international study, collaborations and partnerships.
  - Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics.
  - Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education.
  - Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels.
- Goal I1: Ideas—enabling discovery across the frontier of science and engineering, connected to learning, innovation, and service to society.
  - Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge.
  - Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries.
  - Foster connections between discoveries and their use in the service of society.
  - Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities.
  - Provide leadership in identifying and developing new research and education opportunities within and across science and engineering fields.
  - Accelerate progress in selected science and engineering areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives.
- Goal T1: Tools—providing broadly accessible, state-of-the-art science and engineering facilities, tools and other infrastructure that enable discovery, learning and innovation.

- Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art science and engineering facilities, tools, databases, and other infrastructure.
- Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms.
- Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation.
- Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation.
- Support research that advances instrument technology and leads to the development of next-generation research and education tools.

- Goal O1: Organizational Excellence—providing an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.
  - Merit Review: Operate a credible, efficient merit review system.
  - Human Capital Management: Develop a diverse, capable, motivated staff that operates with efficiency and integrity.
  - Technology-enabled Business Processes: Utilize and sustain broad access to new and emerging technologies for business application.
  - Performance Assessment: Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

2.2 Approach

We followed a multi-step approach to determine if NSF has sufficient processes and procedures in place to validate and verify its performance measures. We tailored our approach to each category of goals and treated them as three unique tasks.

2.2.1 New Review of FY 2005 Qualitative Goals

In FY 2005, NSF introduced two new qualitative goals evaluated by the Information Technical Research (ITR) Committee of Visitors (COV), an external committee which offers an independent opinion on NSF's achievement in its ITR programs. These goals are:

- Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering (ITR COV).
- Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT.

Our purpose in this review was to verify that NSF has reliable processes in place to provide accurate and timely information to the ITR COV to allow the Committee to reach a valid and reasonable judgment of NSF's performance. We note that while the COV examined a range of issues related to the ITR program, we focused our review specifically on the COV's assessment of the two aforementioned PART goals. Specifically, we conducted the following:

- Review of background and performance information: This included the NSF performance plans, guidance provided to the COV, performance data given to the COV for review, and background on the ITR program.
- Attendance at the ITR COV meeting: We observed the ITR COV meeting, held March 8-10, 2005, including large and small group meetings.
- Discussions with NSF staff and ITR COV members: We spoke with NSF staff and COV members to learn about the process and their first-hand experiences coordinating and participating in the ITR COV.
- Documentation of the ITR COV process: Based on our review of background information, observations of the ITR COV meeting, and discussion with staff and committee members, we documented the ITR COV process.
- Assessment of the ITR COV process: We assessed the quality of the ITR COV process based on a number of criteria, including:
  - Organization and overall effectiveness of the COV meeting
  - Quality, timeliness, impartiality, and relevance of the data and performance information available to the ITR COV
  - Expertise, independence and level of knowledge of the ITR COV membership
  - Independence of the COV's judgment from NSF influence
  - Standards by which the COV reached its conclusions on NSF's performance
  - Documentation and transparency of the ITR COV process and results
- Validation of the ITR COV performance assessment: Based on the quality of the ITR COV processes, we reached a conclusion on the validity of the COV's assessment of NSF's performance in its qualitative ITR goals.

2.2.2 Update Review of FY 2005 Quantitative Goals

In FY 2005, there were 15 quantitative goals[5] which involved data sources, systems and processes that we had reviewed in prior years. For these goals, NSF requested a limited "update" review to identify changes and improvements to the data and/or processes since our last review. We assessed the inputs, computations and outputs and recalculated or reconfirmed the results. Specifically, our review consisted of:

- Documentation of changes: We documented changes to the definitions, processes, data and/or calculations for each performance measure. We interviewed NSF staff and reviewed relevant background documentation. As a result of these interviews and analyses, we documented any actions that management has taken to strengthen the data and processes used to report performance results.
- Review of system and other internal controls: Building upon the initial interviews and background analysis, we identified changes to the system algorithms that were used to calculate the measures and the procedures used by NSF to derive the data. To assess the integrity of data inputs, we then verified that the system data is drawn from current and updated databases, files, and interfaces.
- Process verification: We verified the reliability of the processes used to collect, process, maintain, and report accurate data and results.

[5] Two of the quantitative goals (O3 and O4) contained a qualitative component, related to the effectiveness of NSF's merit review system, which was evaluated separately by the Advisory Committee for GPRA Performance Assessment (AC/GPA). We validated the results for this qualitative component as part of our review of the AC/GPA process and Strategic Outcome Goals.

- Results validation: After we verified data quality, we recalculated or reconfirmed the results that NSF reported.[6] This recalculation provides a closer look at the algorithms and results for each measure.

2.2.3 Update Review of Strategic Outcome Goals and AC/GPA Process

NSF measures its overall performance as a Foundation using four Strategic Outcome Goals: People, Ideas, Tools, and Organizational Excellence. A key component of NSF's performance assessment in these areas is the Advisory Committee for GPRA Performance Assessment (AC/GPA), a group of independent experts who offer advice and recommendations to the NSF Director on NSF's achievement on a series of performance indicators related to these Strategic Outcome Goals.

We first assessed the AC/GPA process in FY 2003 with the purpose of verifying the reliability of the process and performance data and the validity of the AC/GPA's conclusions based on the strength of these processes. In FY 2005, NSF asked us to conduct an updated review, focusing on changes to the AC/GPA process since FY 2004. Our methodology consisted of:

- Review of background information: Including the NSF Five-Year Strategic Plan, FY 2004 AC/GPA report, AC/GPA guidance and agenda, and supplemental information located on the AC/GPA website.
- Attendance at the AC/GPA meeting: We observed the two-day AC/GPA meeting, held June 16-17, 2005, including committee and subgroup sessions.
- Attendance at the Committee for Business and Operations (AC/B&O) meeting: We attended the May 5-6, 2005 meetings of the AC/B&O, which is responsible for assessing three out of four indicators for Organizational Excellence.
- Discussions with NSF staff and AC/GPA members: We spoke with NSF staff and committee members to learn about the process and their first-hand experiences coordinating and participating in the AC/GPA.
- Documentation of the AC/GPA process with emphasis on changes from FY 2004: Based on our review of background information, observations of the AC/GPA meeting, and discussion with staff and committee members, we documented the FY 2005 AC/GPA process focusing on changes in the past year.
- Assessment of the AC/GPA process: We assessed the quality of the AC/GPA process based on a series of criteria, including:
  - *AC/GPA meeting coordination/planning*: Quality of NSF planning and preliminary review activities to maximize the effectiveness of the AC/GPA meeting and quality of the AC/GPA assessment.
  - *AC/GPA scope of review*: Expectations and extensiveness of the AC/GPA's review and assessment of NSF's performance.
  - *Membership*: Expertise, independence, and level of knowledge of the AC/GPA membership.
  - *Performance information*: Quality, timeliness, impartiality, and relevance of the information available to the AC/GPA to reach its conclusions.
  - *Independence*: Confidence that the Committee's judgment is objective and free from NSF influence.
  - *Determination of achievement*: The Committee's determination of "significant achievement" with respect to the annual performance indicators and Foundation-level comments.

[6] For our third quarter review, NSF did not have complete data or results for some goals. For these goals, as of the third quarter of FY 2005, we were unable to conduct a complete verification and validation review.

- *Documentation and transparency:* Extent to which the AC/GPA process and results are clear, visible and open to review and scrutiny.
- *NSF's response to AC/GPA recommendation:* How NSF responded to the Committee's recommendations in its FY 2004 AC/GPA report to NSF.

- Validation of the AC/GPA performance assessment: Based on the quality of the AC/GPA processes, we reached a conclusion on the validity of the AC/GPA's assessment of NSF's performance against its Strategic Outcome Goals.

2.2.4 Limited System Aspects of Data Quality Review

We reviewed NSF's information systems - used in the collection, processing or maintenance of quantitative performance data - to evaluate whether adequate controls are in place to produce reliable data. Our assessment was a limited review based on discussions with NSF staff, as opposed to a full applications review.

Pursuant to GAO guidelines, we relied on previously conducted work and on departmental sources to determine whether there were any known problems with the data or data sources that would cast doubt on the credibility of the information. Because we performed our initial review of these systems in prior years, our current review focused only on changes to the systems since our last assessment. The NSF systems and applications we reviewed were:

- Award
- Enterprise Information System (EIS)
- Financial Accounting System (FAS)
- FastLane
- Program Information Management System (PIMS)
- Proposal, PI, Panel, Budget and Reviewer System (PARS)

A MESSAGE FROM THE CHIEF FINANCIAL OFFICER

I am proud to join NSF Director Dr. Arden Bement in presenting the National Science Foundation's *FY 2005 Performance and Accountability Report.* This report is an integrated presentation of our programmatic and management achievements over the past year and our financial status as of September 30, 2005.

NSF has a strong tradition as an efficient and effective organization, and builds continuously on its legacy of excellence. Our core business operations are based on the principles of effective internal controls to ensure timely access to reliable financial data. NSF's electronic communications and processing systems are at the forefront of e-government, providing streamlined functions within the agency, as well as to our research and education communities. A few notable achievements of the past year include the following:

- Recognized as the first agency to earn a "Green" rating for financial performance on the President's Management Agenda (PMA) scorecard and sustaining this rating for 14 consecutive quarters.
- Earned "Green" ratings for the PMA's Budget and Performance Integration initiative and for progress in the Improper Payments initiative.
- Recognized by the Department of Treasury and the Office of Management and Budget for achieving the highest agency marks on Treasury's Financial Management Scorecard and the governmentwide CFO Council's financial management metrics.
- Our *Performance Highlights* report was named as one of the top government annual reports by the League of American Communications Professionals for the fourth consecutive year

In addition, I am pleased to report that the agency received its eighth unqualified audit opinion. The audit includes two reportable conditions: post-award monitoring and contract monitoring. In resolving all FY 2004 post-award monitoring corrective action plan recommendations, management believes we have a program that is comprehensive and stronger than ever. We will continue to strengthen the program with the goal of being recognized as the gold standard in the federal government. With regard to contract monitoring, significant progress has been made and we will continue to pursue corrective action. Additional information can be found in Management's Response to the Independent Auditors' Report.

For NSF, excellence in financial management has enabled the agency to pursue critical investments in science and engineering research and education. Underlying all of these efforts is our guiding mission: to promote progress in science and engineering in order to help ensure the Nation's security, prosperity and well being. Our success reflects the quality, integrity and professionalism of the NSF staff. Our successes are a result of their collective outstanding performance.

Thomas N. Cooley

November 7, 2005

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
ARLINGTON, VIRGINIA 22230

OFFICE OF
INSPECTOR GENERAL

November 11, 2005

To: Dr. Warren M. Washington
Chairman, National Science Board

Dr. Arden L. Bement
Director, National Science Foundation

From: Dr. Christine C. Boesz
Inspector General

Subject: Audit of the National Science Foundation's
Fiscal Years 2005 and 2004 Financial Statements

This memorandum transmits KPMG LLP's financial statement audit report of the National Science Foundation (NSF) for its Fiscal Year 2005, which includes Fiscal Year 2004 comparative information.

Results of Independent Audit

The Chief Financial Officer's (CFO) Act of 1990 (P.L. 101-576), as amended, requires NSF's Inspector General or an independent external auditor, as determined by the Inspector General, to audit the Foundation's financial statements. Under a contract monitored by the Office of Inspector General (OIG), KPMG, an independent public accounting firm, performed an audit of NSF's Fiscal Years 2005 and 2004 financial statements. The contract required that the audit be performed in accordance with the Government Auditing Standards issued by the Comptroller General of the United States, and Bulletin 01-02, *Audit Requirements for Federal Financial Statements*, issued by the United States Office of Management and Budget.

KPMG issued an unqualified opinion on NSF's financial statements. In its Report on Internal Controls Over Financial Reporting, KPMG identified two reportable conditions relating to NSF's post-award administration and contract monitoring. KPMG also reported that there were no instances in which NSF's financial management systems did not substantially comply with the requirements of the Federal Financial Management Improvement Act of 1996 (FFMIA), and found no reportable noncompliance with laws and regulations it tested.

Management's response dated November 8, 2005, follows KPMG's report.

Evaluation of KPMG's Audit Performance

To fulfill our responsibilities under the CFO Act of 1990, as amended, and other related financial management legislation, the Office of Inspector General:

- Reviewed KPMG's approach and planning of the audit;
- Evaluated the qualifications and independence of the auditors;
- Monitored the progress of the audit at key points;
- Coordinated periodic meetings with NSF management to discuss audit progress, findings and recommendations;
- Reviewed KPMG's audit report to ensure compliance with Government Auditing Standards and Office of Management and Budget Bulletin No. 01-02; and
- Coordinated issuance of the audit report.

KPMG LLP is responsible for the attached auditor's report dated November 4, 2005, and the conclusions expressed in the report. We do not express any opinion on NSF's financial statements, internal control, conclusions on compliance with laws and regulations, or on whether NSF's financial management systems substantially complied with FFMIA.

The Office of Inspector General appreciates the courtesies and cooperation extended to KPMG LLP and OIG staff by NSF during the audit. If you or your staff have any questions, please contact me or Deborah H. Cureton, Associate Inspector General for Audit.

Attachment

cc: Dr. Mark S. Wrighton, Chair, Audit and Oversight Committee

KPMG LLP
2001 M Street, NW
Washington, DC 20036

Independent Auditors' Report

Dr. Warren M. Washington
Chairman, National Science Board

Dr. Arden Bement
Director, National Science Foundation

We have audited the accompanying balance sheets of the National Science Foundation (NSF) as of September 30, 2005 and 2004 and the related statements of net cost, changes in net position, budgetary resources, and financing (hereinafter referred to as the financial statements) for the years then ended. The objective of our audits was to express an opinion on the fair presentation of these financial statements. In connection with our audits, we also considered NSF's internal control over financial reporting and tested the NSF's compliance with certain provisions of applicable laws, regulations, contracts, and grant agreements that could have a direct and material effect on its financial statements.

Summary

As stated in our opinion on the financial statements, we concluded that NSF's financial statements as of and for the years ended September 30, 2005 and 2004, are presented fairly, in all material respects, in conformity with accounting principles generally accepted in the United States of America.

Our consideration of internal control over financial reporting resulted in the following conditions being identified as reportable conditions:

- ***Post-award Administration* –** Post-award administration, especially with respect to financial monitoring, has been a long-standing concern. In fiscal year 2005, NSF has made progress to address the reportable condition identified in the Independent Auditors' Report in prior years. However, additional improvements are needed to create an effective post-award monitoring program at NSF.
- ***Contract Monitoring* –** NSF does not adequately review quarterly expenditure reports submitted by contractors receiving advance payments to ensure that the reported expenditures are correct and consistent with the contract. Without adequately performing such procedures, misstatements in expenditures may remain undetected.

However, we believe that neither of the reportable conditions are material weaknesses.

The results of our tests of compliance with certain provisions of laws, regulations, contracts, and grant agreements disclosed no instances of noncompliance or other matters that are required to be reported herein under *Government Auditing Standards*, issued by the Comptroller General of the United States, and Office of Management and Budget (OMB) Bulletin No. 01-02, *Audit Requirements for Federal Financial Statements*.

For management's response dated November 8, 2005, see Exhibit III.

The following sections discuss our opinion on the NSF's financial statements, our consideration of the NSF's internal control over financial reporting, our tests of the NSF's compliance with certain provisions of applicable laws, regulations, contracts, and grant agreements, and management's and our responsibilities.

Opinion on the Financial Statements

We have audited the accompanying balance sheets of the National Science Foundation as of September 30, 2005 and 2004, and the related statements of net cost, changes in net position, budgetary resources, and financing, for the years then ended.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the NSF as of September 30, 2005 and 2004, and its net costs, changes in net position, budgetary resources, and reconciliation of net costs to budgetary obligations, for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

The information in the Management Discussion and Analysis, Required Supplementary Stewardship Information, and Required Supplementary Information sections is not a required part of the financial statements, but is supplementary information required by accounting principles generally accepted in the United States of America or OMB Circular A-136, *Financial Reporting Requirements*, Part A, *Form and Content of the Performance and Accountability Report*. We have applied certain limited procedures, which consisted principally of inquiries of management regarding the methods of measurement and presentation of this information. However, we did not audit this information and, accordingly, we express no opinion on it. Based on our limited procedures, we determined that NSF could not complete the intragovernmental balance reconciliations with its governmental trading partners, as required by OMB A-136, because, although NSF issued confirmations to its major partners, such partners did not respond with adequate information to assist in reconciling such balances.

Our audits were conducted for the purpose of forming an opinion on the financial statements taken as a whole. The Detailed Performance Information (Section II) is an integral part of the NSF's *Fiscal Year 2005 Performance and Accountability Report*. However, this information is not a required part of the financial statements and is presented for purposes of additional analysis. Accordingly, it has not been subjected to auditing procedures and, therefore, we express no opinion on it.

Internal Control Over Financial Reporting

Our consideration of internal control over financial reporting would not necessarily disclose all matters in the internal control over financial reporting that might be reportable conditions. Under standards issued by the American Institute of Certified Public Accountants, reportable conditions are matters coming to our attention relating to significant deficiencies in the design or operation of the internal control over financial reporting that, in our judgment, could adversely affect the NSF's ability to record, process, summarize, and report financial data consistent with the assertions by management in the financial statements.

Material weaknesses are reportable conditions in which the design or operation of one or more of the internal control components does not reduce to a relatively low level the risk that misstatements, in amounts that would be material in relation to the financial statements being audited, may occur and not be detected within a timely period by employees in the normal course of performing their assigned functions.

In our fiscal year 2005 audit, we noted certain matters, described in Exhibits I, involving internal control over financial reporting and its operation that we consider to be reportable conditions. However, none of the reportable conditions are believed to be material weaknesses.

* * * * *

A summary of the status of prior year reportable conditions is included as Exhibit II.

We also noted certain additional matters that we reported to the management of the NSF in a separate letter dated November 14, 2005.

Compliance and Other Matters

Our tests of compliance with certain provisions of laws, regulations, contracts, and grant agreements, as described in the Responsibilities section of this report, exclusive of those referred to in the *Federal Financial Management Improvement Act of 1996* (FFMIA), disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards* and OMB Bulletin No. 01-02.

The results of our tests of FFMIA disclosed no instances in which the NSF's financial management systems did not substantially comply with Federal financial management systems requirements, applicable Federal accounting standards, and the United States Government Standard General Ledger at the transaction level.

We noted other matters involving compliance with laws and regulations that, under *Government Auditing Standards* and OMB Bulletin 01-02, were not required to be included in this report, that we have reported to the management of NSF in a separate letter dated November 14, 2005.

Responsibilities

Management's Responsibilities

The *Government Management Reform Act of 1994* (GMRA) requires agencies to report annually to Congress on their financial status and any other information needed to fairly present their financial position and results of operations. To meet these reporting requirements, the NSF prepares and submits financial statements in accordance with Part A of OMB Circular A-136.

Management is responsible for the financial statements, including:

- Preparing the financial statements in conformity with accounting principles generally accepted in the United States of America;
- Preparing the Management Discussion and Analysis (including the performance measures), Required Supplementary Information, and Required Supplementary Stewardship Information;
- Establishing and maintaining internal controls over financial reporting; and
- Complying with laws, regulations, contracts, and grant agreements, including FFMIA.

In fulfilling this responsibility, management is required to make estimates and judgments to assess the expected benefits and related costs of internal control policies. Because of inherent limitations in internal control, misstatements due to error or fraud may nevertheless occur and not be detected.

Auditors' Responsibilities

Our responsibility is to express an opinion on the fiscal year 2005 and 2004 financial statements of the NSF based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America, the standards applicable to financial audits contained in *Government Auditing Standards*, and OMB Bulletin No. 01-02. Those standards and OMB Bulletin No. 01-02 require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the NSF's internal control over financial reporting. Accordingly, we express no such opinion.

An audit also includes:

- Examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements;
- Assessing the accounting principles used and significant estimates made by management; and
- Evaluating the overall financial statement presentation.

We believe that our audits provide a reasonable basis for our opinion.

In planning and performing our fiscal year 2005 audit, we considered the NSF's internal control over financial reporting by obtaining an understanding of the design of NSF's internal control, determining whether internal controls had been placed in operation, assessing control risk, and performing tests of controls in order to determine our auditing procedures for the purpose of expressing our opinion on the financial statements. We limited our internal control testing to those controls necessary to achieve the objectives described in *Government Auditing Standards* and OMB Bulletin No. 01-02. We did not test all internal controls relevant to operating objectives as broadly defined by the *Federal Managers' Financial Integrity Act of 1982*. The objective of our audit was not to provide assurance on the NSF's internal control over financial reporting. Consequently, we do not provide an opinion thereon.

As required by OMB Bulletin No. 01-02, in our fiscal year 2005 audit, we considered the NSF's internal control over the Required Supplementary Stewardship Information by obtaining an understanding of the NSF's internal control, determining whether these internal controls had been placed in operation, assessing control risk, and performing tests of controls. Our procedures were not designed to provide assurance on internal control over the Required Supplementary Stewardship Information and, accordingly, we do not provide an opinion thereon.

As further required by OMB Bulletin No. 01-02, in our fiscal year 2005 audit, with respect to internal control related to performance measures and reported in the Management Discussion and Analysis, we obtained an understanding of the design of significant internal controls relating to the existence and completeness assertions and determined whether they had been placed in operation. Our procedures were not designed to provide assurance on internal control over reported performance measures and, accordingly, we do not provide an opinion thereon.

As part of obtaining reasonable assurance about whether the NSF's fiscal year 2005 financial statements are free of material misstatement, we performed tests of the NSF's compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts, and certain provisions of other laws and regulations specified in OMB Bulletin No. 01-02, including certain provisions referred to in FFMIA. We limited our tests of compliance to the provisions described in the preceding sentence, and we did not test compliance with all laws, regulations, contracts, and grant agreements applicable to the NSF. Providing an opinion on compliance with laws, regulations, contracts, and grant agreements was not an objective of our audit and, accordingly, we do not express such an opinion.

Under OMB Bulletin No. 01-02 and FFMIA, we are required to report whether the NSF's financial management systems substantially comply with (1) Federal financial management systems requirements, (2) applicable Federal accounting standards, and (3) the United States Government Standard General Ledger at the transaction level. To meet this requirement, we performed tests of compliance with FFMIA Section 803(a) requirements.

Distribution

This report is intended for the information and use of NSF's management, NSF's Office of the Inspector General, OMB, the Government Accountability Office, and the U.S. Congress, and is not intended to be and should not be used by anyone other than these specified parties.

KPMG LLP

November 4, 2005

NATIONAL SCIENCE FOUNDATION

Fiscal Year 2005 Reportable Conditions

05-01 Post-Award Monitoring

In fiscal year 2005, NSF had a budget of approximately $6 billion and managed approximately 35,000 awards. Post award monitoring of these funds to ensure that they are spent by awardees in accordance with Federal and NSF requirements has been a long-standing concern. In fiscal year 2005, NSF has made progress by implementing numerous procedures to address the reportable condition identified in the Independent Auditors' Report in prior years. For example, NSF:

- Updated the Standing Operating Guidance (Guide), which provides procedures for award risk assessments and on-site visits to ensure, among other things, that awardees' financial management practices are sound. Also, the Guide provides templates and procedures to be applied in conducting reviews of institutions with high risk awards, and
- Implemented a number of recommendations reported in an NSF consultant's report titled *Post-award Monitoring Assessment*, which was issued in March 2004.

The Guide currently indicates that awards are assessed as high, medium, or low risk based on objective factors such as type of award organization, the complexity of award, and cost sharing requirements, and subjective factors such as programmatic concerns, timely submission of Federal Cash Transactions Reports (FCTRs) and concerns raised by the Division of Grants and Agreements, the Office of Inspector General, or the Division of Contracts and Complex Agreements.

All awards are subject to baseline reviews that cover for example, cash on hand, interest income, and advances to subawardees. Medium and low risk grants are subject to reviews of their FCTRs on a sample basis. Finally, institutions with high risk awards are subject to a more detailed level of review such as site visits and Total Business System Reviews.

While these are important steps to an effective post-award administration program, we believe that improvements are still needed. In particular, not all procedures in the Guide were followed. We noted the following deficiencies:

- While the Guide establishes a process for assessing the risk of NSF awards, it does not provide a detailed plan for monitoring all the institutions identified as having high risk awards. For example, the risk assessment model identified 167 institutions with high risk awards, but NSF only conducted site visits of 25 institutions and performed one Total Business System Review. The 141 institutions that were not selected for site visits became subject to less monitoring than the medium and low risk awardees that are subject to being selected for FCTR transactional testing. However, these 141 institutions were excluded from the sample universe for FCTR reviews.
- The Guide provides a process for excluding certain institutions with high risk awards from the site visit process. For example, institutions at which the office of Budget, Finance, and Award management has conducted site visits during the past four years, those at which OIG conducted audits during the past four years, those that are in the last year of performance of a high risk grant, and those that will be considered in the future are excluded from the current year site visit plan. We question the basis for a number of those exclusions and suggest that management revisit this process.
- The Guide requires that NSF consider both objective and subjective factors in identifying high risk awards. However, NSF only used the objective factors to determine the high risk awards. The

(Continued)

subjective factors were used once the risk assessment was completed to determine which institution with high risk awards would be visited. As a result, by limiting the factors for identifying high risk awards, NSF has potentially not surfaced all institutions that should receive the highest levels of award monitoring.

- The Guide indicates that medium and low risk awards are annually subject to FCTR reviews. In fiscal year 2005, NSF engaged a contractor to perform a review of FCTRs for a statistically selected sample of 293 medium and low risk awards. KPMG also noted the FCTR review was not performed on the most recent FCTRs that were available in fiscal year 2005. Instead, it was performed on fiscal year 2004 FCTRs only.
- NSF has not provided documentation of the results of the Total Business System Review for the Federally Funded Research and Development Center (FFRDC) conducted in September 2005.
- Without adequate monitoring of its awardees, NSF cannot ensure that its grant expenditures were allowable, allocable, and reasonable under the terms of the award, which increase the risk of potential misstatements of its financial statements.

Recommendations

We believe that continued improvement in the post-award monitoring program is needed. Accordingly, we recommend that the NSF Chief Financial Officer:

- Revise the fiscal year 2005 risk assessment model and the Guide to:
  - Establish and implement a detailed strategic plan to monitor all institutions identified by the model as having high risk awards. The plan should have specific procedures to monitor those institutions having high risk awards that were not selected for site visits. Also, NSF management should consider expanding the review procedures for the high risk awardees to a level commensurate with their level of risk.
  - Clearly state how site visits selections are to be determined. If not all high risk awardees are to be visited, NSF should document its basis for excluding institutions with high risk awards from a site visit review including a determination of the sufficiency of the number of awardees selected. In addition, revise the factors used to exclude institutions with high risk awards from site visits to ensure that the factors used are appropriate considering the level of risk assessed.
  - Comply with the Guide requirements to ensure that both the objective and the subjective factors are applied during the risk assessment process to capture all high risk awards.
- Complete and document the FCTR transactional testing that covers the most currently available FCTRs.
- Complete and document the Total Business System Review for the FFRDCs selected including the review plan and the related report. This includes documenting in the Guide a detailed Total Business System Review plan and related procedures.

Management's Response

See Exhibit III.

Auditors' Comments

As stated in the finding, high risk awards at 141 institutions did not receive any form of advanced monitoring. Although some of the 141 institutions that were not selected for site visits may have some medium and low risk awards that are subject to being selected for FCTR transaction testing, the high risk awards at these institutions are subject to less monitoring than the moderate and low risk awards at these awardees. In addition, there was no evidence that other institutions were added to the 167 institutions with high risk awards based on subjective factors.

We continue to believe that the inadequate post-award monitoring program creates a risk that grant funds are not spent for the purpose originally intended. The objective of this finding is to convey to management that improvements are still needed in order for its post-award monitoring program to effectively mitigate such risk.

05-02 Contract Monitoring

Contractors submit advance requests to NSF's Division of Financial Management (DFM). These advance requests are evaluated by DFM and the Contracting Officer's Technical Representative (COTR) to determine whether funds are available. The contractor electronically submits a *Quarterly Expenditure Report for Purchases and Services Other than Personnel* (Quarterly Expenditure Report) on a quarterly basis to DFM. The quarterly expenditure report is supported by project expenditure reports that contain obligations, advances, and expenses summarized by contract modification and are used to reconcile the amounts advanced to the amounts expended on the contract. DFM uses the information contained in the quarterly expenditure report to record expenditures incurred on the contract and to reconcile the expenditures to the outstanding advance payment balance in NSF's records.

As noted in last year's Independent Auditors' Report, NSF does not adequately review quarterly expenditure reports submitted by contractors receiving advance payments to ensure that the reported expenditures are correct and consistent with the contract. Without adequately performing such procedures, misstatements in expenditures may remain undetected. In addition, neither the contracting officer nor the COTR receives copies of quarterly expenditure reports. As a result, a recent audit performed by the Defense Contract Audit Agency (DCAA) of one of NSF's major contractors, questioned $33.4 million in claimed expenditures. This underscores the large sums of money that are subject to advance payment and therefore at risk of misuse. While NSF is considering engaging DCAA to perform reviews of these quarterly expenditure reports, no review was performed over the fiscal year 2005 expenditures.

Recommendations

We recommend that the Chief Financial Officer develop procedures to require that Quarterly Expenditure Reports be distributed to all responsible officials for review and approval of the reports accuracy and propriety, correct computations, and authorized purpose under the contractual agreement. In addition, the review and approval process should include periodic testing of a sample of expenditures to actual invoices/other supporting documentation.

Management's Response

See Exhibit III.

NATIONAL SCIENCE FOUNDATION

Auditors' Comments

We continue to believe that the inadequate review of the quarterly expenditure reports creates the potential for abuse or errors and elevates the risk of fraudulent activities occurring without detection. The purpose of this finding is to convey the concern that without adequate review of the quarterly expenditure reports, unauthorized expenditures may take place. These quarterly expenditure reports support the amounts expended on the contract using the funds that were advanced by NSF and are the only source for the contract expenditures recorded by NSF.

Exhibit II

Status Of FY2004 Reportable Conditions

Post-award Grant Monitoring

NSF continues to need improvement in the post-award monitoring program. Our review of NSF's corrective actions in fiscal year 2005 revealed that NSF made progress in addressing prior years' reportable condition, however, NSF needs to revise the fiscal year 2005 risk assessment model and the Standing Operating Guidance (Guide) to establish and implement a detailed strategic plan to monitor all institutions identified by the model as having high risk awards, clearly state how site visits selections are to be determined, and comply with the Guide requirements to ensure that both the objective and the subjective factors are applied during the risk assessment process to capture all high risk awards. In addition, NSF needs to perform the Federal Cash Transactions Report transactional testing on the most currently available Federal Cash Transactions Reports and the Total Business System Review for the Federally Funded Research and Development Center selected including the review plan and the related report. This is the fifth year that we reported post-award grant monitoring as a reportable condition.

Management's Response

See Exhibit III.

Auditors' Comments

NSF responded that there was no reference to the FCTR review and the Total Business System Review for the Federally Funded Research and Development Center in the fiscal year 2004 recommendation. The FCTR review and Total Business System Review are considered advance monitoring and accordingly, the purpose of this comment is to provide an update of our fiscal year 2004 recommendation that the Chief Financial Officer needs to develop and begin implementing a plan for required baseline and advanced monitoring of all grantees.

Contract Monitoring

NSF continues to need improvement in implementing a comprehensive monitoring and review program for expenditures under advanced payment basis contracts. While NSF is considering engaging DCAA to perform reviews of the quarterly expenditure reports, no review was performed over the fiscal year 2005 expenditures. This is the second year that we reported, contract monitoring as a reportable condition.

Exhibit III

NSF Management's Response to Independent Auditors' Report for Fiscal Year 2005

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

November 8, 2005

To: Christine C. Boesz
Inspector General

From: Thomas N. Cooley
Chief Financial Officer

Subject: Management's Response to the Independent Auditors' Report
Fiscal Year 2005

I am pleased to learn that the National Science Foundation (NSF) is receiving its eighth clean opinion on the audit of its Financial Statements for fiscal year (FY) 2005. In light of the increasingly complex and numerous requirements placed on all federal agencies, this achievement continues to increase in value and significance. The investments and commitments needed to obtain a clean opinion continue to increase correspondingly. Both of our organizations have contributed to this achievement throughout the past fiscal year and I commend your office, and the KPMG contractors, for the improved working relationship.

NSF management notes that the FY 2005 audit includes two reportable conditions: post-award monitoring and contract monitoring. In resolving all FY 2004 post-award monitoring corrective action plan recommendations, management believes that NSF has mitigated the possibility of a significant deficiency that could adversely affect our ability to record, process, summarize and report financial data. We continue to examine opportunities to increase these safeguards. NSF's post-award monitoring accomplishments demonstrate continuing leadership in safeguarding federal investments in science and engineering research and education. In regard to contract monitoring, significant progress has been made and we will continue to pursue corrective action to complete our response. Here too, we judge safeguards are in place adequate to divert any serious threat to our stewardship of federal funds.

Last winter NSF initiated a series of informational exchange meetings that included NSF staff, Office of Inspector General audit staff and the auditor. Management observes that this approach has resulted in an enhancement to communication and coordination of the audit process for FY 2005. NSF will encourage staff to continue these sessions in order to identify opportunities to make the annual audit process more efficient and effective. In turn, these efforts will assist both of our organizations to foster our common objective to support NSF's achievement of excellence in all of its activities. For FY 2006, management will look to this process to clarify, for all of us, what exact actions are needed to result in the closing of the reportable conditions.

cc: Dr. Arden L. Bement, Jr.
cc: Dr. Kathleen Olsen

Attachment 1 (Management Response)

Attachment 1

Management's Response to Auditors' Report

Management's Response to 05-01 – Post-Award Monitoring

Management Comments on the Finding:

NSF's post-award monitoring program is comprehensive and strong. Over the past four years in particular, management has invested significant resources in strengthening post-award monitoring. As discussed in management's response to Exhibit II, management satisfied all four of the FY 04 post-award monitoring recommendations at a reportable condition level.

The FY 05 post-award monitoring finding states that improvements are still needed and that in particular not all procedures specified in management's standard operating guidance for post-award monitoring were followed. As discussed below, management did follow the procedures specified but has evidently failed to effectively communicate that to the auditors. This finding and the disparity between the auditors' and management's basic understandings of procedures in place and actions taken demonstrates the importance of improving communications between NSF management, KPMG, and the Office of Inspector General.

Independent Auditor Recommendation: *Establish and implement a detailed strategic plan to monitor all institutions identified by the model as having high-risk awards. The plan should have specific procedures to monitor those institutions having high-risk awards that were not selected for site visits. Also, NSF management should consider expanding the review procedures for the high-risk awardees to a level commensurate with their level of risk.*

NSF Management Response:

NSF management has established and implemented the BFA Post-award Monitoring Standing Operating Guidance (SOG) 2005-2, a comprehensive, integrated plan for post-award monitoring of all institutions including those that manage high-risk awards.

The SOG includes the policies and procedures for all levels of monitoring:

- All NSF awards are subject to baseline monitoring. Policies and procedures for baseline monitoring are detailed under tabs 1, 2, 3, and 4 of the SOG.
- Low and medium risk awards are subjected to Federal Cash Transaction Report reviews
- High-risk awards receive advanced monitoring. Policies and procedures for advanced monitoring are found under tabs 4 and 7 of the SOG.

Independent Auditor Recommendation: *Clearly state how site visits selections are to be determined. If not all high-risk awardees are to be visited, NSF should document its basis for excluding institutions with high-risk awards from a site visit review including a determination of the sufficiency of the number of awardees selected. In addition, revise the factors used to exclude institutions with high-risk awards from site visits to ensure that the factors used are appropriate considering the level of risk assessed.*

NSF Management Response:

The selection process that results in the annual site visit plan is clearly described in the SOG under Tab 6, "Risk Assessment Guide for Post-award Monitoring Site Visits," a component of the BFA Award Monitoring and Business Assistance Program (AMBAP). The "Risk Assessment Guide" applies to all NSF awards, excluding contracts and those awards specifically covered by the Facilities Management

and Oversight Guide. The "Risk Assessment Guide" contains the detailed policies and procedures for running the annual risk assessment process.

It is through the risk assessment process that we identify the high-risk awards, the first step in the development of the annual site visit plan. This multi-level, dynamic process resulted in NSF's FY 05 initial identification of 167 institutions as managing high-risk awards.

At this same Tab 6 of the SOG, NSF management clearly documents the additional level of subjective review performed to eliminate organizations from the initially identified 167 universe that were: site reviewed through the Award Monitoring and Business Assistance Program the previous year; on the OIG audit plan or had OIG conducted audit reports issued within the last four years; subject to the policies and procedures of the Facilities Management & Oversight Guide; or,had NSF awards due to expire in the current fiscal year.

To prioritize those organizations to be reviewed this fiscal year from the remaining 70 institutions we considered the following factors: A balanced portfolio by directorate and program; diversity of institution type; geographic location; overdue final project reports; issues with FCTR reporting; NSF oversight cognizance.

This second level of review and analysis is how we determined the 25 institutions that we would site visit in FY2005. The following table demonstrates the process and rationale that was undertaken to make this determination.

		Number of Institutions
Universe of Institutions Managing High-risk Awards		167
LESS Institutions that:		
Had BFA Site Visit in the Last 4 Years	31	
Had OIG Audit or Report in the Last 4 Years	12	
Had both a BFA Visit and OIG Audit Activity	5	
Subtotal		(48)
Institutions with No Current Advanced Monitoring Activity		119
LESS: High-risk Awards Due to Expire during FY2005		(49)
Institutions with No Current Advanced Monitoring Activity and Active Awards		70
LESS: Additional prioritization criteria		(46)
Planned Sites Selected for Visits during FY 2005		**24**
LESS: Were on the FY2005 OIG Audit Plan		(2)
Final Site Selection		22
PLUS: Sites Identified by:		
Program Request	4	
BFA Concerns	2	
LESS: Deferred Site Visits	(3)	
Net BFA Adjustments		3
Actual Site Visits during FY 2005		**25**

In the Post-Award Monitoring finding, the auditors conclude, "The 141 institutions that were not selected for site visits became subject to less monitoring than the medium and low risk awardees that are subject to being selected for FCTR transactional testing." This statement is factually incorrect.

In applying the risk analysis procedures outlined under Tab 6 of the SOG for fiscal year 2005, we identified 167 institutions managing high-risk awards. As the following table illustrates, of those 167 institutions or awardees, 99 also manage medium and low risk awards. The medium and low risk awards at those 99 institutions were subjected to the statistical sampling and transaction testing effort conducted under our contract with a Certified Public Accounting firm. The findings from that transactional testing provide information about systemic practices at the awardee institution that informs our monitoring of that institution's high-risk awards. For example, transactional testing of a low or medium risk award can point to the awardee institution's misapplication of its indirect cost rate or the awardee institution's inclusion of expressly unallowable costs. The discovery of indications of an unacceptable systemic practice is considered by NSF in its ongoing monitoring of any high-risk awards at that institution. This practice is consistent with NSF's post-award monitoring program.

An additional 38 institutions were excluded from advanced monitoring, because they were subject to site visits from the IG or BFA in the past four years – as specified in the SOG.

The four remaining institutions, then, were subject to less monitoring than medium and low risk awardees.

		Number of Institutions
Universe of Institutions Managing High-risk Awards		167
LESS:		
Actual Institutions Visited with High-risk Awards		(25)
TBSR Reviews		(1)
Institutions Not Visited in FY2005		141
Institutions with Overlapping Awards:		
Medium and Low Risk Awards	99	
Institutions Visited within Previous 4 Years	38	
Subtotal		(137)
Institutions With only High-risk Awards that receive only Baseline Monitoring		4

Independent Auditor Recommendation: *Comply with the Guide requirements to ensure that both the objective and the subjective factors are applied during the risk assessment process to capture all high-risk awards.*

NSF Management Response:

NSF management complied with the Guide requirements as articulated in Tab 6 of the SOG to ensure that both the objective and the subjective factors were applied during the risk assessment process and captured all high-risk awards at the time the model was run. As our policies and procedures describe, and our documentation demonstrates, this analysis is applied to the entire award universe, and consists of the application of the objective and subjective factors described on pages 2 through 5, Tab 6, of the SOG.

Subjective factors are not only used during the initial phase of the risk assessment. As described in the response to the previous recommendation, subjective considerations influence the final determination of institutions to be visited. Our process allows for Division of Institution and Award Support staff judgment, Grants and Agreements Officers' concerns, and Program Officer concerns to influence the final determination of sites.

Independent Auditor Recommendation: *Complete and document the FCTR transactional testing that covers the most currently available FCTRs.*

NSF Management Response:

NSF will take this recommendation under consideration; however, the rationale for the selection of FY 2004 FCTRs for review was both a purposeful and reasonable NSF management decision. These services were contracted for as one of two tasks under a contract. The other task under the contract was to satisfy the improper payments review requirement under the President's Management Agenda that NSF management includes in its Performance and Accountability Report (PAR). It is true that the review was performed on FY 2004 FCTRs only; to do otherwise would have caused the government to have to perform two separate FCTR reviews– one for each of the two tasks. This would have represented an additional cost and time for both NSF and our awardees; accordingly, in order to save the government money and make efficient use of taxpayer dollars and awardee efforts, NSF management opted to base the two analyses concurrently. The timing of the data was selected in order to establish a consistent timeframe, especially into the future, in order to facilitate a timely review. The goal is for future reviews to be performed earlier this Fiscal Year so that NSF management will have a final report ready by September 30th and available earlier in the annual financial statement audit.

Independent Auditor Recommendation: *Complete and document the Total Business System Review (TBSR) for the FFRDCs selected including the review plan and the related report. This includes documenting a detailed Total Business System Review plan.*

NSF Management Response:

In accordance with the DCCA Standard Operating Guide 2005-1 "Post-award Monitoring & Oversight of Federally Funded Research and Development Centers (FFRDCs) and Complex Cooperative Agreements" NSF completed TBSR fieldwork on the business systems of the National Astronomy and Ionospheric Center, located in Arecibo, PR and operated by Cornell University, in September 2005. The TBSR review plan was signed by the contracts and program division directors in August. A copy of the signed TBSR plan was forwarded to KPMG on November 1, 2005 along with copies of the SOG and TBSR review plan template.

The TBSR team leaders for both sites briefed NSF management on the results. NSF management held an exit teleconference with Cornell on November 4, 2005, and the draft TBSR report was issued that same day. Cornell will be given 45 days to provide comment on the draft report. NSF will consider the University's reaction, finalize the report, and issue it to Cornell within two weeks. Cornell will be given 30 days to develop a written plan responding to the *areas for improvement* and *suggested actions* identified in the report. Any remaining disagreements will be the subject of further discussions. NSF will follow-up with Cornell on the status of proposed actions using a combination of periodic telephone conferences and semi-annual status reports.

Management's Response to 05-02 – Contract Monitoring

Management Comments on the Finding:

NSF agrees with the overall objective of the finding -- to strengthen the monitoring of contract oversight. Management has substantial existing controls and oversight in place over the program, budget and contracting areas for our three advance basis contractors. To further strengthen our financial controls we are planning to conduct reviews in FY 2006 of the quarterly expenditure reports. Our NSF management response reflects our commitment.

NSF Management, over the past year, resolved FY 2004 contract monitoring recommendation one, that the Chief Financial Officer develop procedures to require that "public vouchers are adequately certified by the contractors' representatives." NSF management modified the reporting mechanism used by our three advanced basis contractors and required a certification by the contractors on cash draw down requests and quarterly expenditure reports. NSF management worked cooperatively with KPMG and our OIG to devise an agreed upon appropriate certification.

Independent Auditor Recommendation: *Recommend that the Chief Financial Officer develop procedures to require that Quarterly Expenditure Reports are distributed to all responsible officials for review and approval of the reports for accuracy and propriety, correct computations, and authorized purpose under the contractual agreements. In addition, the review and approval process should include periodic testing of a sample of expenditures to actual invoices/other supporting documentation*

NSF Management Response:

During FY 2005, we engaged in a series of discussions on this finding with the OIG and KPMG. We noted that the federal guidance for managing advance payment contracts can be found in the FAR and NSF is fully compliant with those standards. These discussions also clarified that the auditor's purpose for this recommendation is to have management apply the same procedures to posting expenditure reports, under the advance payment contract, as are applied to the payment of invoices. The posting of adjustments resulting from expenditure reports is a different process and involves different control processes. Because we support the opportunity to strengthen our internal control processes, we will continue to pursue implementing a plan to conduct periodic reviews of the quarterly expenditure report for our three advance basis contractors.

As part of this process, copies of the Quarterly Expenditure Report will be provided to the contracting officer and COTR for utilization in monitoring the review. NSF management has been working with KPMG and the OIG to develop acceptable procedures to conduct the recommended reviews. The review will cover, but is not limited to, such factors as accuracy, correct computations, and consistency to the contract. NSF anticipates performing these types of activities for a two-year period, at which time management will assess the results of the reviews and the level of need for reviewing expenditure reports in the future. We will confer with OIG representatives to discuss alternative options for satisfying the auditors' request that expenditure reports be approved.

Exhibit II Management's Response: Status of FY 2004 Reportable Conditions

Post-award Grant Monitoring:

Exhibit II of the Audit Report, titled, "Status of FY2004 Reportable Conditions", notes the National Science Foundation's considerable progress in addressing the prior years' reportable condition in post-award grant monitoring. This exhibit then goes on to cite the need for additional improvements to supplement the actions we have taken in FY2005, and those additional suggestions comprise the auditors' FY2005 audit recommendations for post-award grant monitoring. It should be noted that there was no reference to Federal Cash Transaction Reports (FCTR's) or Total Business System Reviews for Federally Funded Research & Development Centers in the 2004 recommendations. These issues were raised in FY 2005.

Following are the four recommendations from the FY2004 audit report, and the actions NSF has taken to resolve them.

Recommendation One: Revise the fiscal year 2005 risk assessment model so that it identifies all known high-risk awards.

- NSF/BFA/Division of Institution and Award Support (DIAS) significantly improved and expanded the NSF Risk Assessment Model to include additional objective and subjective factors. The NSF Risk Assessment model assesses the entire NSF grant award portfolio and all awards are classified as either low, medium or high-risk

Recommendation Two: Develop and begin implementing a plan for required baseline and advanced monitoring of all grantees.

A Post-award Monitoring and Business Assistance Program Site Visit Review Guide

- NSF issued Standing Operating Guidance (SOG) 2005-2 that articulated policies and procedures for the host of activities that comprise the NSF) Award Monitoring and Business Assistance Program. This included the following:
    - Documentation for Real-time Baseline Grantee Monitoring performed by the Division of Financial Management (DFM)
    - Documentation for Post Activity Grantee Monitoring processes performed by DFM
    - Documentation for post-award monitoring activities performed by the Division of Grants and Agreements (DGA)
    - Documentation for post-award monitoring activities performed by the Division of Contracts and Complex Agreements (DCCA)
    - Documentation for Low and Medium Risk Award Monitoring – FCTR Reconciliation
    - A Risk Assessment Guide

- NSF/BFA/DFM conducted baseline monitoring on all awards
- NSF/BFA/DFM conducted post activity grantee monitoring processes including Cash on Hand, Days of Cash on Hand, Advances, Interest Income and Program Income
- NSF/BFA/DGA conducted post-award monitoring activities to monitor for compliance with award terms and conditions
- NSF/BFA/DCCA conducted post-award monitoring activities to monitor for compliance with award terms and conditions
- NSF/BFA successfully contracted for services for medium/low risk grant FCTR expenditure sampling
- NSF/BFA/DIAS led Post-award Monitoring and Business Assistance Site Visits to 25 institutions identified as managing high-risk awards and issued the reports during FY 2005
- NSF/BFA/DCCA led the conduct of one Total Business Systems Review on one of NSF's Federally Funded Research and Development Centers (FFRDCs) for which a report will be issued by November 4
- NSF/BFA/DIAS conducted analyses on Final Unobligated Balances

Recommendation Three: Develop a corrective action plan to address the suggestions in the "Overall Assessment Opportunities for Improvement" section in the *Post-award Monitoring Assessment Report*, dated March 2004.

In the referenced report, NSF's contractor – International Business Machines (IBM) – stated, "Overall, NSF has a sound post-award monitoring program, which provides valuable oversight and assistance to a risk-based sample of institutions." That said NSF reached agreement with the auditors as to which among the IBM opportunities for improvement would, if implemented, deliver the greatest value for our investment. NSF developed a corrective action plan that focused on those opportunities and implemented the following improvements:

- NSF increased the length of site visits from approximately four to six hours to two to three days
- Pre-visit communication was improved
- NSF developed standardized procedures for writing the site visit report and collecting and maintaining documentation, including templates and procedures.
- NSF formalized procedures for follow-up and issue resolution after completion of site visits
- NSF increased the weighted value of new awardee status in the risk assessment
- NSF incorporated expanded systems automation into the risk assessment model
- BFA added a more formalized program of outreach to solicit for suggestions for visits from program, BFA divisions and the OIG
- NSF developed a database to collect and maintain the results of site visits and shared overall findings and lessons learned during various outreach opportunities
- NSF restructured BFA and BFA/DIAS/Cost Analysis and Audit Resolution Branch (CAAR) to position NSF for success in the Post-award Monitoring and Business Assistance Program. As such, Team Lead and Special Assistant positions were established as follows: Team Lead for Monitoring and Business Assistance; Team Lead for Audit Resolution and Follow-up; and a Special Assistant to the CAAR Branch Chief for Program Liaison, OIG Liaison, and Business Assistance
- NSF/BFA estimated its budgetary costs for Post-award Monitoring
- NSF/BFA is working with the NSF Academy to develop an award monitoring training curriculum
- NSF is considering contracting out certain post-award monitoring activities, and a number of these will be accomplished through our competitive sourcing initiative. This process is underway and includes:
    - A customer feedback tool
    - An estimate of the cost to awardees to participate in post-award monitoring activities
    - The creation of a more formalized database to collect and maintain the results of site visits that will assist in compiling and summarizing the results from the monitoring visits into overall finding and lessons learned to facilitate making results available to NSF staff and awardees.

Recommendation Four: Increase the resources dedicated to post-award monitoring. This should include increasing the number of professionals fully focused on post-award monitoring, performing more desk reviews and site reviews, and devoting more time to each site review.

- This year, NSF/BFA significantly increased resources, staff professionals and budgetary resources, dedicated to post-award monitoring activities
- NSF/BFA further augmented these resources and monitoring activities through a contract with a Certified Public Accounting firm that performed transaction testing on a statistically valid sample of Federal Cash Transaction Reports from our medium and low risk universe
- NSF increased the average length of time spent on site for each visit

National Science Foundation

FINANCIAL STATEMENTS
as of and for the years ended
September 30, 2005 and 2004

National Science Foundation
Balance Sheet
As of September 30, 2005 and 2004
(Amounts in Thousands)

		2005		2004
ASSETS				
Intragovernmental				
Fund Balance With Treasury (Note 2)	$	7,674,185	$	7,543,452
Accounts Receivable (Note 3)		35,825		23,875
Advances (Note 4)		26,531		38,389
Total Intragovernmental Assets		7,736,541		7,605,716
Cash and Other Monetary Assets (Note 2)		11,196		9,355
Accounts Receivable, Net (Note 3)		97		97
Advances (Note 4)		69,661		73,423
General Property, Plant and Equipment, Net (Note 5)		257,564		240,443
Total Assets	**$**	**8,075,059**	**$**	**7,929,034**
LIABILITIES				
Intragovernmental Liabilities				
Advances From Others	$	15,171	$	23,411
Employer Contributions & Other (Note 7)		671		557
FECA Employee Benefits (Notes 8 and 9)		281		280
Other Intragovernmental Liabilities (Note 12)		3,000		3,000
Total Intragovernmental Liabilities		19,123		27,248
Accounts Payable		44,019		43,519
Accrued Liabilities - Grants, Payroll & Other (Note 7)		299,953		311,719
FECA Employee Benefits (Notes 8 and 9)		1,381		1,465
Estimated Clean-Up Cost Liability (Note 14)		116		-
Accrued Annual Leave (Note 8)		12,951		12,162
Total Liabilities		**377,543**		**396,113**
Commitments and Contingencies (Note 12)				
NET POSITION				
Unexpended Appropriations		7,198,420		7,097,014
Cumulative Results of Operations		499,096		435,907
Total Net Position		7,697,516		7,532,921
Total Liabilities and Net Position	**$**	**8,075,059**	**$**	**7,929,034**

National Science Foundation
Statement of Net Cost
For the Years Ended September 30, 2005 and 2004
(Amounts in Thousands)

Program Costs	**2005**	**2004**
Ideas		
Fundamental Science & Engineering	$ 2,327,110	$ 2,121,465
Centers	176,183	297,569
Capability Enhancements	202,855	221,127
Total Ideas Program Costs	2,706,148	2,640,161
Less: Earned Revenue	119,826	62,110
Net Ideas Program Costs	**2,586,322**	**2,578,051**
Tools		
Large Facilities	531,911	536,163
Infrastructure and Instrumentation	321,155	280,542
Polar Tools, Facilities and Logistics	312,784	245,232
Federally Funded Research & Development Centers	209,570	212,388
Total Tools Program Costs	1,375,420	1,274,325
Less: Earned Revenue	324	13,341
Net Tools Program Costs	**1,375,096**	**1,260,984**
People		
Individuals	894,227	651,050
Institutions	179,356	202,087
Collaborations	379,489	428,260
Total People Program Costs	1,453,072	1,281,397
Less: Earned Revenue	6,316	20,289
Net People Program Costs	**1,446,756**	**1,261,108**
Net Cost of Operations (Note 10)	$ **5,408,174**	$ **5,100,143**

The accompanying notes are an integral part of these statements.

National Science Foundation
Statement of Changes in Net Position
For the Year Ended September 30, 2005
(Amounts in Thousands)

	2005	
	Cumulative Results of Operations	Unexpended Appropriations
Beginning Balances		
Beginning Balances	$ 435,907	$ 7,097,014
Budgetary Financing Sources		
Appropriations Received (Net of Offsetting Receipts)	-	5,516,960
Appropriations Transferred In/(Out)	-	9,670
Other Adjustments	-	(78,395)
Appropriations Used	5,346,829	(5,346,829)
Non-exchange Revenue and Other	87	-
Donations	31,077	-
Appropriated Earmarked Receipts Transferred In	83,677	-
Other Financing Sources		
Transfers-in/out Without Reimbursement	675	-
Imputed Financing from Costs Absorbed by Others	9,002	-
Other	16	-
Total Financing Sources	**5,471,363**	**101,406**
Net Cost of Operations	**5,408,174**	**-**
Net Change	**63,189**	**101,406**
Ending Balances	$ **499,096**	$ **7,198,420**

National Science Foundation
Statement of Changes in Net Position
For the Year Ended September 30, 2004
(Amounts in Thousands)

	2004	
	Cumulative Results of Operations	Unexpended Appropriations
Beginning Balances		
Beginning Balances	$ 489,411	$ 6,555,803
Budgetary Financing Sources		
Appropriations Received (Net of Offsetting Receipts)	-	5,610,950
Appropriations Transferred In/(Out)	-	11,250
Other Adjustments	-	(67,712)
Appropriations Used	5,013,277	(5,013,277)
Non-exchange Revenue and Other	23	-
Donations	23,915	-
Appropriated Earmarked Receipts Transferred In	569	-
Other Financing Sources		
Transfers-in/out Without Reimbursement	303	-
Imputed Financing from Costs Absorbed by Others	8,552	-
Total Financing Sources	**5,046,639**	**541,211**
Net Cost of Operations	**5,100,143**	**-**
Net Change	**53,504**	**541,211**
Ending Balances	$ **435,907**	$ **7,097,014**

The accompanying notes are an integral part of these statements.

National Science Foundation
Statement of Budgetary Resources
For the Years Ended September 30, 2005 and 2004
(Amounts in Thousands)

	2005	2004
Budgetary Resources		
Budgetary Authority:		
Appropriations Received	$ 5,631,800	$ 5,635,457
Net Transfers	9,670	11,250
Unobligated Balance – Beginning of Period	179,144	298,368
Spending Authority from Offsetting Collections:		
Earned:		
Collected	114,517	90,247
Receivable from Federal Sources	11,949	5,629
Change in Unfilled Customer Orders:		
Advance Received	(8,240)	(18,522)
Without Advance from Federal Sources	(6,378)	33,975
Subtotal	111,848	111,329
Recoveries of Prior Year Obligations	43,510	61,168
Permanently Not Available	(78,395)	(67,709)
Total Budgetary Resources (Note 11)	$ **5,897,577**	$ **6,049,863**
Status of Budgetary Resources		
Obligations Incurred:		
Direct	$ 5,542,061	$ 5,759,154
Reimbursable	111,842	111,565
Subtotal	5,653,903	5,870,719
Unobligated Balance:		
Apportioned	155,531	85,230
Unobligated Balance Not Available	88,143	93,914
Total Status of Budgetary Resources (Note 11)	$ **5,897,577**	$ **6,049,863**
Relationship of Obligations to Outlays		
Net Obligated Balance – Beginning of Period	$ 7,364,308	$ 6,784,209
Net Obligated Balance – End of Period		
Accounts Receivable	(35,825)	(23,875)
Unfilled Customer Orders from Federal Sources	(103,858)	(110,236)
Undelivered Orders	7,233,315	7,148,677
Accounts Payable	336,879	349,742
Total Net Obligated Balance – End of Period	$ **7,430,511**	$ **7,364,308**
Outlays:		
Disbursements	$ 5,538,620	$ 5,189,847
Collections	(106,277)	(71,725)
Subtotal	5,432,343	5,118,122
Less: Offsetting Receipts	31,164	23,938
Net Outlays	$ **5,401,179**	$ **5,094,184**

National Science Foundation
Statements of Financing
For the Years Ended September 30, 2005 and 2004
(Amounts in Thousands)

	2005	2004
Resources Used to Finance Activities		
Budgetary Resources Obligated		
Obligations Incurred	$ 5,653,903	$ 5,870,719
Less: Spending Authority for Offsetting Collections and Recoveries	155,358	172,497
Obligations Net of Offsetting Collections and Recoveries	5,498,545	5,698,222
Less: Offsetting Receipts	31,164	23,938
Net Obligations	5,467,381	5,674,284
Other Resources		
Transfers-in	675	303
Imputed Financing	9,002	8,552
Net Other Resources Used to Finance Activities	9,677	8,855
Total Resources Used to Finance Activities	5,477,058	5,683,139
Resources Used to Finance Items Not Part of the Net Cost of Operations		
Change in Budgetary Resources Obligated for Goods, Services and Benefits Ordered But Not Yet Provided	(83,636)	(598,238)
Resources that Fund Expenses recognized in Prior Periods	(85)	(146)
Budgetary Offsetting Collections and Receipts that Do Not Affect Net Cost of Operations	31,164	23,938
Resources that Finance the Acquisition of Assets	(35,793)	(27,078)
Total Resources Used to Finance Items Not Part of the Net Cost of Operations	(88,350)	(601,524)
Total Resources Used to Finance Net Cost of Operations	5,388,708	5,081,615
Components of the Net Cost of Operations that will not Require or Generate Resources in the Current Period		
Components Requiring or Generating Resources in Future Periods		
Other	790	1,058
Total Components of Net Cost of Operations that will Require or Generate Resources in Future Periods (Note 13)	790	1,058
Components Not Requiring or Generating Resources		
Depreciation and Amortization	18,655	17,396
Other	21	74
Total Components of Net Cost of Operations that will not Require or Generate Resources	18,676	17,470
Total Components of Net Cost of Operations that will not Require or Generate Resources in the Current Period	19,466	18,528
Net Cost of Operations (Note 10)	**$ 5,408,174**	**$ 5,100,143**

The accompanying notes are an integral part of these statements.

NOTES TO THE PRINCIPAL FINANCIAL STATEMENTS

Note 1. Summary of Significant Accounting Policies

A. Reporting Entity

The National Science Foundation (NSF or "Foundation") is an independent federal agency created by the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-75). Its mission is to promote and advance scientific progress in the United States. NSF initiates and supports scientific research and research fundamental to the engineering process and programs to strengthen the Nation's science and engineering potential. NSF also supports education programs at all levels in all fields of science and engineering. NSF funds research and education in science and engineering by awarding grants and contracts to educational and research institutions in all parts of the United States. NSF, by law, cannot operate research facilities except in the polar regions. By award, NSF enters into relationships to fund the research operations conducted by grantees.

NSF is led by a presidentially-appointed director and the policy-making National Science Board (NSB). The NSB, composed of 24 members, represents a cross section of American leaders in science and engineering research and education, who are appointed by the President for six-year terms. The NSF Director is a member *ex officio* of the Board.

NSF is authorized to accept and use U.S. and foreign funds into the NSF Donation Account per the General Authority of the Foundation as found in 42 U.S.C. 1862 Section 3 (a)(3), "to foster the interchange of scientific and engineering information among scientists and engineers in the United States and foreign countries, and also 42 U.S.C. 1870 Section 11 (f) which allows NSF to receive and use funds donated by others. Donations are received from foreign governments, private companies, academic institutions, non-profit foundations, and individuals. Donated funds are either earmarked for a specific NSF program or unrestricted, which can be used on one or more of the general purposes of the foundation. NSF maintains four interest bearing donation accounts. Interest earned on the bank deposits are used for the same purpose as the principal donations. When needed for program support, donations are transferred to the U.S. Treasury. Funds are made available for obligations as necessary to support NSF programs.

B. Basis of Presentation

These financial statements have been prepared to report the financial position and results of operations of NSF as required by the Chief Financial Officers Act of 1990, the Government Management Reform Act of 1994, the Reports Consolidation Act of 2000, and the Office of Management and Budget (OMB) Circular A-136, *Financial Reporting Requirements*. While the statements have been prepared from the books and records of NSF in accordance with United States generally accepted accounting principles (GAAP) for federal entities and the formats prescribed by OMB, the statements are in addition to the financial reports used to monitor and control budgetary resources which are prepared from the same books and records.

The fiscal year (FY) 2007 *Budget of the United States* (also known as the President's Budget) with actual numbers for FY 2005 was not published at the time that these financial statements were issued. The President's Budget is expected to be published in February 2006 and will be available from the United States Government Printing Office. There are no differences in the actual amounts for FY 2004 that have been reported in the FY 2006 Budget of the United States and the actual numbers that appear in the FY 2004 Statement of Budgetary Resources.

C. Basis of Accounting

The accompanying financial statements have been prepared using the accrual method of accounting in addition to recognizing certain budgetary transactions. Under the accrual method, revenues are recognized when earned and expenses are recognized when a liability is incurred, without regard to receipt or payment of cash. Budgetary accounting facilitates compliance with legal constraints and controls over the use of federal funds. NSF records grant expenses from expenditure reports submitted by the grantees.

D. Revenues and Other Financing Sources

NSF received the majority of its funding through appropriations contained in the Departments of Veterans Affairs, Housing and Urban Development, and Independent Agencies Appropriations Act. NSF receives both annual and multi-year appropriations that may be expended, within statutory limits. Additional amounts are obtained from reimbursements for services provided to and allocation transfers from other federal agencies and from receipts to the donation account. Also, NSF receives interest earned on overdue receivables and excess cash advances to grantees. The interest earned on overdue receivables is returned to the Treasury. Interest earned on excess cash advances to grantees is sent directly to the Department of Health and Human Services in accordance with OMB Circular A-110, *Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals and Other Non Profit Organizations.*

Appropriations are recognized as a financing source at the time the related "funded" program or administrative expenses are incurred. Appropriations are also recognized when used to purchase property, plant and equipment. "Unfunded" liabilities result from liabilities not covered by budgetary resources and will be paid when future appropriations are made available for these purposes. Donations are recognized as revenues when funds are received. Revenues from reimbursable agreements are recognized when the services are provided and the related expenditures are incurred. Reimbursable agreements are mainly for grant administrative services provided by NSF on behalf of other federal agencies.

E. Fund Balance with Treasury and Cash and Other Monetary Assets

Cash receipts and disbursements are processed by the Treasury. Fund Balance with Treasury is composed primarily of appropriated funds that are available to pay current liabilities and finance authorized purchase commitments. Cash and Other Monetary Assets primarily include non-appropriated funding sources from donations, non-convertible Indian rupees and undeposited collections.

NSF has also established commercial bank accounts to hold some donated funds in trust, in interest bearing accounts as permitted by the contributors. These funds are collateralized by the bank through the U.S. Treasury.

F. Accounts Receivable, Net

Accounts Receivable consists of amounts due from governmental agencies, private organizations, and individuals. NSF establishes an allowance for loss on accounts receivable from private sources that are deemed uncollectible, but regards amounts due from other federal agencies as fully collectible. In FY 2004, OMB issued M-04-10: *Memorandum on Debt Collection Improvement Act Requirements,* which reminded agencies of their responsibility to comply with the policies for writing off and closing out debt. Based on this memo, NSF writes off delinquent debt that is more than two years old. NSF also analyzes each account independently to assess collectability and the need for an offsetting allowance or write-off.

G. Advances

Advances consist of advances to grantees, contractors, and federal agencies. Advance payments are made to grant recipients so that recipients may incur expenses related to the approved grant. Payments are only made within the amount of the recorded grant obligation and are intended to cover immediate cash needs. Total grant expenditures for the year include an estimate of fourth quarter amounts due from and payable to grantees. The estimate is compiled using historical grantee expenditure data. For those grantees with advance payments exceeding reported expenditures, the aggregate difference is treated as an advance. Additionally, for those grantees with expenditures exceeding advance payments, the aggregate difference is treated as a grant liability. Advances to contractors are payments made in advance of incurring expenses. Advances to federal agencies are only issued when agencies are operating under working capital funds and are unable to incur costs on a reimbursable basis. Advances are reduced when documentation supporting expenditures is received and recorded.

H. General Property, Plant and Equipment (PP&E)

PP&E: NSF capitalizes acquisition costs exceeding $25,000 and useful lives of two or more years. Acquisitions not meeting these criteria are recorded as operating expenses. NSF currently reports capitalized PP&E at original acquisition cost; assets acquired from General Services Administration's (GSA) excess property schedules are recorded at the value assigned by the donating agency; assets transferred in from other agencies are at the cost recorded by the transferring entity for the asset net of accumulated depreciation or amortization. Completed buildings are transferred from Construction in Progress to Real Property at NSF's acceptance. Depreciation expense is calculated using the straight-line method. The economic life classifications for capitalized assets are as follows:

Equipment

5 years	-	computers and peripheral equipment, fuel storage tanks, laboratory equipment, and vehicles
7 years	-	communications equipment, office furniture and equipment, pumps and compressors
10 years	-	generators, Department of Defense equipment

Aircraft and Satellites

7 years	-	aircraft, aircraft conversions, and satellites

Buildings and Structures

31.5 years	-	buildings and structures placed in service prior to 1993
39 years	-	buildings and structures placed in service after 1993

Internal Use Software

5 years	-	internal use software

Leasehold Improvements

The economic life of Leasehold Improvements is amortized over the number of years remaining on the occupancy agreement for the NSF headquarters building. In FY 2005, Leasehold Improvements completed during the year were amortized over 8 years. This represents the remaining years on NSF's lease with GSA.

The PP&E balance consists of Equipment, Aircraft and Satellites, Buildings and Structures, Leasehold Improvements, and Construction in Progress. Costs are accumulated in construction in progress until the complete project is accepted by NSF and at that time, project costs are capitalized and depreciated over the respective useful life of the asset. These balances are comprised of PP&E maintained "in-house" by

NSF to support agency operations and PP&E under the U.S. Antarctic Program (USAP). The majority of USAP property is currently the custodial responsibility of Raytheon Technical Services Company, the NSF contractor for the program. Additionally, the U.S. Navy's Space and Naval Warfare Center, the Air National Guard 109th, and Ken Borek Air also have custodial responsibility for some USAP property.

Office Space: The NSF headquarters buildings are leased through the GSA under an occupancy agreement. The cancellation clause within the agreement allows NSF to terminate use with a 120 day notice. NSF is billed by GSA for the leased space as rent based upon estimated lease payments made by GSA plus an administrative fee. The cost of the headquarters building is not capitalized by NSF. The cost of leasehold improvements performed by GSA is financed with NSF appropriated funds. The leasehold improvements are capitalized by NSF as they are transferred from Construction in Progress. Amortization is calculated using the straight-line method over the lesser of their useful lives or the unexpired lease term.

Internal Use Software: NSF controls, values and reports purchased or developed software as tangible property assets, in accordance with the Statement of Federal Financial Accounting Standards (SFFAS) No. 10 – "Accounting for Internal Use Software." NSF identifies software investments as accountable property for items that, in the aggregate, cost $500,000 or more to purchase, develop, enhance or modify a new or existing NSF system. Software projects that are not completed at year-end and are expected to exceed the capitalization threshold are recorded as software in development. All internal use software meeting the capitalization threshold is amortized over a five-year period using the straight-line method.

Assets Owned by NSF in the Custody of Other Entities: NSF awards grants, cooperative agreements, and contracts to various organizations, including colleges and universities, non-profit organizations, state and local governments, Federally Funded Research and Development Centers (FFRDC), and private entities. The funds provided may be used in certain cases to purchase or construct Property, Plant and Equipment (PP&E) to be used for operations or research on projects or programs sponsored by NSF. In these instances, NSF funds the acquisition of property, but transfers control to these entities. NSF's authorizing legislation specifically prohibits it from operating such property directly. In practice, NSF's ownership interest in such PP&E is similar to a reversionary interest. To address the accounting and reporting of these assets, specific guidance was sought by NSF and provided by the Federal Accounting Standards Advisory Board (FASAB). This guidance stipulated that NSF should: (i) disclose the value of such PP&E held by others in its financial statements based on information contained in the audited financial statements of these entities (if available). Where separate audited amounts are not available for a specific entity, NSF should name the entity and note that these amounts are unavailable; and (ii) report information on costs incurred to acquire the research facilities, equipment, and platforms in the Research and Human Capital Activity costs as required by the Statement of Federal Financial Accounting Standards No. 8, *Supplementary Stewardship Reporting*.

I. Advances from Others

Advances from Others consist of prior year amounts obligated and advanced by other federal entities to NSF for grant administration and other services to be furnished under reimbursable agreements. Balances at the end of the year are adjusted by an allocated amount from the fourth quarter grantee expenditure estimate described under Note 1G, *Advances*. The amount to be allocated is based on a percentage of reimbursable grant expenditures, by trading partner, to total grant expenditures.

J. Accounts Payable

Accounts Payable consists of liabilities to commercial vendors, contractors, and disbursements in transit. Accounts payable to commercial vendors are expenses for goods and services received but not yet paid by NSF at the end of the fiscal year. At year-end, NSF accrues for the amount of estimated unpaid expenses

to commercial vendors. Contract liabilities are estimated expenses over and above the amount of advances given to contractors. At year-end, NSF accrues the amount of estimated expenses not covered by advances given to contractors. Intra-governmental accounts payable consists of disbursements in transit recorded by NSF but not paid by Treasury.

K. Other Liabilities

Other liabilities consist of grant accruals, accrued payroll and benefits. Grant liabilities are estimated grantee expenses over and above the amount of advances given to grantees. At year-end, NSF accrues for the amount of estimated grantee expenses not covered by advances given to grantees. Accrued payroll and benefits relate to services rendered by NSF employees but not yet paid. At year-end, NSF accrues the actual amount of wages and benefits earned, but not yet paid. In FY 2004, NSF outsourced its payroll services to the Department of the Interior.

L. Annual, Sick, and Other Leave

Annual leave is accrued as it is earned, and the accrual is reduced as leave is taken. Each year, the balance in the accrued annual leave account is adjusted to reflect changes. To the extent current and prior-year appropriations are not available to fund annual leave earned but not taken, funding will be obtained from future Salaries and Expenses appropriations. Sick leave and other types of nonvested leave are expensed as taken.

M. Employee Benefits

A liability is recorded for estimated and actual future payments to be made for workers' compensation pursuant to the Federal Employees' Compensation Act (FECA). The liability consists of the net present value of estimated future payments calculated by the U.S. Department of Labor (DOL) and the actual unreimbursed cost paid by DOL for compensation paid to recipients under FECA. The actual costs incurred are reflected as a liability because NSF will reimburse DOL two years after the actual payment of expenses. Future NSF Salaries and Expenses Appropriations will be used for DOL's estimated reimbursement.

N. Net Position

Net position is the residual difference between assets and liabilities and is composed of unexpended appropriations and cumulative results of operations. Unexpended appropriations represent the amount of unobligated and unexpended budget authority. Unobligated balances are the amount of appropriations or other authority remaining after deducting the cumulative obligations from the amount available for obligation. The cumulative results of operations is the net result of NSF’s operations since inception.

O. Retirement Plan

In FY 2005, approximately 28 percent of NSF employees participated in the Civil Service Retirement System (CSRS), to which NSF made matching contributions equal to 7 percent of pay. The majority of NSF employees are covered by the Federal Employees Retirement System (FERS) and Social Security. A primary feature of FERS is that it offers a thrift savings plan to which NSF automatically contributes 1 percent of pay and matches employee contributions up to an additional 4 percent of pay. NSF also contributes the employer's matching share for Social Security for FERS participants.

Although NSF funds a portion of the benefits under FERS and CSRS relating to its employees and withholds the necessary payroll deductions, the agency has no liability for future payments to employees under these plans, nor does NSF report CSRS, FERS, or Social Security assets, or accumulated plan benefits, on its financial statements. Reporting such amounts is the responsibility of the Office of Personnel Management (OPM) and The Federal Retirement Thrift Investment Board. In FY 2005, NSF’s

contributions to CSRS and FERS were $2,333,414 and $8,858,629 respectively. In FY 2004, NSF's contributions to CSRS and FERS were $2,363,364 and $7,862,417 respectively.

SFFAS No. 5, *Accounting for Liabilities of the Federal Government*, requires employing agencies to recognize the cost of pensions and other retirement benefits during their employees' active years of service. OPM actuaries determine pension cost factors by calculating the value of pension benefits expected to be paid in the future, and provide these factors to the agency for current period expense reporting. Information was also provided by OPM regarding the full cost of health and life insurance benefits.

In FY 2005, NSF, utilizing OPM provided cost factors, recognized $3,562,579 of pension expenses, $5,417,815 of post-retirement health benefits expenses, and $21,664 of post-retirement life insurance expenses, beyond amounts actually paid. NSF recognized offsetting revenue of $9,002,058 as an imputed financing source to the extent that these intragovernmental expenses will be paid by OPM.

In FY 2004, NSF, utilizing OPM provided cost factors, recognized $3,942,925 of pension expenses, $4,587,960 of post-retirement health benefits expenses, and $21,285 of post-retirement life insurance expenses, beyond amounts actually paid. NSF recognized offsetting revenue of $8,552,170 as an imputed financing source to the extent that these intragovernmental expenses will be paid by OPM.

P. Commitments, Contingencies, and Possible Future Costs

Commitments: Commitments are contractual agreements involving financial obligations. NSF is committed for goods and services that have been ordered, but have not yet been delivered.

Contingencies - Claims and Lawsuits: NSF is a party to various legal actions and claims brought against it. In the opinion of NSF management and legal counsel, the ultimate resolution of the actions and claims will not materially affect the financial position or operations of the Foundation. NSF recognizes the contingency in the financial statements when claims are expected to result in a material loss, whether from NSF's appropriations or the "Judgment Fund" administered by the Department of Justice under Section 1304 of Title 31 of the United States Code, and, the payment amounts can be reasonably estimated.

Claims and lawsuits have also been made and filed against awardees of the Foundation by third parties. NSF is not a party to these actions and NSF believes there is no possibility that NSF will be legally required to satisfy such claims. Judgments or settlements of the claims against awardees that impose financial obligation on them may be claimed as costs under the applicable contract, grant, or cooperative agreement and thus may affect the allocation of program funds in future fiscal years. In the event that the likelihood of loss on such claims by awardees becomes probable, these amounts can be reasonably estimated and NSF management determines that it will probably pay them, NSF will recognize these potential payments as expenses.

Contingencies – Unasserted Claims: For claims and lawsuits that have not been made and filed against the Foundation, NSF management and legal counsel determine, in their opinion, whether resolution of the actions and claims it is aware of will materially affect the agency's financial position or operations. NSF recognizes a contingency in the financial statements when unasserted claims are probable of assertion, and if asserted would be probable of an unfavorable outcome, and expected to result in a measurable loss, whether from NSF's appropriations or the "Judgment Fund." NSF discloses unasserted claims if materiality or measurability of a potential loss cannot be determined or the loss is more likely than not to occur rather than probable.

Termination Claims: NSF engages organizations in cooperative agreements and contracts to manage, operate and maintain research facilities for the benefit of the scientific community. As part of these agreements and contracts, NSF funds on a pay-as-you-go basis certain employee benefit costs, (accrued vacation and other employee related liabilities, severance pay and medical insurance), long term leases and vessel usage. These agreements permit awardees to make claims for any unpaid costs upon termination or non-renewal of the agreements and contracts.

NSF considers the likelihood of termination or non-renewal to be remote, and has not recorded liabilities for these termination claims on its financial statements. However, one FFRDC operator has identified these payments as obligations of NSF. The termination provision of the cooperative agreement clearly states that NSF's liability for such costs exists only upon termination and is limited to the lesser of available appropriations or $25 million. NSF, at the discretion of its Director, has offered to use its best efforts to obtain these additional funds, including efforts to obtain such funds from Congress. However, nothing in the agreements or contracts can be construed as implying that Congress will appropriate funds to meet the terms of these claims.

Environmental Liabilities: NSF manages the U.S. Antarctic Program. The Antarctic Conservation Act and its implementing regulations identify the requirements for environmental clean-up in Antarctica. NSF continually monitors the U.S. Antarctic Program in regards to environmental issues. NSF establishes its environmental liability estimates in accordance with the requirements of the Statement of Federal Financial Accounting Standard (SFFAS) No. 5, "*Accounting for Liabilities of the Federal Government*," and as amended by SFFAS No. 12, "Recognition *of Contingent Liabilities Arising from Litigation*," and the Federal Financial Accounting and Auditing Technical Release No. 2, "*Determining Probable and Reasonably Estimable for Environmental Liabilities in the Federal Government.*"

Q. Use of Estimates

The preparation of the accompanying financial statements requires management to make certain estimates and assumptions. Actual results will invariably differ from those estimates.

R. Tax Status

NSF, as a federal agency, is not subject to federal, state, or local income taxes and, accordingly, no provision for income taxes is recorded.

Note 2. Fund Balance with Treasury

Fund Balance with Treasury consisted of the following components as of September 30, 2005 and 2004:

(Amounts in Thousands)	2005			
	Appropriated Funds	Donated Funds	Special Funds	Total
Obligated	$ 7,279,716	20,678	130,117	$ 7,430,511
Unobligated Available	54,064	14,495	86,972	155,531
Unobligated Unavailable	85,324	213	2,606	88,143
Total Fund Balance with Treasury	$ 7,419,104	35,386	219,695	$ 7,674,185

(Amounts in Thousands)	2004			
	Appropriated Funds	Donated Funds	Special Funds	Total
Obligated	$ 7,204,385	9,979	149,944	$ 7,364,308
Unobligated Available	45,802	13,276	26,152	85,230
Unobligated Unavailable	90,601	364	2,949	93,914
Total Fund Balance with Treasury	$ 7,340,788	23,619	179,045	$ 7,543,452

The Donations Account includes amounts donated to NSF from all sources. Amounts in the Donations Account are restricted for intended purposes. Unavailable balances include recovered expired appropriations and other amounts related to expired authority and holdings, which are unavailable for NSF use.

In 1999, in accordance with P.L. 105-277, NSF established a special fund called H-1B Nonimmigrant Petitioner Fees Account. These funds are considered "Special Funds" and are not included in Appropriated Funds. The funds are fees collected for each petition for nonimmigrant status. Under the law, NSF was prescribed a percentage of these fees for specific programs.

NSF's Cash and Other Monetary Assets as of September 30, 2005 and 2004 consisted of the following:

(Amounts in Thousands)	2005	2004
Cash	$ 10,879	$ 9,053
Foreign Currency	317	302
Total Cash and Other Monetary Assets	$ 11,196	$ 9,355

Note 3. Accounts Receivable, Net

Intragovernmental

The Intragovernmental Accounts Receivable consists of reimbursements and repayments due from other government agencies. As of September 30, 2005 and 2004, the amount of intragovernmental accounts receivable was $35,824,733 and $23,875,393 respectively.

Public

As of September 30, 2005 and 2004, Accounts Receivable (net) due from private organizations and individuals consisted of:

(Amounts in Thousands)	2005	2004
Accounts Receivable	$ 98	$ 97
Allowance for Uncollectible Accounts	(1)	-
Net Amount Due	$ 97	$ 97

As of September 30, 2005 and 2004, the reconciliation of the allowance for uncollectible accounts is as follows:

(Amounts in Thousands)	2005	2004
Beginning Allowance	$ -	$ 8,182
Additions	(1)	66
Reductions (write-offs)	-	(8,248)
Ending Allowance	$ (1)	$ -

Note 4. Advances

As of September 30, 2005 and 2004, Advances consisted of the following components:

Intragovernmental

(Amounts in Thousands)	2005	2004
Advances to Others	$ 26,531	$ 38,389

Public

(Amounts in Thousands)	2005	2004
Advances to Grantees	$ 65,123	$ 72,268
Advances to Others	448	-
Advances to Contractors	4,090	1,155
Total Advances with the Public	$ 69,661	$ 73,423

Note 5. General Property, Plant and Equipment, Net

The components of General Property, Plant and Equipment as of September 30, 2005 and 2004 were:

(Amounts in Thousands)	2005		
	Acquisition Cost	Accumulated Depreciation	Net Book Value
Equipment	$ 98,659	$ 79,592	$ 19,067
Aircraft and Satellites	138,487	116,084	22,403
Buildings and Structures	132,209	48,125	84,084
Construction in Progress	127,975	-	127,975
Internal Use Software	7,881	3,846	4,035
Total PP&E	$ 505,211	$ 247,647	$ 257,564

(Amounts in Thousands)	2004		
	Acquisition Cost	Accumulated Depreciation	Net Book Value
Equipment	$ 121,160	$ 103,219	$ 17,941
Aircraft and Satellites	138,487	109,683	28,804
Buildings and Structures	129,319	44,296	85,023
Construction in Progress	104,848	-	104,848
Internal Use Software	6,259	2,432	3,827
Total PP&E	$ 500,073	$ 259,630	$ 240,443

Note 6. Property, Plant and Equipment in the Custody of Other Entities

As explained in Note 1-H, *Assets Owned by NSF in the Custody of Other Entities*, NSF received a ruling from FASAB on accounting for PP&E owned by NSF but in the custody of and used by others. The FASAB guidance requires PP&E in the custody of others be excluded from NSF PP&E as defined in the Statement of Federal Financial Accounting Standards No. 6 *Accounting for Property, Plant and Equipment.* NSF is, however, required to disclose the dollar amount of NSF PP&E held by others in the footnotes based on information contained in the audited financial statements of the organization holding the assets.

The amount of PP&E owned by NSF but in the custody of other entities identified in the following table was obtained from the respective entities' audited financial statements. If the audited financial statements were not published or released by September 1, or if NSF PP&E is not separately stated on the entities' audited financial statements, then the amounts relating to such entities are annotated as Not Available (N/A) in the table.

The amounts reported by entities in their audited financial statements submitted as of September 1 are as follows:

(Amounts in Thousands)			
Federally Funded Research and Development Centers	2005	2004	Year End
National Astronomy & Ionosphere Center - NAIC Cornell	$ N/A	$ N/A	6/30
National Center for Atmospheric Research - UCAR	N/A	235,233	9/30
National Optical Astronomy Observatories - AURA	N/A	413,081	9/30
National Radio Astronomy Observatory - AUI	N/A	120,173	9/30

Colleges and Universities	2005	2004	Year End
California Institute of Technology	$ N/A	$ N/A	9/30
Columbia University	N/A	N/A	6/30
Duke University	N/A	N/A	6/30
ECPI College of Technology	N/A	N/A	6/30
Oregon State University	N/A	N/A	6/30
San Jose State University Foundation	N/A	N/A	6/30

Colleges and Universities, continued	2005	2004	Year End
Stanford University	N/A	N/A	8/31
University of Alaska Fairbanks Campus	N/A	N/A	6/30
University of California - San Diego	N/A	N/A	6/30
University of Hawaii	N/A	N/A	6/30
University of Rhode Island	N/A	N/A	6/30
University of Texas at Austin	N/A	N/A	8/31
University of Washington	N/A	N/A	6/30
University of Wisconsin - Madison	N/A	N/A	6/30

Other Entities	2005	2004	Year End
Aerodyne Research Inc	$ N/A	$ N/A	10/03
Articular Engineering LLC	N/A	N/A	N/A
Bermuda Biological Station for Research Inc	N/A	N/A	12/31
Bossa Nova Technologies LLC	N/A	N/A	Not Audited
Brighton Technologies Group Inc	N/A	N/A	N/A
Ekips Technologies Inc	N/A	N/A	Not Audited
EM Photonics, Inc	N/A	N/A	N/A
Fourth Wave Imaging Corporation	N/A	N/A	Not Audited
Global Contour Ltd	N/A	N/A	N/A
Imago Scientific Instruments Corp	N/A	N/A	9/30
Incorporated Research Institutions for Seismology	N/A	N/A	6/30
Information Systems Laboratories Inc	N/A	N/A	12/31
Kapetyn-Murnane Laboratories LLC	N/A	N/A	Not Audited
Lucigen Corporation (Formerly Microgen - a WI Corp)	N/A	N/A	Not Audited
Lynntech, Inc	N/A	N/A	N/A
Monterey Bay Aquarium Research Institute	N/A	N/A	12/31
Physical Optics Corporation	N/A	N/A	12/31
SINMAT Inc	N/A	N/A	Not Audited
Smithsonian Institution Astrophysical Observatory	N/A	N/A	N/A
Tetramer Technologies LLC	N/A	N/A	Not Audited
The Venture Group (Venture Innovations, Inc)	N/A	N/A	Not Audited
UNAVCO, Inc	N/A	N/A	12/31
Verionix Engineering Inc	N/A	N/A	Not Audited
Vista Engineering Inc	N/A	N/A	Not Audited
Woods Hole Oceanographic Institute	N/A	N/A	12/31

Note 7. Other Liabilities

These are current accrued liabilities, which consist of grant and contract accruals, accrued employer contributions for payroll and benefits, disbursements in transit, accrued payroll and benefits, and various employee related liabilities for payroll and benefit deductions. As of September 30, 2005 and 2004, these liabilities consisted of the following:

(Amounts in Thousands)	2005	2004
Intragovernmental		
Employer Contributions for Payroll Benefits and Other	$ 671	$ 557
Total Intragovernmental	$ 671	$ 557
Accrued Liabilities - Grants and Payroll		
Accrued Liabilities	$ 293,631	$ 306,609
Accrued Payroll and Benefits	6,322	5,110
Total Accrued Liabilities - Grants and Payroll	$ 299,953	$ 311,719
Total Other Liabilities - Grants, Payroll and Other	$ 299,953	$ 311,719

Note 8. Liabilities Not Covered by Budgetary Resources

Certain liabilities are not funded by current budgetary resources. As of September 30, 2005 and 2004, Liabilities Not Covered by Budgetary Resources consisted of the following:

(Amounts in Thousands)	2005	2004
Intragovernmental: FECA Employee Benefits	$ 281	$ 280
Public: FECA Employee Benefits	1,381	1,465
Accrued Annual Leave	12,951	12,162
Liabilities Not Covered by Budgetary Resources to Fund Cost of Operations	$ 14,613	$ 13,907
Total Liabilities Not Covered by Budgetary Resources	$ 14,613	$ 13,907

Note 9. FECA Employee Benefits

As of September 30, 2005 and 2004, unreimbursed FECA cost to the DOL for actual compensation paid to recipients was $281,116 and $280,398 respectively. FECA provides income and medical cost protection to cover federal employees injured on the job or who have a work-related injury or occupational disease, and beneficiaries of employees whose death is attributable to a job related injury or occupational disease. The DOL initially pays valid claims and then bills the employing federal agency.

As of September 30, 2005 and 2004, the estimated liability of $1,381,000 and $1,465,000 respectively, are for future worker compensation claims calculated by DOL and include the expected liability for death, disability, medical, and miscellaneous costs for approved compensation cases. The liability is determined using a method that utilizes historical benefit payment patterns related to a specific incurred period and annual benefit payments discounted to present value using OMB's economic assumptions for 10-year Treasury notes and bonds. To account for the effects of inflation on the liability, wage and medical inflation factors are applied to the calculation of future benefits.

Note 10. Statement of Net Cost

Major Program Descriptions
NSF's primary business is to make merit-based grants and cooperative agreements to individual researchers and groups, in partnership with colleges, universities, and other public, private, state, local, and federal institutions, throughout the U.S. By providing these resources, NSF contributes to the health and vitality of the U.S. research and education enterprise, which enables and enhances the Nation's capacity to sustain growth and prosperity. These grants are managed through eight programmatic organizations within NSF that review and evaluate competitive proposals submitted by the science and engineering community for its consideration.

NSF is a single entity for net cost reporting purposes. NSF's programmatic organizations are the Directorates for the Biological Sciences; Computer and Information Science and Engineering; Education and Human Resources; Engineering; Geosciences; Mathematical and Physical Sciences; Social, Behavioral and Economic Sciences; and the Office of Polar Programs.

The Statement of Net Cost is a general overall presentation of NSF-wide expenses incurred by the agency. The presentation of the Statement of Net Cost is aligned with NSF's strategic goals of *Ideas, Tools, and People.* NSF's fourth strategic goal, *Organizational Excellence,* focuses on NSF's administrative and management activities. NSF has assigned ten investment categories that align to *Ideas, Tools and People.* The Investment categories for *Ideas* are Fundamental Science and Engineering; Centers; and Capability Enhancements. For *Tools* they are Large Facilities; Infrastructure and Instrumentation; Polar Tools, Facilities and Logistics; and FFRDCs. For *People* they are Individuals; Institutions; and Collaborations. These goals are outlined in NSF's FY 2003 – 2008 Strategic Plan and are integrated into NSF's FY 2006 Budget Request (www.nsf.gov/about/budget/fy2006/toc.htm).

In pursuit of its mission, NSF makes investments in *Ideas, Tools* and *People*. These goals reflect outcomes at the heart of the research enterprise: discoveries across the frontier of science and engineering, connected to learning, innovation and service to society (*Ideas*); broadly accessible, state-of-the-art science and engineering facilities (*Tools*); and a diverse, competitive, and globally-engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens (*People*). *People* produce the *Ideas* that are the currency of the new knowledge-based economy. The need for more sophisticated *Tools* has paralleled recent advances in science and engineering, creating a growing demand for access to them. NSF's overall strategy is to invest in state-of-the-art tools that add unique value to research and are accessible and widely shared among researchers across the Nation.

In FY 2005 and 2004, approximately 95 percent of NSF's funds are directly related to the *Ideas, Tools, and People* strategic areas of focus. The remaining five percent of NSF's investments support *Organizational Excellence* activities. In FY 2005 and 2004, *Organizational Excellence* costs amounted to $292,426,388 and $268,298,594, respectively. All organizational excellence costs are assigned on a prorated basis to the *Ideas, Tools and People* strategic areas.

In FY 2005 and 2004, *Organizational Excellence* activities include Salary & Expenses, NSB and Office of Inspector General (OIG) expenses which provide for salaries and benefits of persons employed at the NSF; general operating expenses, including key activities to advance the NSF information systems technology and to enhance staff training, audit and OIG activities, and OPM and DOL benefits costs paid on behalf of NSF. These indirect costs are allocated to NSF programs based on each program's direct costs.

In FY 2005, NSF implemented programmatic realignments that affected certain investment categories within the Statement of Net Cost. Under the *Ideas* strategic goal, NSF updated the principles governing *Centers* programs. This led to a number of activities being reclassified from the *Centers* investment category to *Fundamental Science and Engineering (FS&E)*. The impact on the FY 2005 Statement of Net Cost was a reduction in expenditures reported as *Centers* and an increase in expenditures reported as *FS&E*. Under the *People* strategic goal, NSF reclassified several activities within all of the investment categories, which had a minimal overall impact on the Statement of Net Cost.

In accordance with OMB Circular A-136, *Financial Reporting Requirements*, costs incurred for services provided by other federal entities are reported in the full costs of NSF programs and are identified as "intragovernmental." All earned revenues are funding sources provided through reimbursable agreements with other federal entities and are retained by NSF. Earned revenues are recognized when the related program or administrative expenses are incurred and are deducted from the full cost of the programs to arrive at the net cost of operating NSF's programs. In FY 2005, NSF implemented a change that assigned earned revenue to the related strategic area based on appropriation type rather than prorating across all investment categories. NSF applies an administrative fee for grant management services provided to other federal entities. The administrative fee is based on the ratio of prior year administrative cost to total expenses. The intragovernmental costs are as follows:

Intragovernmental and Public Costs and Earned Revenue by Investment Category

(Amounts in Thousands)	2005		
	Federal	Public	Total
Ideas			
Fundamental Science & Engineering	$ 28,167	2,298,943	
Centers	-	176,183	
Capability Enhancements	-	202,855	
Total Ideas Program Cost			2,706,148
Less: Earned Revenue			119,826
Net Ideas			2,586,322
Tools			
Large Facilities	10,399	521,512	
Infrastructure and Implementation	16,836	304,319	
Polar Tools, Facilities and Logistics	105,351	207,433	
Federally Funded R&D Centers	6,067	203,503	
Total Tools Program Cost			1,375,420
Less: Earned Revenue			324
Net Tools			1,375,096
People			
Individuals	$ 4,116	890,111	
Institutions	206	179,150	
Collaborations	130	379,359	
Total People Program Cost			1,453,072
Less: Earned Revenue			6,316
Net People			1,446,756
Total Net Costs	$ 171,272	5,363,368	5,408,174

(Amounts in Thousands)	2004		
	Federal	Public	Total
Ideas			
Fundamental Science & Engineering	$ 25,312	2,096,153	
Centers	2,400	295,169	
Capability Enhancements	1,596	219,531	
Total Ideas Program Cost			2,640,161
Less: Earned Revenue			62,110
Net Ideas			2,578,051
Tools			
Large Facilities	5,260	530,903	
Infrastructure and Implementation	15,688	264,854	
Polar Tools, Facilities and Logistics	70,276	174,956	
Federally Funded R&D Centers	4,275	208,113	
Total Tools Program Cost			1,274,325
Less: Earned Revenue			13,341
Net Tools			1,260,984
People			
Individuals	3,368	647,682	
Institutions	62	202,025	
Collaborations	2,233	426,027	
Total People Program Cost			1,281,397
Less: Earned Revenue			20,289
Net People			1,261,108
Total Net Costs	$ 130,471	5,065,413	5,100,143

Gross Cost and Earned Revenue by Budget Functional Classification

Total Gross Cost and Earned Revenue by Budget Functional Classification for FY 2005 and 2004 were as follows:

Budget Functional Classification		
NSF - General Science, Space and Technology (Code 250)		
(Amounts in Thousands)	2005	2004
Gross Cost	$ 5,534,640	$ 5,195,883
Earned Revenue	126,466	95,740
Net Cost	$ 5,408,174	$ 5,100,143

Intragovernmental Gross Cost and Earned Revenue by Budget Functional Classification
Intragovernmental Gross Cost and Earned Revenue by Budget Functional Classification for FY 2005 and 2004 were as follows:

Budget Functional Classification NSF - General Science, Space and Technology (Code 250) (Amounts in Thousands)	2005	2004
Gross Cost	$ 171,272	$ 130,471
Earned Revenue	126,466	95,740
Net Cost	$ 44,806	$ 34,731

Note 11. Budgetary Resources

Budget Authority includes $31,163,816 and $23,937,915 of donations and interest as of September 30, 2005 and 2004, respectively. Budget Authority increased as a result of non-expenditure transfers from the U.S. Agency for International Development of $9,670,000 in 2005, and $11,250,000 in 2004. Budget Authority as of September 30, 2005 and 2004 was also adjusted for Congressional initiated rescissions contained in P.L. 108-447 totaling $44,135,680 and P.L. 108-199 totaling $33,104,065, respectively.

NSF maintains permanent indefinite appropriations for Research and Related Activities - 49x0100 and Major Research Equipment - 49x0551. NSF also maintains permanent indefinite accounts for Donations - 49x8960 and H-1B Nonimmigrant Petitioner fees - 49x5176.

The status of Budgetary Resources as of September 30, 2005, consisted of Budgetary Resources obligated of $5,653,903,006 available authority of $155,530,239 and unavailable authority of $88,143,790. The status of Budgetary Resources as of September 30, 2004, consisted of Budgetary Resources obligated of $5,870,718,720 available authority of $85,230,105 and unavailable authority of $93,913,641.

Note 12. Commitments and Contingencies

Claims: Other Intragovernmental Liabilities include contractor claims for additional compensation under a contract awarded by the United States Air Force for the reconfiguration of three NSF owned LC130 aircraft was paid by the Judgment Fund for $2,999,941 and is reflected on the balance sheet. NSF plans to include a request for funds in its FY 2007 budget submission in order to reimburse the Judgment Fund.

Note 13. Statement of Financing Disclosures

Explanation of the Relationship Between Liabilities Not Covered by Budgetary Resources on the Balance Sheet and the Change in Components Requiring or Generating Resources in Future Periods.

Liabilities Not Covered by Budgetary Resources of $14,613,101 and $13,907,308 for FY 2005 and 2004, respectively, represent NSF's FECA liability to DOL and employees, leave earned but not taken, and lease liabilities. The amount reported on the Statement of Financing as Total Components of Net Cost of Operations that will Require or Generate Resources in Future Periods of $789,793 for FY 2005 and $1,058,445 for FY 2004, represents the change in NSF's expenses for unfunded liabilities for FECA, leave earned but not taken, and lease liabilities.

Note 14. Estimated Clean up Cost Liability

Environmental and Clean up Costs: The Toolik Field Station is operated by the Institute of Arctic Biology at the University of Alaska, Fairbanks. As the primary customer for the Institute, NSF projects a remaining balance of $116,395 in remediation costs for the Toolik Field Station oil spill that occurred on August 25, 2001. This figure is reflected in the Balance Sheet.

Joint planning for the clean up of Cape Hallett, the former U.S. and New Zealand station, is ongoing. At the present time it is anticipated that approximately $5,000 will be expended in FY 2006 to disassemble and pack all items planned for removal. Options for removing the remaining materials from the site in the future are the subject of ongoing discussions between the U.S. and New Zealand. No cost estimate can be made beyond FY 2006. In the interim, the site will be monitored.

NSF is continuing its actions to excess the National Scientific Balloon Facility (NSBF), renamed Columbia Scientific Balloon Facility (CSBF), land through the General Services Administration to the National Aeronautics and Space Administration (NASA) by completing a no-cost transfer. NASA engineers have reported 10 wells on the NSBF site and are aware of one contaminated well from battery disposal. NSF estimates total future outflow for clean-up costs to range between $45,500 and $228,733. This estimate is based upon the proposed NSF share of Phase II Environmental Due Diligence Audit (EDDA) of the CSBF assessment resulting from findings in the Due Diligence Audit Phase I. NSF has not evaluated these findings reported by NASA's contractor that a Phase II EDDA is necessary.

REQUIRED SUPPLEMENTARY INFORMATION

Budgetary Resources by Major Budgetary Accounts

In the following table, NSF budgetary information for the fiscal years ended September 30, 2005 and 2004, as presented in the Statement of Budgetary Resources, is disaggregated for each of NSF's major budgetary accounts.

Combining Statement of Budgetary Resources

	2005 (Amounts in Thousands)					
	Research and Related	Education	Major Research Equipment	OIG, S&E, and NSB	Special and Donated	Total
Budgetary Resources						
Budget Authority:						
Appropriations Received	$ 4,254,593	848,207	175,050	239,110	114,840	$ 5,631,800
Net Transfers	9,420	-	-	250	-	9,670
Unobligated Balances - Beginning of Period	58,948	32,768	37,124	7,564	42,740	179,144
Spending Authority from Offsetting Collections:						
Earned:						
Collected	98,848	10,618	-	5,050	1	114,517
Receivable from Federal Sources	11,847	146	-	(44)	-	11,949
Change in Unfilled Customer Orders:						
Advance Received	(2,463)	(5,777)	-	-	-	(8,240)
Without Advance from Federal Sources	(10,070)	3,692	-	-	-	(6,378)
Spending Authority Subtotal	98,162	8,679	-	5,006	1	111,848
Recoveries of Prior Year Obligations	27,517	11,192	49	1,790	2,962	43,510
Permanently Not Available	(55,103)	(18,743)	(1,400)	(3,149)	-	(78,395)
Total Budgetary Resources	$ 4,393,537	882,103	210,823	250,571	160,543	$ 5,897,577
Status of Budgetary Resources						
Obligations Incurred:						
Direct	$ 4,238,499	844,210	165,141	237,954	56,257	$ 5,542,061
Reimbursable	98,225	8,661	-	4,956	-	111,842
Total Obligations Incurred	4,336,724	852,871	165,141	242,910	56,257	5,653,903
Unobligated Balances:						
Apportioned	6,613	402	45,633	1,416	101,467	155,531
Unobligated Balances Not Available	50,200	28,830	49	6,245	2,819	88,143
Total Status of Budgetary Resources	$ 4,393,537	882,103	210,823	250,571	160,543	$ 5,897,577
Relationship of Obligations to Outlays						
Net Obligated Balance - Beginning of Period	$ 5,317,711	1,618,039	219,704	48,931	159,923	$ 7,364,308
Net Obligated Balance - End of Period						
Accounts Receivable	(33,589)	(2,071)	-	(165)	-	(35,825)
Unfilled Customer Orders from Federal Sources	(96,736)	(7,117)	-	(5)	-	(103,858)
Undelivered Orders	5,333,904	1,504,358	201,285	35,437	158,331	7,233,315
Accounts Payable	265,308	52,071	9,988	17,048	(7,536)	336,879
Total Net Obligated Balance - End of Period	$ 5,468,887	1,547,241	211,273	52,315	150,795	$ 7,430,511
Outlays						
Disbursements	$ 4,156,256	908,639	173,522	237,778	62,425	$ 5,538,620
Collections	(96,385)	(4,841)	-	(5,050)	(1)	(106,277)
Subtotal	4,059,871	903,798	173,522	232,728	62,424	5,432,343
Less: Offsetting Receipts	-	-	-	-	31,164	31,164
Net Outlays	$ 4,059,871	903,798	173,522	232,728	31,260	$ 5,401,179

Combining Statement of Budgetary Resources

	2004 (Amounts in Thousands)					
	Research and Related	Education	Major Research Equipment	OIG, S&E, and NSB	Special and Donated	Total
Budgetary Resources						
Budget Authority:						
Appropriations Received	$ 4,276,600	944,550	155,900	233,900	24,507	$ 5,635,457
Net Transfers	10,989	-	-	261	-	11,250
Unobligated Balances - Beginning of Period	82,985	41,979	66,108	4,381	102,915	298,368
Spending Authority from Offsetting Collections:						
Earned:						
Collected	74,296	10,996	-	4,955	-	90,247
Receivable from Federal Sources	4,607	1,305	-	(283)	-	5,629
Change in Unfilled Customer Orders:						
Advance Received	(10,647)	(7,875)	-	-	-	(18,522)
Without Advance from Federal Sources	33,911	66	-	(2)	-	33,975
Spending Authority Subtotal	102,167	4,492	-	4,670	-	111,329
Recoveries of Prior Year Obligations	38,864	17,285	-	2,736	2,283	61,168
Permanently Not Available	(43,707)	(20,357)	(920)	(2,725)	-	(67,709)
Total Budgetary Resources	$ 4,467,898	987,949	221,088	243,223	129,705	$ 6,049,863
Status of Budgetary Resources						
Obligations Incurred:						
Direct	$ 4,306,488	950,679	183,964	231,058	86,965	$ 5,759,154
Reimbursable	102,462	4,502	-	4,601	-	111,565
Total Obligations Incurred	4,408,950	955,181	183,964	235,659	86,965	5,870,719
Unobligated Balances:						
Apportioned	4,351	1,406	37,124	2,921	39,428	85,230
Unobligated Balances Not Available	54,597	31,362	-	4,643	3,312	93,914
Total Status of Budgetary Resources	$ 4,467,898	987,949	221,088	243,223	129,705	$ 6,049,863
Relationship of Obligations to Outlays						
Net Obligated Balance - Beginning of Period	$ 4,855,623	1,528,165	198,482	36,349	165,590	$ 6,784,209
Net Obligated Balance - End of Period						
Accounts Receivable	(21,741)	(1,925)	-	(209)	-	(23,875)
Unfilled Customer Orders from Federal Sources	(106,805)	(3,426)	-	(5)	-	(110,236)
Undelivered Orders	5,171,697	1,568,165	209,444	34,621	164,750	7,148,677
Accounts Payable	274,560	55,225	10,260	14,524	(4,827)	349,742
Total Net Obligated Balance - End of Period	$ 5,317,711	1,618,039	219,704	48,931	159,923	$ 7,364,308
Outlays						
Disbursements	$ 3,869,480	846,651	162,743	220,624	90,349	$ 5,189,847
Collections	(63,649)	(3,121)	-	(4,955)	-	(71,725)
Subtotal	3,805,831	843,530	162,743	215,669	90,349	5,118,122
Less: Offsetting Receipts	-	-	-	-	23,938	23,938
Net Outlays	$ 3,805,831	843,530	162,743	215,669	66,411	$ 5,094,184

REQUIRED SUPPLEMENTARY INFORMATION

Intragovernmental Balances and Deferred Maintenance
(Unaudited)

Intragovernmental Assets by Partner Agency (Unaudited)

Intragovernmental assets on this schedule support the intragovernmental asset line items on NSF's Balance Sheets as of September 30, 2005 and 2004. Intragovernmental balances included in Fund Balance with Treasury as of September 30, 2005 and 2004 consisted of the following:

(Amounts in Thousands)	2005	2004
Department of the Treasury	$ 7,674,185	$ 7,543,452

Intragovernmental Accounts Receivable by Partner Agency (Unaudited)

Intragovernmental Accounts Receivable balances as of September 30, 2005 and 2004 consisted of the following:

(Amounts in Thousands)	2005	2004
Central Intelligence Agency	$ 5,658	$ 5,306
Department of Agriculture	246	84
Department of Air Force	1,964	958
Department of Army	966	418
Department of Commerce	2,536	1,443
Department of Defense	6,080	4,191
Department of Education	512	433
Department of Energy	2,303	1,313
Department of Health and Human Services	5,771	4,175
Department of Homeland Security	2,060	820
Department of Housing and Urban Development	316	205
Department of Justice	38	23
Department of Labor	137	121
Department of Navy	1,061	520
Department of State	328	176
Department of the Interior	81	64
Department of Transportation	206	244
Department of Treasury	13	8
Environmental Protection Agency	141	98
Executive Office of the President	46	-
General Services Administration	114	1
Library of Congress	617	71
National Aeronautics and Space Administration	3,107	2,325
National Archives and Records Administration	1,035	245
National Foundation on the Arts and Humanities	-	8
Small Business Administration	11	2
Smithsonian Institute	1	1
Social Security Administration	157	50
U.S. Agency for International Development	3	-
U.S. Army Corp of Engineers	317	572
Total	$ 35,825	$ 23,875

Intragovernmental Advances by Partner Agency (Unaudited)

Intragovernmental Advances balances as of September 30, 2005 and 2004 consisted of the following:

(Amounts in Thousands)	2005	2004
Department of the Air Force	$ 65	$ 9,202
Department of Commerce	2,117	300
Department of the Navy	24,349	28,887
Total	$ 26,531	$ 38,389

Intragovernmental Liabilities by Partner Agency (Unaudited)
(Amounts in Thousands)

	2005			2004		
Agency	Advances From Others	Other Liabilities	Employee Benefits	Advances From Others	Other Liabilities	Employee Benefits
Central Intelligence Agency	$ 174	$ -	$ -	$ 406	$ -	$ -
Department of Agriculture	26	-	-	86	-	-
Department of Air Force	1,219	-	-	1,514	3,000	-
Department of Army	7	-	-	26	-	-
Department of Commerce	505	-	-	713	-	-
Department of Education	11,038	-	-	15,642	-	-
Department of Energy	130	-	-	495	-	-
Department of Health and Human Services	273	-	-	875	-	-
Department of Housing and Urban Development	302	-	-	718	-	-
Department of Justice	15	-	-	36	-	-
Department of Labor	154	-	281	148	-	280
Department of Navy	91	-	-	204	-	-
Department of State	79	-	-	204	-	-
Department of the Interior	1	-	-	-	-	-
Department of Transportation	263	-	-	413	-	-
Department of Treasury	-	3,000	-	11	-	-
Executive Office of the President	1	-	-	2	-	-
General Services Administration	-	-	-	1	-	-
National Aeronautics and Space Administration	410	-	-	924	-	-
Office of Personnel Management	-	671	-	-	557	-
Office of the Secretary - Defense Agencies	460	-	-	920	-	-
Social Security Administration	23	-	-	22	-	-
U.S. Army Corp of Engineers	-	-	-	51	-	-
Total	$ 15,171	$ 3,671	$ 281	$ 23,411	$ 3,557	$ 280

Deferred Maintenance (Unaudited)

NSF performs condition assessment surveys in accordance with FASAB standards for capitalized property, plant and equipment to determine if any maintenance is needed to keep an asset in an acceptable condition or restore an asset to a specific level of performance. NSF considers deferred maintenance to be any maintenance that is not performed on schedule, unless it is determined from the condition of the asset that scheduled maintenance does not have to be performed. Deferred maintenance also includes any other type of maintenance that, if not performed, would render the PP&E non-operational. Circumstances such as non-availability of parts or funding are considered reasons for deferring maintenance.

NSF considered whether any scheduled maintenance necessary to keep fixed assets of the agency in an acceptable condition was deferred at the end of fiscal years 2005 and 2004. Assets deemed to be in excellent or good condition are considered to be in acceptable condition. Assets in fair or poor condition are in unacceptable condition and the deferred maintenance required to get them to an acceptable condition are reported. NSF determines the condition of an asset in accordance with standards comparable to those used in the private industry. Due to the environment and remote location of Antarctica, all deferred maintenance on assets in fair or poor condition is considered critical in order to maintain operational status.

In FY 2004, NSF determined that scheduled maintenance on 173 items of Antarctic equipment was not completed and was deferred or delayed for a future period. The largest dollar amount of deferred maintenance for any single item approximated $15,383. The items included light and heavy mobile equipment with a few items of power distribution and shop equipment. 167 items were rated to be in fair condition and 6 were rated to be in poor condition. All of the equipment is considered critical to NSF operations and estimated to require $127,646 in maintenance.

In FY 2005, NSF determined that scheduled maintenance on 141 items of Antarctic equipment was not completed and was deferred or delayed for a future period. The largest dollar amount of deferred maintenance for any single item approximated $7,570. The items included light and heavy mobile equipment with a few items of power distribution and shop equipment. 134 items were rated to be in fair condition and 7 were rated to be in poor condition. All of the equipment is considered critical to NSF operations and estimated to require $95,238 in maintenance.

REQUIRED SUPPLEMENTARY STEWARDSHIP INFORMATION

Stewardship Investments
(Unaudited)

Stewardship Investments
Research and Human Capital

(Amounts in Thousands)
(Unaudited)

	2005	2004	2003	2002	2001
Research and Human Capital Activities					
Basic Research	$ 3,564,093	$ 3,494,302	$ 3,519,159	$ 3,092,060	$ 2,692,243
Applied Research	291,169	209,225	218,152	193,788	211,421
Education and Training	1,386,952	1,224,058	867,489	767,734	704,949
Non-Investing Activities	292,426	268,298	196,363	183,887	170,757
Total Research & Human Capital Activities	$ 5,534,640	$ 5,195,883	$ 4,801,163	$ 4,237,469	$ 3,779,370
Inputs, Outputs and/or Outcomes					
Research and Human Capital Activities					
Investments In:					
Universities	$ 3,970,851	$ 3,705,751	$ 3,310,365	$ 2,919,897	$ 2,631,405
Industry	223,563	196,260	178,000	185,062	162,176
Federal Agencies	143,316	107,212	144,792	106,458	125,823
Small Business	193,199	200,995	186,400	144,844	130,977
Federally Funded R&D Centers	1,003,711	985,665	981,606	881,208	728,989
	$ 5,534,640	$ 5,195,883	$ 4,801,163	$ 4,237,469	$ 3,779,370
Support To:					
Scientists	$ 454,053	$ 477,970	$ 427,304	$ 394,144	$ 355,261
Postdoctoral Programs	162,132	175,680	163,239	148,334	128,499
Graduate Students	538,233	546,084	475,315	402,620	362,820
	$ 1,154,418	$ 1,199,734	$ 1,065,858	$ 945,098	$ 846,580
Outputs & Outcomes:					
Number Of:					
Awards Actions	22,000	23,000	23,000	21,000	20,000
Senior Researchers	32,000	31,000	30,000	28,000	27,000
Other Professionals	12,000	15,000	12,000	11,000	10,000
Postdoctoral Associates	6,000	6,000	6,000	6,000	6,000
Graduate Students	27,000	29,000	27,000	26,000	25,000
Undergraduate Students	33,000	35,000	32,000	32,000	31,000
K-12 Students	11,000	14,000	14,000	11,000	11,000
K-12 Teachers	74,000	86,000	85,000	84,000	83,000

NSF's mission is to support basic scientific research and research fundamental to the engineering process as well as science and engineering education programs. Toward this end, NSF's Stewardship Investments fall principally into the categories of Research and Human Capital. In Research, most NSF funding is devoted to basic research, with a relatively small share going to applied research. This funding supports both the conduct of research and the necessary supporting infrastructure, including state-of-the-art instrumentation, equipment, computing resources, and multi-user facilities such as digital libraries, observatories, and research vessels and aircraft. NSF's Human Capital investments focus principally on education and training, toward a goal of creating of a diverse, internationally competitive and globally engaged

workforce of scientists, engineers and well-prepared citizens. NSF supports activities to improve formal and informal science, mathematics, engineering and technology education at all levels, as well as public science literacy projects that engage people of all ages in life-long learning. The decrease in the number of people involved in NSF activities in FY 2005 reflects decrease funding for programmatic activities related to science and engineering education.

DESCRIPTION OF NSF DIRECTORATES AND MANAGEMENT OFFICES

The **Directorate for Biological Sciences (BIO)** provides support for research to advance understanding of the underlying principles and mechanisms governing life. Research ranges from the study of the structure and dynamics of biological molecules, such as proteins and nucleic acids, through cells, organs and organisms, to studies of populations and ecosystems. It encompasses all processes that are internal to the organism as well as those that are external, and includes temporal frameworks ranging from measurements in real time through individual life spans, to the full scope of evolutionary time. BIO plays a major role in support of research resources for the biological sciences including multi-user instrumentation, living stock centers, systematics collections, biological field stations, and computerized databases, including sequence databases for plants and micro-organisms. As part of the National Plant Genome Initiative (NPGI), BIO plays a major role through support for research infrastructure to enable a broad community and for research to understand the structure, organization and function of plant genomes.

The **Directorate for Computer and Information Science and Engineering (CISE)** supports research on the foundations of computing and communications devices and their usage, research on computing and networking technologies and software, and research to increase the capabilities of humans and machines to create, discover, and reason with knowledge by advancing the ability to represent, collect, store, organize, locate, visualize, and communicate information. CISE supports a range of activities in education and workforce that complement these efforts.

The **Directorate for Education and Human Resources (EHR)** supports activities that promote excellence in U.S. science, technology, engineering, mathematics (STEM) education at all levels and in all settings (both formal and informal). The goal of these activities is to develop a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators, as well as a well-informed citizenry with access to the ideas and tools of science and engineering. Support is provided for individuals to pursue advanced study, for institutions to build their capacity to provide excellent STEM education, and for collaborations to strengthen STEM education at all levels by fostering alliances and partnerships among colleges, universities, school districts, and other institutions in the public and private sectors.

The **Directorate for Engineering (ENG)** supports research and education activities contributing to technological innovation that is vital to the nation's economic strength, security, and quality of life. ENG invests in fundamental research on engineering systems, devices, and materials, and the underpinning processes and methodologies that support them. Emerging technologies—nanotechnology, information technology and biotechnology—comprise a major focus of ENG research investments. ENG also makes critical investments in facilities, networks and people to assure diversity and quality in the nation's infrastructure for engineering education and research.

The **Directorate for Geosciences (GEO)** supports research in the atmospheric, earth and ocean sciences. Basic research in the Geosciences advances our scientific knowledge of the Earth and advances our ability to predict natural phenomena of economic and human significance, such as climate change, weather, earthquakes, fish-stock fluctuations, and disruptive events in the solar-terrestrial environment. GEO also supports the operation of national user facilities.

The **Directorate for Mathematical and Physical Sciences (MPS)** supports research and education in astronomical sciences, chemistry, materials research, mathematical sciences and physics. Major equipment and instrumentation such as telescopes and particle accelerators are

provided to support the needs of individual investigators. MPS also supports state-of-the-art facilities that enable research at the cutting edge of science and research opportunities in totally new directions.

The **Directorate for Social, Behavioral and Economic Sciences (SBE)** supports research and education to build fundamental scientific knowledge about human cognition, language, social behavior and culture, and on economic, legal, political and social systems, organizations and institutions. To improve understanding of the science and engineering enterprise, SBE also supports science resources studies that are the nation's primary source of data on the science and engineering enterprise.

The **Office of Cyberinfrastructure (OCI)** coordinates and supports the acquisition, development and provision of state-of-the-art cyberinfrastructure resources, tools and services essential to the conduct of 21st century science and engineering research and education. OCI supports cyberinfrastructure such as supercomputers, high-capacity mass-storage systems, system software suites and programming environments, scalable interactive visualization tools, productivity software libraries and tools, large-scale data repositories and digitized scientific data management systems, networks of various reach and granularity and an array of software tools and services that hide the complexities and heterogeneity of contemporary cyberinfrastructure while providing broad access and enhanced usability. OCI supports the preparation and training of current and future generations of researchers and educators to use cyberinfrastructure to further their research and education goals, while also supporting the scientific and engineering professionals who create and maintain these IT-based resources and systems and who provide essential customer services to the national science and engineering user community.

The **Office of Polar Programs (OPP)**, which includes the U.S. Polar Research Programs and U.S. Antarctic Logistical Support Activities, supports multidisciplinary research in the Arctic and Antarctic regions. These geographic frontiers—premier natural laboratories—are the areas predicted to be the first affected by global change. They are vital to understanding past, present, and future responses of Earth systems to natural and man-made changes. Polar Programs support provides unique research opportunities ranging from studies of Earth's ice and oceans to research in atmospheric sciences and astronomy.

The **Office of International Science and Engineering (OISE)** serves as the focal point, both within and outside NSF, for international science and engineering activities. OISE promotes the development of an integrated, Foundation-wide international strategy and manages international programs that are innovative, catalytic, and responsive to a broad range of NSF interests. The Office also supports programs that provide international research experiences to students and young investigators, preparing them for full participation in the global research enterprise. In addition, OISE manages on behalf of NSF cooperative relationships with partner countries around the world and scientific international organizations.

The **Office of Budget, Finance and Award Management (BFA)** is headed by the Chief Financial Officer who has responsibility for budget, financial management, grants administration and procurement operations and related policy. Budget responsibilities include the development of the Foundation's annual budget, long range planning and budget operations and control. BFA's financial, grants and other administrative management systems ensure that the Foundation's resources are well managed and that efficient, streamlined business and management practices are in place. NSF has been acknowledged as a leader in the federal

research administration community, especially in its pursuit of a paperless environment that provides more timely, efficient awards administration.

The **Office of Information and Resource Management (OIRM)** provides human capital management, information technology solutions, continuous learning opportunities, and general administrative services to the NSF community of scientists, engineers, and educators. OIRM also provides logistical support functions for NSF staff as well as the general public. It is responsible for recruiting, staffing and other human resource service requirements for all NSF staff and visiting personnel. OIRM is responsible for the management of NSF's physical infrastructure and conference facilities; the administration of its sophisticated technology infrastructure, and the dissemination of information about NSF programs to the external community through the agency's website. It is also responsible for delivery of the hardware, software and support systems necessary to manage the Foundation's grant-making process and to maintain advanced financial and accounting systems.

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[1] Replaced Joseph Bordogna in August 2005.
[2] Replaced Judith Ramaley in December 2004.
[3] Replaced John A. Brighton in August 2005.

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SCHEDULE OF PROGRAM EVALUATIONS

The following table provides information on the scheduling of meetings for Committees of Visitors (COVs) for NSF programs. The table lists the fiscal year of the most recent COV meeting for the program and the fiscal year for the next COV review of the program. The COV meetings that were held in FY 2005 are highlighted in bold.

Committee of Visitors Meetings By Directorate

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
BIOLOGICAL SCIENCES		
Biological Infrastructure	2004	2007
Research Resources (includes former Instrument-Related Activities)	2004	2007
Human Resources (includes former Training Cluster)	2004	2007
Plant Genome Research Program	2004	2007
Environmental Biology	2003	2006
Ecological Biology (Ecol. Studies held COV in 2002)	2002	2006
Ecosystem Science (Thematic Review held COV in 2001)	2001	2006
Population and Evolutionary Processes (Systematic and Population Biology held COV in 2000)	2000	2006
Systematic Biology and Biodiversity Inventories		2006
Integrative Organismal Biology(formerly Int. Biology and Neuroscience)	**2005**	2008
Behavioral Systems	**2005**	2008
Developmental Systems	**2005**	2008
Environmental and Structural Systems	**2005**	2008
Functional and Regulatory Systems	**2005**	2008
Molecular and Cellular Biosciences	**2005**	2008
Biomolecular Systems (formerly Biomolecular Structure and Function and Biomolecular Processes)	**2005**	2008
Cellular Systems (formerly Cell Biology)	**2005**	2008
Genes and Genome Systems (formerly Genetics)	**2005**	2008
Emerging Frontiers (new in 2003)	N/A	2006

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
COMPUTER AND INFORMATION SCIENCE AND ENGINEERING Please note that CISE programs and divisions were reorganized in FY 2003. COVs for IIS, ANIR, and CCR were held in FY 2003. Although reviewed in FY 2003, these Divisions have been renamed.		
Computing & Communication Foundations (CCF)	2003	2006
Emerging Models & Technologies for Computation	2003	2006
Formal & Mathematical Foundations	2003	2006
Foundations of Computing Processes & Artifacts	2003	2006
Computer & Network Systems (CNS)	2003	2006
Computer Systems	2003	2006
Computing Research Infrastructure	2003	2006
Education & Workforce	2003	2006
Network Systems	2003	2006
Information & Intelligent Systems (IIS)	2003	2006
Data, Inference & Understanding	2003	2006
Science & Engineering Informatics	2003	2006
Systems in Context		
Shared Cyberinfrastructure (SCI)	**2005**	2008

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
EDUCATION AND HUMAN RESOURCES		
Educational Systemic Reform (discontinued)		
Statewide Systemic Initiatives	2004	N/A
Urban Systemic Initiatives	2004	N/A
Rural Systemic Initiatives	2004	N/A
Office of Innovation Partnerships		
EPSCoR	**2005**	2008
Elementary, Secondary and Informal Education		
Informal Science Education	**2005**	2008
Teacher Enhancement (now Teacher Professional Continuum)	2003	2006
Instructional Materials Development	**2005**	2008
Centers for Learning and Teaching (new in 2001)	2004	2007
Undergraduate Education		
Teacher Preparation (subsumed under Teacher Professional Continuum)		
Advanced Technological Education	2003	2006
NSF Computer, Science, Engineering and Mathematics		
Scholarships (new in 2001)	2003	2006
Distinguished Teaching Scholars (new in 2002)	**2005**	2008
Scholarship for Service (new in 20011)	2004	2007
National SMETE Digital Library (new in 2001)	**2005**	2008
Course, Curriculum, and Laboratory Improvement	2003	2006
The STEM Talent Expansion Program (STEP) (new in 2002)	2006	2009
Graduate Education		
Graduate Research Fellowships	2003	2006
NATO Post doctorate Fellowships (program discontinued)	2004	N/A
IGERT (new in 1997)	**2005**	2008
GK-12 Fellows (new in 1999)	**2005**	2008
Human Resource Development		
The Louis Stokes Alliances for Minority Participation	**2005**	2008
Centers for Research Excellence in Science and Technology (CREST)	**2005**	2008
Programs for Gender Equity (PGE)	2003	2006
Programs for Persons with Disabilities (PPD)	2003	2006
Alliances for Graduate Education and the Professoriate (AGEP)	**2005**	2008
Tribal Colleges Program (TCP) (new in 2001)	2004	2007
Historically Black Colleges and Universities (HBCU)	2005	2008
Research, Evaluation & Communications		
REPP/ROLE (new in 1996)	**2005**	2008
Evaluation	2003	2006
Interagency Education Research Initiative (IERI) (new in 2001)	**2005**	2008
Other		
H-IB VISA K-12	**2005**	2008
Math and Science Partnership (MSP) (new in 2002)	**2005**	2008

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
ENGINEERING		
Bioengineering and Environmental Systems	**2005**	2008
Biochemical Engineering & Technology	**2005**	2008
Biomedical Engineering & Research to Aid Persons with Disabilities	**2005**	2008
Environmental Engineering & Technology	**2005**	2008
Civil and Mechanical Systems	2004	2007
Dynamic System Modeling, Sensing and Control	2004	2007
Geotechnical and GeoHazard Systems	2004	2007
Infrastructure and Information Systems	2004	2007
Solid Mechanics and Materials Engineering	2004	2007
Structural Systems and Engineering	2004	2007
Network for Earthquake Engineering Simulation	2004	2007
Chemical and Transport Systems	2003	2006
Chemical Reaction Processes	2003	2006
Interfacial, Transport and Separation Processes	2003	2006
Fluid and Particle Processes	2003	2006
Thermal Systems	2003	2006
Design, Manufacture and Industrial Innovation		
Engineering Decision Systems Programs (new in 2002)	2003	2006
Engineering Design	2003	2006
Manufacturing Enterprise Systems (new in 2002)	2003	2006
Service Enterprise Systems (new in 2002)	2003	2006
Operations Research	2003	2006
Manufacturing Processes and Equipment Systems	2003	2006
Materials Processing and Manufacturing	2003	2006
Manufacturing Machines and Equipment	2003	2006
Nanomanufacturing (new in 2002)	2003	2006
Small Business		
Small Business Innovation Research (SBIR)	2004	2007
Small Business Technology Transfer	2004	2007
Crosscutting		
Grant Opportunities for Academic Liaison w/ Industry	2003	2006
Innovation and Organizational Change	2003	2006
Electrical and Communications Systems		
Electronics, Photonics and Device Technologies	**2005**	2008
Control, Networks, and Computational Intelligence	**2005**	2008
Integrative Systems (new in 2002)	**2005**	2008
Engineering, Education and Centers		
Engineering Education	2004	2007
Engineering Research Centers	2004	2007
Industry/University Cooperative Research Centers	2004	2007
Partnerships for Innovation (new in 2001)	2004	2007

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
GEOSCIENCES		
Atmospheric Sciences		
Lower Atmosphere Research Section		
Atmospheric Chemistry	2004	2007
Climate Dynamics	2004	2007
Mesoscale Dynamic Meteorology	2004	2007
Large-scale Dynamic Meteorology	2004	2007
Physical Meteorology	2004	2007
Paleoclimate	2004	2007
Upper Atmosphere Research Section		
Magnetospheric Physics	**2005**	2008
Aeronomy	**2005**	2008
Upper Atmospheric Research Facilities	**2005**	2008
Solar Terrestrial Research	**2005**	2008
UCAR and Lower Atmospheric Facilities Oversight Section		
Lower Atmospheric Observing Facilities	2003	2006
UNIDATA	2003	2006
NCAR/UCAR	2003	2006
Earth Sciences		
Instrumentation and Facilities	2004	2007
Research Support		
Tectonics	**2005**	2008
Geology and Paleontology	**2005**	2008
Hydrological Sciences	**2005**	2008
Petrology and Geochemistry	**2005**	2008
Geophysics	**2005**	2008
Continental Dynamics	**2005**	2008
Ocean Sciences		
Integrative Programs Section		
Oceanographic Technical Services	**2005**	2008
Ship Operations	**2005**	2008
Oceanographic Instrumentation	**2005**	2008
Ship Acquisitions and Upgrades (new in 2002)	**2005**	2008
Shipboard Scientific Support Equipment (new in 2002)	**2005**	2008
Oceanographic Tech and Interdisciplinary Coordination	2003	2006
Ocean Science Education and Human Resources	2003	2006
Marine Geosciences Section		
Marine Geology and Geophysics	2003	2006
Ocean Drilling	2003	2006
Ocean Section		
Chemical Oceanography	2003	2006
Physical Oceanography	2003	2006
Biological Oceanography	2003	2006
Other Programs		
Global Learning and Observation to Benefit the Environment	2003	2006
Opportunities to Enhance Diversity in the Geosciences	2003	2006
Geoscience Education	2003	2006

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
MATHEMATICAL AND PHYSICAL SCIENCES		
Astronomical Sciences	**2005**	2008
Planetary Astronomy	**2005**	2008
Stellar Astronomy and Astrophysics	**2005**	2008
Galactic Astronomy	**2005**	2008
Education, Human Resources and Special Programs	**2005**	2008
Advanced Technologies and Instrumentation	**2005**	2008
Electromagnetic Spectrum Management	**2005**	2008
Extragalactic Astronomy and Cosmology	**2005**	2008
-Facilities Cluster		
Gemini Observatory	**2005**	2008
National Radio Astronomy Observatory (NRAO)	**2005**	2008
National Optical Astronomy Observatories (NOAO)	**2005**	2008
National Solar Observatory (NSO)	**2005**	2008
National Astronomy and Ionosphere Center (NAIC)	**2005**	2008
Atacama Large Millimeter Array (ALMA)	**2005**	2008
Chemistry	2004	2007
Analytical & Surface Chemistry	2004	2007
Chemistry Research Instrumentation and Facilities	2004	2007
Collaborative Research in Chemistry	2004	2007
Inorganic, Bioinorganic and Organometallic Chemistry	2004	2007
Organic & Macromolecular Chemistry	2004	2007
Physical Chemistry	2004	2007
Undergraduate Research Centers (pilot program, new in 2004)	N/A	2007
Materials Research	**2005**	2008
Base Science Cluster		
Condensed Matter Physics	**2005**	2008
Solid-State Chemistry	**2005**	2008
Polymers	**2005**	2008
Advanced Materials and Processing Cluster		
Metals	**2005**	2008
Ceramics	**2005**	2008
Electronic Materials	**2005**	2008
Materials Research and Technology Enabling Cluster		
Materials Theory	**2005**	2008
Instrumentation for Materials Research	**2005**	2008
National Facilities	**2005**	2008
Materials Research Science and Engineering Centers	**2005**	2008
Office of Special Programs (new in 2003)	N/A	2008

MATHEMATICAL AND PHYSICAL SCIENCES (continued)		
Mathematical Sciences	2004	2007
Applied Mathematics	2004	2007
Geometric Analysis, Topology and Foundations	2004	2007
Computational Mathematics	2004	2007
Infrastructure	2004	2007
Analysis	2004	2007
Algebra, Number Theory, and Combinatorics	2004	2007
Statistics and Probability	2004	2007
Mathematical Biology (new in 2004)	N/A	2007
Physics		
Atomic, Molecular, Optical and Plasma Physics	2003	2006
Elementary Particle Physics	2003	2006
Theoretical Physics	2003	2006
Particle and Nuclear Astrophysics (new in 2000)	2003	2006
Nuclear Physics	2003	2006
Biological Physics (new in 2003)	N/A	2006
Physics at the Information Frontier (new in 2003)	N/A	2006
Physics Frontier Centers (new in 2002)	N/A	2006
Education and Interdisciplinary Research (new in 2000)	2003	2006
Gravitational Physics	2003	2006
Office of MultidisciplinaryResearch	2003	2006

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES		
Science Resource Statistics (SRS)		
All programs	N/A	**2006**
Behavioral and Cognitive Sciences (BCS)		
Cultural Anthropology	2003	2006
Linguistics	2003	2006
Social Psychology	2003	2006
Physical Anthropology	2003	2006
Geography and Regional Sciences	2003	2006
Cognitive Neuroscience (new in 2001)	2003	2006
Developmental and Learning Sciences (formally Child Learning & Development)	2003	2006
Perception, Action, and Cognition (formally Human Cognition & Perception)	2003	2006
Archaeology	2003	2006
Archaeometry (formally part of Archaeology)	2003	2006
Environmental Social and Behavioral Science (new in 1999)	2003	2006
Social and Economic Sciences (SES)		
Decision, Risk, and Management Sciences	2004	2007
Political Science	2004	2007
Law and Social Science	2004	2007
Innovation and Organizational Change	2004	2007
Methodology, Measurement and Statistics	2004	2007
Science and Technology Studies	2004	2007
Societal Dimensions of Engineering, Science, and Technology	2004	2007
Economics	2004	2007
Sociology	2004	2007
ADVANCE (Cross-Directorate Program, new in FY2001/FY2002)	**2005**	2008
Science of Learning Centers (new in FY2003/FY2004)	N/A	2007
Human and Social Dynamics (new in FY2004)	N/A	2008

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
OFFICE OF INTEGRATIVE ACTIVITIES		
Major Research Instrumentation (MRI)	**2005**	2008
Science and Technology Centers (STC)	1996*	2007*
OFFICE OF INTERNATIONAL SCIENCE & ENGINEERING (OISE)	**2005**	2008
OFFICE OF POLAR PROGRAMS		
Polar Research Support	2004	2007
Antarctic Sciences	2003	2006
Antarctic Aeronomy and Astrophysics	2003	2006
Antarctic Biology and Medicine	2003	2006
Antarctic Geology and Geophysics	2003	2006
Antarctic Glaciology	2003	2006
Antarctic Ocean and Climate Systems	2003	2006
Arctic Sciences		
Arctic Research Support and Logistics	2003	2006
Arctic System Sciences	2003	2006
Arctic Natural Sciences	2003	2006
Arctic Social Sciences	2003	2006
NSF PRIORITY AREAS AND CROSSCUTTING PROGRAMS		
Nanoscale Science and Engineering Priority Area	2004	2007
Biocompexity in the Environment	2004	2007
CAREER	2001	2006*
Information Technology Research (new in 2000; no longer active)	**2005**	N/A
*External Evaluations		

TABLE OF EXTERNAL EVALUATIONS

The Table on the following pages provides information on program assessments and evaluations other than Committee of Visitor and Advisory Committee assessments.

The Table lists other types of evaluations, not used in GPRA performance assessment, that were completed in FY 2005. These reports, studies, and evaluations are frequently used in setting new priorities in a field or in documenting progress in a particular area. The reader is encouraged to review the reports for additional information on findings and recommendations that are beyond the scope of this report.

Reports (other than COV reports) produced by NSF are available online at http://www.nsf.gov/pubs/start.htm using the NSF's online document system and the publication number indicated.

Information on obtaining reports produced by the National Research Council or National Academy of Sciences can be found online by searching www.nap.edu or from the National Academy Press, 2101 Constitution Avenue, N.W., Lockbox 285, Washington, D.C. 20055 (1.800.642.6242).

Evaluations Completed in FY 2005

	Directorate for Biological Sciences (BIO)
Report of a Workshop, "Education and Recruitment into the Biological Sciences: Potential Role of Field Station and Marine Laboratories"	**Findings** A group of researchers and educators convened at the NSF, and examined the potential role of Field Stations and Marine Laboratories (FSMLs) in improving education and recruitment into the biological sciences. From the standpoint of education, important features of FSMLs include: (1) Long-term research efforts that facilitate repeated teacher, student involvement; (2) Experiential learning opportunities which are ideal for self-defined question-driven learning; (3) Well-developed organizations (Organization for Biological Field Stations, National Association of Marine Laboratories) that provide effective mechanisms for sharing successful learning and recruitment models; (4) Broad geographical distribution, with many close enough to urban/suburban areas to provide opportunities for community interaction/involvement; and (5) Access, in some cases, to areas of unusual beauty or scientific interest that can stimulate the curiosity of students and researchers. **Recommendations:** 1) Initial exposure to inquiry investigation in field biology needs to begin early and be continued in order to improve the recruitment of underrepresented minorities into ecology and other field biology disciplines. 2) To facilitate field experiences for students at community colleges, linkages between FSMLs and community college faculty and students must be improved. 3) Partnerships between FSMLs and minority serving institutions should be considered. 4) FSMLs need to develop new, innovative undergraduate courses that integrate molecular and organismal biology, and that take account of the total environment in which organisms live. This can best be done through inquiry based learning in the organisms natural environment. The Course, Curriculum and Laboratory Improvement Program at NSF is particularly suited for the development of such courses/programs. Additionally, professional development opportunities for teachers, undergraduate faculty, and administrators could facilitate the development of such courses and curricula. 5) The Research Experiences for Undergraduates Program could be diversified to include: the development of pre-REU programs that allow for increasing amount of background preparation prior to getting into a research environment; a new type of REU or IGERT-like program that combines the intense coursework characteristic of a FSML course with field research experience; and greater emphasis on the undergraduate/ graduate student interactions as a way of providing both groups with positive education opportunities. 6) Expansion of the planning grant use guidelines in the NSF FSML infrastructure and facilities program. 7) NSF should consider a competition for funding of education programs and coordination at FSMLs. As part of this, consideration could be given to establishing consortia of field stations with a shared education coordinator. 8) A detailed survey of the current education programs at all FSMLs is required. 9) Common evaluation instruments need to be developed for use at all FSMLs. The existing infrastructure of OBFS and NAML provide a means for the development and testing of such instruments. **Availability:** http://www.obfs.org/ed/

Integrative Developmental Biology Workshop Report	**Findings**: A deep understanding of development, arguably the most complex problem in all of biology, will require research programs that integrate molecular, cellular and physiological approaches. There are three challenges in building research programs that integrate genetic and physiological approaches: (1) raising awareness and interest in such integrative approaches; (2) facilitating the transfer of technology, expertise, and information among scientists belonging to traditionally separate research communities; and (3) establishing sources of financial support for research and for graduate and post-doctoral training. **Recommendations:** As a first step towards reaching these goals, recommendations include: (1) publication of review articles that articulate a vision for Integrative Developmental Biology, (2) a series of symposia at national conferences that focus attention on Integrative Developmental Biology within the disparate communities that contribute to it, and (3) creation of a "cyber community that provides a forum for exchanging ideas and should also develop a database of willing expert advisors (and potential collaborators) who can help investigators incorporate new approaches in their research program. In the longer term, it will be important to provide financial and logistic support for research and training. As Integrative Developmental Biology grows and matures as a field, it is anticipated that the disciplinary programs at NSF will likewise grow and adapt to accommodate the new opportunities for research and scholarship in this changing field. For the immediate future recommendations include: (1) Establishing a program to support post-doctoral training in interdisciplinary research by young investigators. These postdoctoral fellows can then act as bridges between more traditionally-oriented laboratories. (2) Establishing a program of mid-career sabbaticals for established investigators who want to develop a more integrative or synthetic research program and need to gain expertise with relevant methods of analysis. **Availability:** http://www.nsf.gov/pubs/reports/idbwsreport.pdf
Frontiers in Evolutionary Biology (Report of a Workshop prepared for the National Science Foundation March 2005)	**Findings:** The workshop had four specific goals: to identify emerging tools essential to evolutionary research; to identify and illustrate research themes of particular promise; to summarize major institutional resources available to support evolutionary research; and to suggest infrastructural needs and opportunities for enabling the next generation of advances in our understanding of evolution. **Recommendations:** Advances in phenotypic analysis, e.g., high-throughput, high-precision techniques for measurement of characteristics in large numbers of individuals in both the field and in controlled laboratory environments, are needed. Also, NEON, and additional genomic resources, and analytical resources (databases and computational tools). **Availability:** this report is available from the Division of Environmental Biosciences in the Directorate for Biological Sciences.

Review of the Joint National Institutes of Health / National Science Foundation Ecology of Infectious Disease Program, July 18th-20th, 2005	**Findings:** Since 1999, the Ecology of Infectious Diseases (EID) initiative has been a competitive research grant program administered jointly by NIH and NSF, with the goal of encouraging development of predictive models and discovery of principles for relationships between anthropogenic environmental change and transmission of infectious agents. In 2005, as part of its ongoing program review procedures, the Fogarty International Center (FIC) convened a panel of experts to review the achievements of the EID program to date and to make recommendations about its future. Fields of expertise represented on the panel included infectious diseases, epidemiology, public health, ecology, environmental science, and biostatistics. The panel met June 18th–20th, 2005. Interviews were conducted in-person and via telephone with EID principal investigators, EID key personnel, NSF and NIH program partners, EID program officers, and outside experts with relevant knowledge. In these interviews, the panelists explored the appropriateness of the program mission, management, partnerships, communication, and results. The Panelists also reviewed key program data including: current and former Request for Applications (RFAs) and Program Solicitations, annual progress reports, funding data, publication data, key personnel data, and other historical program documents. Overall, the panel concluded that the first five years of the EID program have been successful and productive. A total of 34 projects have been funded, and all of them have been both interdisciplinary and appropriately targeted at the development of new concepts and methods to predict and respond to emerging or re-emerging infectious diseases. In addition, at least 566 individuals from 123 institutions in 23 countries around the world have served as key personnel on the grants; more than 228 journal articles, 95 abstracts, and 11 book chapters already have been attributed to the EID program; and although it is not a training program it has considerable potential for impact with respect to capacity building, especially in the area of human capital. **Recommendations:** NIH and NSF should continue and expand the Ecology of Infectious Diseases (EID) program; the program should add a special emphasis on those infectious diseases that are serious pandemic threats; the program should foster translational research in order to develop public health interventions based on research findings; given its inherently interdisciplinary nature, the program should continue to evolve as a model for interagency cooperation; the EID program should nurture the development of a community of scientists interested in the ecology of infectious diseases. **Availability:** This report is available from the Fogarty International Center, NIH or from the Directorate for Biological Sciences.

	CISE-Division of Computer and Network Systems
Outcomes and Impacts of the National Science Foundation's Cyber Trust Program	**Findings:** The NSF-CISE Cyber Trust program was reviewed by the President's Information Technology Advisory Committee (PITAC) as part of a larger evaluation of current Federal cyber security research and development activities. The committee's findings were published in its February 2005 report to the president entitled "Cyber Security: A Crisis of Prioritization." In their report, PITAC members offered the following assessment : The Cyber Trust program is the only substantial Federal program in civilian cyber security R&D, one area of paramount importance to securing the Nation's IT infrastructure. Although the program is having positive results, it is seriously under-funded relative to the need for cyber security research for the nation. The of the committee developed its conclusions based on the following facts: • The program's FY 2004 success rate of 8% is a factor of three lower than the NSF wide average. • In peer review, at lease 25% of the proposals submitted were judged worthy of support. • In order to attain a success rate of 8%, the majority of the proposals supported had to be funded at levels significantly below those requested by PIs. **Recommendations:** A quadrupling of the Cyber Trust budget (an increase of approximately $90 million in new funding to the program) could be employed on high-quality research that would lay the foundation for critical improvements in the nation's cyber security. Because much of the fundamental work in "other" CISE areas is beneficial to cyber security, an increase in the Cyber Trust budget should not be funded at the expense of other parts of the CISE directorate. **Availability of report: PITAC**

	Directorate for Engineering
Impact on Industry of Interaction with Engineering Research Centers - Repeat Study	**Findings:** - The most frequent and important reason for firms to become associated with ERCs was access to new ideas and know-how, rated by 78 percent of representatives of member firms as "very important" or "extremely important," followed by gaining access to faculty and to ERC technology, and having prior connections or relationships with individuals at one or more ERCs. - Member firm representatives reported that their firms received a broad range of benefits from their ERC involvement. For example, 90 percent reported gaining access to ideas and know-how and 60 percent reported that the involvement led to improving or developing new products and processes. Less frequent reasons included reported licensing center-produced technology or software; access to center equipment, facilities, and/or testbeds; and the ability to leverage the firm's investment in an ERC with funding from other ERC sponsors. - Forty percent of firm representatives reported that their firm had hired center students or graduates. This was the most highly rated benefit of ERC involvement. These firm representativealso rated their ERC hires on a wide range of job performance dimensions. A large majority of ERC students or graduates hired were rated "somewhat better" or "much better" than comparable non-ERC hires at their firms. - Three quarters of firm representatives reported that the value of benefits matched or exceeded the costs; the same proportion reported that center membership had increased their firm's competitiveness. - Factors important for realizing ERC-derived benefits are numerous and include company issues (e.g., management support of the ERC and the existence of a "champion"), ERC-specific features (e.g., responsiveness of ERC faculty/researchers to company needs), and the nature of ERC-member interaction (e.g., ERC efforts to communicate with members). - Firms whose research agenda was influenced by participation in an ERC were most likely (compared to firms receiving other benefits) to report a positive benefit/cost rating and most likely to expect continued membership in the center in 2003. Product or process improvements were also associated with high benefit/cost ratings as well as with greater likelihood of renewal for 2003. - Obtaining technical advice/consulting services from center faculty, using the results of fundamental research and enabling technology research, and hiring students and graduates were all predictive of higher benefit/cost ratings. - Barriers to the realization of benefits by member firms are not serious, and they continue to relate mostly to firm policies and environments, not ERC activities.

Impact on Industry of Interaction with Engineering Research Centers - Repeat Study	**Recommendations:** - Results show the need for program flexibility to continue, allowing center directors, Industry Liaison Officers (ILOs), and other members of center management teams to adjust to different conditions, e.g., changes over time and variations in policies among ERC lead institutions and their environments. -In the next generation of centers, relationships with small businesses, especially start-ups based on ERC technology, are likely to continue to grow in importance. ILOs will need to balance (a) fostering creation of internal start-ups and nurturing them, with working effectively with non-member small firms in the region, (b) recruitment and retention of fee-paying members, and (c) encouraging lower-level firms to become full members. Flexibility in member fee and benefit structures and in the membership agreement are especially critical. **Availability:** http://www.sri.com/policy/csted/reports/sandt/documents/ERC2004REPORT.pdf

Evaluation of the Research Experiences for Teachers (RET) Program	**Findings:** - Participants were considerably more likely than K-12 teachers nationwide to have obtained an advanced degree. - Most participants were enthusiastic about their RET experiences overall: between about 70% and 75% were "very satisfied" with their experience as a whole and felt that the amount of time spent on hands-on research and curriculum development was "about right." However, participants' experience involved much more watching, listening, and developing classroom plans than on hands-on research - 84% of participants spent at least 4 weeks on site (the average was almost 6 weeks); RET was essentially a full-time experience. - Graduate students coming into the classroom and doing hands-on demonstrations." - The amount of follow-up varied substantially, and twice as many 2003 participants reported no or only a little follow-up as reported a great deal of follow-up. - Having done at least something that seemed like "real research" and having participated in a variety of project activities were most highly correlated with satisfaction with the experience's relevance to the classroom. Over 80% of respondents also reported positive effects on their students. Most common were students' increased awareness of STEM career options (56%), more positive attitudes about STEM subjects in general (53%), and greater interest in the respondents' classes (52%). **Recommendations:** -Consider ways of promoting the goal of develop long-term relationships between researchers and K-14 teachers, explicitly. -Increase participant awareness and understanding of the Program by preparing and requiring PIs to distribute a brochure outlining the Program goals and requirements. -Encourage PIs to focus on making the summer experience relevant to participants' K-14 classroom needs and to include a variety of activities, one of which must be hands-on research. -Look for ways to ensure that academic-year follow-up activities take place. -Work to ensure that adequate funds are available for materials and equipment needed to translate RET experiences for classroom instruction and learning. **Availability: Provide websites** http://www.sri.com:8000/policy/csted/reports/university

	Directorate for Education and Human Resources (EHR)
The Advanced Technological Education program is evaluated annually by external evaluation of PI-supplied survey data, and the evaluator (The Evaluation Center at Western Michigan University) issued a report of the 2004 data in November 2004. *Division of Undergraduate Education, Advanced Technological Education (ATE)*	**Scope:** With an emphasis on two-year colleges, the Advanced Technological Education (ATE) program focuses on the education of technicians for the high-technology fields that drive our nation's economy. The ATE evaluation seeks to assess the impact and effectiveness of the ATE program by addressing these four questions: To what degree is the program achieving its goals? Is it making an impact and reaching the individuals and groups intended? How effective is it when it reaches its constituents? Are there ways the program can be significantly improved? **Findings (selected)** Seventy-four percent of ATE projects were hosted by 2-year colleges. ATE projects have established large numbers of collaborative partnerships with other ATE grantees and non-ATE institutions. These partnerships provide monetary and in-kind support to the ATE projects. ATE projects are producing large quantities of materials, providing professional development opportunities for educators, developing programs across numerous locations, serving students, and providing students pathways to higher-level technological education. More than 20,000 students participated in ATE project programs during the past year. ATE projects report a total of 295 articulation agreements across 517 institutions, which served matriculation needs for 1,001 students during the reporting period. **Recommendations:** In large measure the ATE program's efforts related to projects appear to be on target. This suggests that the program should continue its current course. The suggestions below should be treated as items to explore rather than as mandates for change. 1. Encourage the ATE projects to narrow their focus of work activities. Approximately a third of the projects attempt to address all four categories of project work: materials development, professional development, program development, and articulation partnerships. That number is quite high given the program expectation that projects have a narrow focus. The lower level of success among the projects supports narrowing the focus a bit. We encourage limiting projects to three areas of emphasis at most, with clear priority given to one. Our findings suggest that strong success is usually in one area, and the added impetus may help projects plan better for success.

	2. More strongly encourage the ATE projects to conduct assessments of workforce needs. One way to do this is to include needs assessments as part of evaluation expectations for projects. Including such needs assessments certainly can be accommodated without stressing the evaluation budgets of the projects (at least not beyond recommended NSF bounds). These assessments likely will strengthen the projects and the program as a whole, since timely knowledge of the local, regional, and national workforce needs will guide and inform project efforts across all program-related activity areas (e.g., materials development, program improvement). 3. Encourage studies of recruitment and retention of female and minority students. In this and previous reports we have consistently noted the difficulties in meeting the challenges of gender and ethnicity recruitment. This continues to be an area of program underachievement. We are not sure what additional steps should be taken. We encourage study (research) of this problem. Perhaps this is an area where collaborative relationships, an area of program strength, can be employed in conjunction with this focus to improve results. **Availability:** http://www.wmich.edu/evalctr/ate

ADDITIONAL FINANCIAL REPORTING INFORMATION

IMPROPER PAYMENTS INFORMATION ACT REPORTING DETAILS

I. Describe your agency's risk assessment(s), performed subsequent to compiling your full program inventory. List the risk-susceptible programs (i.e., programs that have a significant risk of improper payments based on OMB guidance thresholds) identified through your risk assessments. Be sure to include the programs previously identified in the former Section 57 of OMB Circular A-11.

Former Section 57 of OMB Circular No. A-11 listed NSF's "Research and Education Grants and Cooperative Agreements" as a risk-susceptible program. NSF defined this "program" as all grants and cooperative agreements within our Research and Related Activities (R&RA) and Education and Human Resources (EHR) appropriations, which are comprised primarily of grants and cooperative agreements (NSF's IPIA program). NSF came to this determination after conducting an analysis of outlays; the R&RA and EHR appropriations were the only ones that met the IPIA reporting threshold of payments over $10 million and 2.5% of outlays. NSF conducts this risk assessment annually but we do not anticipate a change in the results unless the agency were to receive a significant change in funding. The risk assessment conducted in January 2005 indicated that the grants and cooperative agreements within our R&RA and EHR appropriations which constitute our risk-susceptible program accounted for 91% of the agency's total outlays -- $4.649 billion out of $5.118 billion.

II. Describe the statistical sampling process conducted to estimate the improper payment rate for each program identified.

NSF contracted with McBride, Lock, and Associates, Certified Public Accountants, to conduct a statistical review of our FCTR transactions received from grant recipients funded from the two appropriations (R&RA and EHR) that are included in our risk-susceptible program. Management Analysis, Incorporated (MAI) conducted the statistical sample determination under a subcontract agreement with McBride, Lock, and Associates. NSF staff in the Division of Financial Management and Division of Institution and Award Support worked closely with the contractors as they proceeded with this large IPIA effort. NSF staff made a concerted effort to ensure the project was successful and completed on time.

The large number of FCTR transactions received each year necessitated a statistical sampling be applied to determine the degree of "improper use" in payments to grant recipients. The sampling was conducted in accordance with OMB guidance. MAI selected the FCTR transaction to be reviewed and McBride, Lock, and Associates conducted the actual reviews. This team arrangement ensured a distinctly unbiased sampling approach.

The sampling team of McBride, Lock and Associates along with MAI considered all FCTR transactions from the quarter ending December 31, 2003, through the quarter ending September 30, 2004, as the statistical population for review. The total statistical population (universe) includes all the quarterly transactions of NSF's IPIA program.

> **Sample Size Determination***:* Sample size was determined in accordance with the Implementation Guidance for Improper Payments Information Act of 2002, PL 107-300,

and specifically in the cited reference (Sampling of Populations: Methods and Applications, Levy and Lemeshow, 1999). The number of FCTR awards to be reviewed was calculated as:

$$n \geq (2.706*(1-P)) / ((.025/P)^2 * P)$$

In the formula "n" is the minimum sample size and "P" is the estimated percentage of erroneous payments. This equation is based on a 90% confidence interval of plus or minus 2.5% (or 0.025) around the estimate of the percentage of erroneous payments. The total awards, with each of their quarterly submissions, are included in the universe for the sample determination. The minimum number of samples to be reviewed was determined by applying the above formula to the standards in the table below:

Sample Type	Total Universe Represented	% from calculation	Minimum Sample to be Reviewed
Improper Payments	151,488	0.08317%	126
Dollar Value Represented	$4,215,714,913	0.08317%	$3,506,210

The information in the "Total Universe Represented" represents FY 2004 outlays and FCTR's in determining the 2005 NSF IPIA program results. The sample sizes determined by the above formula were also evaluated by MAI using other recognized equations and tables and found to be reasonable. However, it was recognized that the number of samples evaluated and fully reviewed must meet the minimum sample size, not just the samples pulled. As such, additional samples were pulled to ensure that the final amount was sufficient.

Actual Sample Determination: Samples selected for review were selected by an algorithm developed by MAI that used random number generation to select the grant award identification number. The quarter to be evaluated was also randomly selected. During the initial reviews of the data, it was determined that the data included significant zero entries for quarterly periods that were preceding the grant award effective date. There are a total of 12,522 zero entries or 8.3% of the total FCTR transactions. Under the NSF General Grant Terms and Conditions, grant recipients can incur pre-award costs up to 90 days prior to the effective date of the award at their own risk. Therefore, NSF determined that transaction amounts other than zero with dates prior to the award effective date were valid transactions.

However, for sampling purposes NSF determined that zero entries for dates prior to the effective date of the awards represented invalid zero transaction amounts because incurring pre-award costs is an option for the grant recipients. This makes a zero amount for pre-award periods the standard for the vast majority of NSF grants. These zero entries were not used in the final sample for review. NSF determined that zero entries for quarterly periods during the performance period of the award were valid entries and were included in the final sample. Additional zero entries present in quarters that follow final payments of closed out awards were also not included in the final sample. OMB was consulted on NSF's approach for handling zero entries. All samples identified as not to be sampled were confirmed by NSF.

It was anticipated that some grantees would not respond in a timely manner in order for the review to be completed within the timeline specified. Therefore, the initial sample randomly selected was larger than the minimums, to ensure that zero payment samples and non-responses would not result in a sample less than the minimum required to ensure a statistically valid sampling for the record. The samples were also kept in the random priority order to ensure validity of the total sample when samples were zero or non-responsive. NSF did not encounter any grantees that could not respond in this year's sample.

The list of grantees selected for review was transmitted to McBride, Lock, and Associates for communication to the grantees informing them of NSF's intent to review their specific FCTR transaction. Based on data that McBride, Lock and Associates received from grantees, a listing of sampled FCTRs with their respective number of subtasks was transmitted to MAI. From this FCTR list, MAI randomly selected the subtask to be reviewed in detail. Each group of samples was validated by an MAI method to ensure they were truly random. The sub-transaction number identification was then sent to McBride, Lock and Associates for the detailed audit of the respective sub-transaction.

Letters Requesting FCTR Transaction Lists: Letters were prepared for each grantee informing them of their selection for review. The letters were coordinated with NSF prior to sending and also electronically transmitted to grantees to expedite the process. The letter requested the grantee provide a list of the individual transactions for the award selected for review that were included in the expenditure amount that was submitted on the FCTR for the quarter.

FCTR Transaction List Processing*:* Upon receipt of the transaction lists from each grantee, the information was documented for accountability, reconciled with the FCTR, and NSF was apprised of the status of receipts. The transaction lists were processed by MAI into an MS Excel format for sample determination. Using the MS Excel random sampling function, one sample from each selected FCTR quarterly transaction list was selected. The identified grantee, associated FCTR quarterly transaction list, and one specific transaction representing the respective FCTR quarterly report was then transmitted to McBride, Lock and Associates for review.

The non-timely response of grant holders was documented and forwarded to NSF. All grantees selected for sampling were advised in the request letter that failure to provide the requested information by the due date without reasonable explanation could result in the suspension of the award(s) until such time that the information was submitted. As stated earlier, additional samples were pulled to account for non-responses, however, none of the additional samples were needed. NSF communication with grantees facilitated all samples to be received. Substitutions were only to be allowed for grantees who could not respond due to hardship or circumstances beyond their control (e.g. Hurricane Katrina, etc). Once sufficient returns to meet the sample requirement were met, the remaining returns were eliminated to reduce the inconvenience to grant holders.

Selected Transaction Supporting Documentation: Letters and electronic communication were sent to each grantee with instructions to provide supporting documentation for the specific transaction selected from their FCTR transaction list. The information received was then reviewed in accordance with applicable cost principles.

Reviews included, but were not limited to the following:

- Did the cost represent expressly unallowable cost as cited in the Cost Principles, Grant Policy Manual, and award terms and conditions?
- Was this a duplicative payment?
- Were the services or products provided?
- Were the costs incurred during the period of performance?
- Did the payment agree with the terms of sub-award agreement?
- Was there adequate documentation?

III. Describe the Corrective Action Plans for:

A. Reducing the estimated rate of improper payments. Include in this discussion what is seen as the cause(s) of errors and the corresponding steps necessary to prevent future occurrences. If efforts are already underway, and/or have been going on for some length of time, it is appropriate to include that information in this section.

NSF's results were well below the $10 million IPIA Act threshold requirement for a reduction plan and associated corrective action plan reporting. The IPIA initiative for NSF did not focus on whether we correctly pay the correct grantee. NSF's electronic process for cash draws and FCTR payments is highly automated and accurate. Our grant payment process in paying eligible recipients has been near perfect—99.9%—for many years and is one of the most accurate in government. Therefore, NSF's IPIA initiative focuses on the awardees' proper use of taxpayer funds. NSF's statistically favorable results in Section 1V demonstrate the effectiveness of the Foundation's end-to-end award management process.

As the lead research grant-making agency participating in the IPIA initiative, NSF encountered challenges in developing an appropriate plan for sampling FCTRs. This year, NSF overcame the challenges and implemented a successful IPIA assessment program for grantees. The combination of contractor and internal resources provided a knowledgeable team. NSF will continue its successful IPIA program in the future and will discuss results and our inclusion in future reporting requirements with OMB.

B. Grant-making agencies with risk susceptible grant programs, discuss what your agency has accomplished in the area of funds stewardship past the primary recipient. Include the status on projects and results of any reviews.

NSF's integrated systems and policies provide assurance that assistance awards are made to the proper recipient. NSF awards and responsibility for those funds are provided to the primary grant recipient. The terms and conditions of awards state that the awardee has full responsibility for the conduct of the project or activity supported and for adherence to award conditions, and, that by acceptance of the award, the awardee agrees to comply with applicable federal requirements for grants and cooperative agreements and to the prudent management of all expenditures and actions affecting the award. It is important to note that NSF has an integrated award administration enterprise that builds-in risk mitigation from the pre-award stage and throughout post-award administration. As such, NSF fulfills its fiduciary and programmatic responsibilities throughout the award administration lifecycle or continuum.

Federal post-award financial and administrative responsibilities are shared. NSF has responsibility for business assistance and monitoring, and the NSF/OIG has responsibility for the conduct of audits. These federal responsibilities are supplemented at the awardee-level. Specifically, awardees must have adequate administrative systems in place as a predicate for the receipt of federal funding, and the A-133 audit process serves to enhance and complement federal oversight of awardee compliance. This shared responsibility for oversight is robust, multilevel and comprehensive. Our IPIA program and the low error rate results that have been demonstrated provide further proof that this shared, multilevel approach is successful.

IV.

Improper Payment Reduction Outlook FY 2004 - FY 2007

($ in Millions)

Program	2004			2005			2006	2007
R&RA	Outlays	IP%	IP$	Outlays	IP%	IP$	IP%	IP%
& EHR	$4,742	0.093%	$4.4	$4,215	0.0248%	$1.05	< 0.1%	< 0.1%

NSF's IPIA program outlay and improper payment rates and dollars are an assessment of prior year activity. The 2005 outlays and improper payment rates reported represent FY 2004 outlays and FCTR transactions reviewed (quarter ending December 31, 2003 through the quarter ending September 30, 2004). NSF assesses its activity in this manner in relation to timing of receipt of our FCTRs, allowing time for extensive review, and relating them to a fiscal year of outlays.

NSF's change in methodology from 2004 to 2005 impacted the comparability of the results. In 2004, NSF's assessment for our IPIA program was directed to awards already identified as high-risk through our pre-existing Award Monitoring and Business Assistance Program. The extrapolation of the results of our high-risk awards to our IPIA program led to higher results and statistical issues. In 2005, NSF revamped our IPIA plan and implemented a process to ensure statistically valid improper payment testing across NSF's IPIA program.

NSF contracted with McBride, Lock and Associates and they reviewed each of the individual sub-transactions representing the FCTR. The results of their review were presented to MAI for analysis against the initial requirements. The improper payment rate percentage described above is the calculated erroneous payment rate based on the sample size determination discussed in the sampling plan. The extrapolated values listed above therefore have a standard deviation of plus or minus 2.5% and an associated confidence level of 90%. The results indicate that the occurrence of improper payments is well below the significant standard for improper payments defined as a total of improper payments exceeding $10 million and 2.5% of the total outlays (as outlined by the Improper Payments Information Act of 2002 and OMB Guidance). These statistically favorable results demonstrate the effectiveness of NSF's end-to-end award management process.

V. Discuss your agency's Recovery Auditing effort, if applicable, include any contract types excluded from review and the justifications for doing so; actions taken to recoup improper payments, and the business process changes and internal controls instituted and/or strengthened to prevent further occurrences.

Not applicable for NSF's program of Research and Education Grants and Cooperative agreements.

VI. Describe the steps the agency has taken and plans to take (including time line) to ensure that agency managers (including the agency head) are held accountable for reducing and recovering improper payments.

NSF's grant monitoring framework for assessing and managing awardee risks and assets is based on a planned, dynamic multi-level risk minimization strategy with levels. Our IPIA program is an important part of our baseline level. It is within this overall context that NSF incorporates risk assessment as a management tool to ensure a balanced cost-benefit approach that frames its multi-level strategy. It is a proactive approach that requires a working relationship with both the program staff and the awardee community and helps to ensure that the public funds that are received are properly managed and accounted for.

VII.A. Describe whether the agency has the information systems and other infrastructure it needs to reduce improper payments to the levels the agency has targeted.

NSF is currently using its existing end-to-end award information systems and infrastructure. NSF will evaluate future grant and core financial needs consistent with its e-Government Implementation Plan.

VII. B. If the agency does not have such systems and infrastructure, describe the resources the agency requested in its FY 2006 budget submission to Congress to obtain the necessary information systems and infrastructure.

Continuation of contractor support for this initiative will be dependent upon NSF's future Salaries and Expenses appropriation level.

VIII. Describe any statutory or regulatory barriers that may limit the agencies' corrective actions in reducing improper payments and actions taken by the agency to mitigate the barriers' effects.

None currently identified.

IX. Additional comments, if any, on overall agency efforts, specific programs, best practices, or common challenges identified, as a result of IPIA implementation.

None.

OTHER FINANCIAL REPORTING INFORMATION

Debt Collection Improvement Act of 1996

Net Accounts Receivable totaled $35,921,764 at September 30, 2005. Of that amount, $35,824,733 is due from other federal agencies. The remaining $97,031 is due from the public. NSF fully participates in the Department of the Treasury Cross-Servicing Program. In accordance with the Debt Collection Improvement Act, this program allows NSF to refer debts that are delinquent more than 180 days to the Department of the Treasury for appropriate action to collect those accounts. In FY 2004 OMB issued M-04-10 Memorandum on Debt Collection Improvement Act Requirements which reminded agencies of their responsibility to comply with the policies for writing-off and closing-out debt. Based on this memo, NSF has now incorporated the policy of writing-off delinquent debt more than two years old. Additionally, NSF seeks Department of Justice concurrence for action on items over $100,000.

Civil Monetary Penalty Act

There were no Civil Monetary Penalties assessed by NSF during the relevant financial statement reporting period.

Prompt Payment Act

NSF continues to strive for the highest levels of electronic fund transfers (EFT) payments required by the Prompt Payment Act. Payroll, vendor and grantee payment transactions are made by EFT. Only payments made to foreign banks are made by paper check. Our FastLane system utilized for grants enables grantees to draw cash as required for execution of the grant. Interest payments for commercial vendors under the Prompt Payment Act in FY 2005 are $22,247.67.

Cash Management Improvement Act (CMIA)

In FY 2005, NSF had no awards covered under CMIA Treasury-State Agreements. NSF's FastLane system with grantee draws of cash make the timeliness of payments issue under the Act essentially not applicable to the agency. No interest payments were made in FY 2005.

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
ARLINGTON, VIRGINIA 22230

OFFICE OF
INSPECTOR GENERAL

October 14, 2005

MEMORANDUM

To: Dr. Warren Washington
Chair, National Science Board

Dr. Arden Bement
Director, National Science Foundation

From: Dr. Christine C. Boesz
Inspector General, National Science Foundation

Subject: Management Challenges for NSF in FY 2006

In accordance with the Reports Consolidation Act of 2000, I am submitting our annual statement summarizing what the Office of Inspector General (OIG) considers to be the most serious management and performance challenges facing the National Science Foundation (NSF). We have compiled this list based on our audit and investigative work, general knowledge of the agency's operations, and the evaluative reports of others, such as GAO and NSF's various advisory committees, contractors, and staff.

This year's management challenges are organized under seven broad issue areas: award administration; human capital; budget, cost and performance integration; information technology; procurement; U.S. Antarctic Program; and merit review. Ten challenges remain from last year's list, most of which reflect areas of fundamental program risk that are likely to require management's attention for years to come. We are pleased to note that NSF has made significant progress this past year on several longstanding challenges.

Five new management challenges appear this year: project reporting, contract monitoring, environmental liabilities in the Antarctic, unfunded proposals, and promoting integrity. One challenge pertaining to the management of the Math and Science Partnership has been removed from this year's list, as the agency has successfully managed the program through its critical early stages and has implemented recommendations OIG made in its July 2004 audit report.

If you have any questions or need additional information, please call me at 703-292-7100.

Award Administration

Post-award administration policies. During the past year, NSF has made progress toward strengthening its post-award monitoring of grantee institutions, but has not yet established an effective program for monitoring high-risk institutions. The agency has improved its documentation procedures, and expanded its monitoring program to cover low and medium risk grantees, in addition to those that are considered high-risk. It has also developed standard operating guidance for monitoring all grants and cooperative agreements, and two components of advanced post-award monitoring: the Award Monitoring and Business Assistance Program (AMBAP) which guides the reviews of awardees with high-risk grants; and Total Business System Reviews (TBSR) that apply to Federally Funded Research and Development Centers (FFRDCs) and large facilities.

However, NSF's program does not ensure that all high-risk institutions are adequately monitored. Although NSF identified 167 institutions that are high-risk, it conducted only 25 site visits during the past year. While some of the remaining 142 institutions are in the last year of their NSF award period and may not warrant a site visit, most will receive additional awards, and a number of them have recently had audits that identify grant management problems. The agency has not specified how or whether it intends to monitor high-risk institutions that are not visited. NSF has performed 60 evaluations of high-risk awards under AMBAP over the past two years, and plans to conduct TSBRs of each of NSF's four FFRDCs over a 4-year cycle. Since both types of advanced post-award monitoring rely on on-site evaluations for which the availability of travel funds has been problematic in the past, the effectiveness of the new policies is still being assessed.

Management of large infrastructure projects. NSF's management of large science infrastructure projects has been listed as a management challenge since two OIG audits conducted several years ago found weaknesses in their financial management.[1] In response to audit recommendations to enhance organizational accountability, provide better financial guidance, and capture more information about project costs, NSF established a Large Facility Projects Office (LFPO) and hired a Deputy Director to coordinate its activities. Last December, OIG assessed the progress made by LFPO in developing and implementing its project management guidelines and central cost-tracking system.[2] We found that progress toward issuing the guidance and providing oversight of current large facility projects has been slow, constrained by workload and staffing issues. The assessment found that LFPO had only two permanent staff.

These findings were similar to those that appeared in separate reviews by two other groups. A report by the National Academies last year concluded that the LFPO "needs adequate and experienced project construction and management staff, access to qualified consultants and contractors, and the institutional authority to oversee the design engineering, construction, and operation phases adequately."[3] In May 2005, NSF's

[1] Audit of the Financial Management of the Gemini Project, December 15, 2000, OIG 01-2001
Audit of Funding for Major Research Equipment and Facilities, May 1, 2002, OIG 02-2007
[2] Survey of Large Facility Projects Management and Oversight Division, December 29, 2004, OIG 05-6002
[3] Setting Priorities for Large Research Projects Supported by the National Science Foundation, p.31.

Advisory Committee for Business and Operations (AC/B&O) reviewed NSF's progress and said: "the implementation of adequate project management methods for MREFC projects during the Development Stage seriously lags the National Academies Report recommendations as well as NSF policy guidance."[4] The Committee also criticized NSF's "under-investment" in engineering, cost-estimating, and project management support during the development stage when baseline project definitions are being formulated. The agency has stated that testing of the cost-tracking system will be completed during the first quarter of FY 2006.

Cost-sharing. While federal guidelines require that cost-shared expenses be accounted for in a manner consistent with federal expenditures, our audit work has revealed that in practice many awardees do not adequately document or substantiate the value of cost-shared expenditures, raising questions about whether required contributions are actually being made. Concerned that NSF's policy allowing cost-sharing gave an unfair advantage to wealthier institutions in competing for awards, the National Science Board voted in October 2004 to eliminate program-specific, cost-sharing requirements and maintain only the statutory cost-sharing of one percent. As a result, the amount of new cost-sharing commitments declined in FY 2005 and this trend is likely to continue.

However, remaining commitments entered into before the new policy was implemented still represent a significant amount, and recent investigations and audit reports indicate that cost-sharing problems have not declined despite NSF's efforts to provide greater oversight in its risk assessment protocol and site reviews. Cost-sharing was an issue in two recent high-profile investigations of institutions. Also, in our March 2005 Semiannual Report to Congress, we reported on audits of awards that included approximately $14 million in promised cost-sharing. Shortfalls of $6.8 million were reported for these awards. Since the awards were contingent on the contributions of the awardees, and the new policy was not implemented retroactively, NSF should continue to be vigilant in ensuring that awardees live up to their commitments. To treat these awards otherwise would require NSF to finance a significant additional cost, and/or risk not completing or reducing the original scope of the research project.

Promoting integrity. The research community is again debating whether integrity in research is eroding as science enters the 21st century. A recent survey[5] found that one-third of NIH-supported researchers surveyed acknowledge engaging in activities that are best described as questionable research practices. The authors concluded that the "range of questionable practices . . . are striking in their breadth and prevalence." We have observed the types of practices these scientists admitted to during our investigations and concluded they are not unique to NIH-supported researchers. They can reasonably be expected to be practiced by scientists supported by other federal agencies. Separate from the more serious behaviors defined as research misconduct (falsification, fabrication, and plagiarism) these questionable practices damage the integrity of science and erode the

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[4] Letter dated May 25, 2005 to Anthony Arnolie and Thomas Cooley from the Committee for Business and Operations.

[5] Martinson, B.C.; Anderson, M.S. and R. de Vries; Scientists behaving badly; *Nature:* Vol. 435 pp. 737-738, 9 June 2005.

trust one scientist places in another, which can in turn undermine the reliance NSF's merit review system places in the quality of the proposals it receives.

HHS, through its Office of Research Integrity, has embarked on an effort to require institutions to instruct HHS-supported personnel (students, faculty, support staff) in key elements of its Responsible Conduct of Research program to formalize and standardize training and create baseline expectations and rules for integrity throughout the enterprise. Similarly, we discuss these elements in our outreach to the research and education community as part of our mission to prevent and detect fraud and abuse. However, unlike, HHS, NSF has no parallel, standardized effort to reinforce its expectations for high scholarship and integrity throughout its proposal and award systems.

From our perspective, the opportunities to commit research misconduct and the pressures to do so are certainly increasing. The survey authors found "significant associations between scientific misbehavior and perceptions of inequities in the resource distribution processes in science." Such perceptions have significant potential for harm to the research enterprise, and thus present a management challenge to NSF to seek new opportunities and means to ensure integrity within the research community and within the pipeline of students NSF is charged with educating.

Human Capital

Workforce planning. Strategic workforce planning refers to a process of determining the appropriate number of employees and competencies needed to carry out the agency's strategic goals. NSF's growing workload has kept workforce planning a formidable management challenge. In FY 2004, the number of proposals NSF received increased to 43,851, up 49 percent since FY 2000. However during this time period the number of program officers, who determine which proposals are funded, actually *declined* from 396 to 385. As a result, the average number of proposals each program officer handles per year has increased from 74 to 113, during a time when proposals are becoming more complex and reflect a more multidisciplinary orientation.

In 2002, NSF contracted for a multi-year, multi-million dollar *Business Analysis*, to review NSF's management of human capital, business processes, and use of technology. An important part of the project was the development of a Human Capital Management Plan to enable NSF to make informed and timely decisions about the type, number and required competencies of NSF positions. During the past year, the human capital project managers have focused on streamlining and refining the agency's core competencies and redesigning administrative jobs. Although the *Business Analysis* was scheduled for completion at the end of FY 2005, the agency was not able to fully fund it during some years and has extended the completion date.

Three years into the *Business Analysis* project NSF has still not achieved its goal of establishing a strategic workforce planning process. This past year, the agency decided to pursue workforce planning on a separate track from the *Business Analysis* with the assistance of another contractor. NSF is hopeful that it can implement the new process

during the next year. However, in the short term, workforce plans will continue to be based on the best estimates of NSF's senior managers, as it has in past years. As indicated by the growing disparity between the science and engineering workforce and the proposal workload, the need for informed and effective workforce planning grows increasingly urgent.

NSF's non-permanent workforce. NSF's workforce includes a significant number of non-permanent or visiting personnel on loan from their home institutions or agencies. In FY 2004, 50 percent of NSF's program officers were non-permanent employees commonly referred to as *rotators*. The rotators make a valuable contribution to NSF by providing the directorates current knowledge of their disciplines and a different perspective formed by their recent experiences as researchers. They enable NSF to achieve its goal of investing in the best science.

However, the employment of rotators poses an administrative challenge that requires careful planning and management. More frequent recruiting, hiring, and training are required for their support and replenishment. In addition, rotating staff serving in more senior levels lack needed institutional knowledge and are less likely to make long-term planning a priority. It is important that the agency recognize the areas in which rotators need additional management support and provide it. Also, in July 2004, OIG conducted an audit of the costs associated with visiting personnel and made three recommendations for resolving issues related to their employment and compensation. While NSF concurred with each recommendation, corrective actions are not yet complete.

Administrative infrastructure. The size and effectiveness of NSF's workforce are limited in some ways by the agency's administrative infrastructure. Internal control reviews performed by the agency in response to the Federal Managers' Financial Integrity Act (FMFIA) continue to indicate that key administrative needs of agency managers are not being met. This year many of the comments made by managers cite a lack of adequate support in the area of human resource management. As it takes longer for hiring actions to be processed, there is a growing perception within the agency that the personnel area is not adequately staffed to provide needed support. Many managers also reported problems in using *e-recruit* and *Quick Hire*, two systems that are intended to simplify and streamline the hiring process.

As in the past, many of the managers' internal control certifications emphasized a particular need for more office space and travel funds. One Assistant Director stated "space remains a critical issue, impeding recruitment of high quality staff and limiting the ability to store sensitive documents." Another said that resources to "support travel to monitor on-site performance remain inadequate in an environment that places increasing emphasis on program impact, project yield, and the monitoring of fraud, waste and abuse." These shortages impede the ability of staff to do its job.

Budget, Cost, and Performance Integration

GPRA reporting. For an agency engaged in funding basic research, implementing the Government Performance and Results Act (GPRA) is intrinsically challenging because the knowledge acquired through its funding may not lead to practical application for many years, if at all. In 1999, the National Academies Committee on Science, Engineering, and Public Policy indicated in a report that federal research programs could best be evaluated by a process of expert review that uses three criteria: quality, relevance, and leadership.[6] NSF has long consulted with external experts through its independent advisory committees and committee of visitors programs that periodically evaluate each part of the organization on its performance against operational and strategic goals. More recently it has integrated these practices with GPRA and Program Assessment Rating Tool, a method of program evaluation developed by the Office of Management and Budget (OMB). The agency is to be commended for the effort it has invested in continually improving its GPRA program, one that is in many respects a model for the federal community.

The Advisory Committee on GPRA, which assesses NSF's performance on its strategic objectives, found that the agency demonstrated significant accomplishment on 15 of its 16 strategic goals related to People, Ideas, and Tools. It worked with the Advisory Committee for Business and Operations to evaluate NSF's remaining strategic goals related to Organizational Excellence and decided that the agency had significantly accomplished these strategic goals as well. However the committee suggested NSF could improve its GPRA reporting process if it did a better job of demonstrating the relevance of its accomplishments to its outcome goals. It stated, "In the absence of more contextual information, we are often left wondering how strong the linkage is between the accomplishments and the outcome goals."[7] NSF should respond to this recommendation by better demonstrating the relevance of its accomplishments to its objectives.

Cost information. NSF does not track the cost of its internal business processes or utilize to best advantage measures to assess the efficiency and cost-effectiveness of these business processes. The agency has worked with OMB during the past two years to enable its cost accounting system to track the cost of its strategic goals as well as its 10 investment categories that are subject to OMB evaluation. This information is important in evaluating program results. However the agency does not know how much it costs to perform a routine activity such as reviewing a proposal or administering a grant. Such basic information is equally important in managing NSF's operations.

As NSF staff struggle to keep up with a growing workload, the issue for the agency is not whether it is working hard, but whether it is working efficiently. Information about the cost-effectiveness and efficiency of its workforce and work processes is critical to finding solutions. As an example, the agency employs several different methods of merit review,

[6] Evaluating Federal Research Programs: Research and the Government Performance and Results Act
[7] Report of the Advisory Committee for GPRA Performance Assessment, July 25, 2005; p.57

which may vary in terms of cost and effectiveness. A cost/benefit analysis of each method could provide valuable information about how best to handle the work.

Improving the efficiency of government agencies has been an important priority of present and past administrations. NSF states that its historic overhead rate of 5-6 percent indicates that it is operating efficiently, and that it is more important for managers to focus on results than costs to ensure quality. We believe that both costs and results are important and that management should reconsider its use of measures for efficiency and cost effectiveness as a means to set funding priorities and maximize its limited resources.

Project reporting. A recent OIG audit uncovered weaknesses in NSF's collection of project reports, which captures information on the progress and results of awards. Project reports not only provide NSF with important scientific information, but also enhance accountability for federal funds by serving as a permanent record of what was purchased with taxpayers' money. Auditors found that over a five-year period approximately 47 percent of the 151,000 final and annual reports required by the terms and conditions of NSF's awards and cooperative agreements were submitted late or not at all. Of 43,000 *final* project reports, 8 percent were never submitted and 53 percent were submitted an average of 5 months late. Moreover, although NSF has a policy of not making new awards to Principal Investigators (PIs) who have not submitted final project reports, there were 74 instances (13%) in which delinquent PIs inappropriately received new funding. NSF agreed with the report's recommendations and is taking corrective action.

Information Technology

Information security. A strong and effective information security program is crucial to the success of virtually all of NSF's activities and operations. As GAO recently stated: "Federal agencies rely extensively on computerized information systems and electronic data to carry out their missions. The security of these systems and data is essential to prevent data tampering, disruptions in critical operations, fraud, and inappropriate disclosure of sensitive information."[8] As we have reported over the past several years, NSF has made good progress in strengthening its information security program.

However, the constantly changing nature of security risks and threats makes IT security an ongoing challenge. An effective IT security program should above all be adaptable to the changing environment. Recognizing the pervasive nature of information security problems within federal agencies, Congress passed the Federal Information Security Management Act (FISMA) in 2002. FISMA requires agencies to develop, document, and implement an agency-wide information security program to provide security for the information and information systems that support the operations and assets of the agency, including those provided or managed by another agency, contractor, or other source.

FISMA requires inspectors general to conduct annual evaluations of their agency's information security program. In our 2005 FISMA Independent Evaluation Report, we noted that NSF has continued to strengthen its security program but needed to make

[8] GAO Report 05-552

improvements in the areas of personnel background investigations, the U.S. Antarctic Program information security program, access controls, security plans, risk assessments, disaster recovery testing, change controls, and incident response procedures. An ever changing information security environment requires all federal agencies to maintain a strong, effective, and vigilant security program.

Procurement

Contract monitoring. NSF's FY 2004 financial statement audit identified a reportable condition[9] that the agency does not adequately review public vouchers submitted by contractors who receive advance payments. Without a proper review, over $150 million of NSF's annual contract expenditures may be subject to error or impropriety. NSF limits its review of vouchers to a comparison of the reported quarterly expenditures with the cumulative advance request amount and does not assess the validity, propriety, or accuracy of the actual incurred cost. Neither the contracting officer nor their technical representative reviews the voucher documents. Federal law requires that responsible officials review the public vouchers for accuracy and propriety, and to ensure that the reported costs are for authorized purposes under the contract.

A recent audit of Raytheon Polar Services Company (RPSC) that questioned $33.4 million in claimed expenditures underscores the large sums of money that are subject to advance payment and therefore at risk of misuse. Of the amount questioned, $21 million was charged as direct costs when it should have been recovered through RPSC's indirect cost rate, a violation of Cost Accounting Standards and RPSC's disclosed federal accounting practices. RPSC also claimed $6.7 million that exceeded limitations specified in the contract. If NSF had adopted a policy requiring a more active review of vouchers, it is possible that the erroneous payments would have been caught at a much earlier point. The large amount of questioned costs resulting from this audit indicates that more scrutiny of advance payments and more internal control reviews are warranted. NSF is evaluating its options for resolving the questioned costs.

United States Antarctic Program

Long term planning. An audit of the USAP's Occupational Health & Safety and Medical Programs performed in 2003 identified a need for long-term planning to assure that necessary capital assets are replenished on a regular basis and not pressed into service past their useful lives. The audit report cited examples of an aging infrastructure at McMurdo Station, which could pose unnecessary risks to the health and safety of program participants and recommended a separate line item in the budget dedicated to funding a capital asset management plan. In its response to the report, NSF said that its current practices were adequate and expressed concern that a dedicated fund would restrict financial flexibility needed to respond to the needs of researchers.

[9] A reportable condition is defined as a significant deficiency in internal controls that could adversely affect the agency's ability to report financial data.

However, a recent Committee of Visitors (COV) Report charged with evaluating the Polar Research Support Section also cited the need for improved long-term planning. The report said that scientists who are aware of the existing logistical limitations in Antarctica rarely submit proposals requesting support that is difficult to provide. The result is that cutting edge science projects may well be limited by logistics capabilities. It recommends that the agency consider developing a long-term planning process that would involve scientists so that the agency could learn about the new ideas and consider attendant logistical challenges at the cutting edge of Antarctic science before they reach the proposal stage. The report also calls upon the agency to improve its projections of the actual costs of doing field and lab science in Antarctica to assure that novel but expensive science can be successfully planned for. The agency has responded positively to both COV recommendations.

Accounting for environmental liabilities. NSF's accounting practices may not be consistent with the intent of applicable accounting standards for the recognition and reporting of environmental liabilities in the Antarctic because of the unique status of the treaty that governs NSF's activities there. The *Antarctic Treaty and the Antarctic Science, Tourism and Conservation Act of 1996* governs NSF's roles and activities in the Antarctic and states that NSF is responsible for the review, oversight, and remediation of environment incidents. Although NSF's General Counsel has argued that the agency does not have a *legal* liability related to environmental clean-up costs in Antarctica, the auditors suggest that the language of the treaty places the ultimate responsibility with NSF and recommended that NSF's responsibility for recording such liabilities should be reviewed by the Federal Accounting Standards Advisory Board (FASAB) to ensure that they are correctly reported. Depending on how FASAB decides the issue, NSF's environmental liability obligations may be understated in its financial statements.

Merit Review

Broadening participation. The Foundation is committed to broadening the participation of women and minorities in all NSF programs and activities. Increasing the number of applicants, awardees and reviewers from underrepresented groups that participate in the merit review process is a key objective, and is carefully monitored by the agency. Underrepresented groups made progress in FY 2004 in several respects. While the total number of awards made by NSF decreased, the number of awards made to women and minorities each increased. The number of proposals received from women and minorities also increased by 15 and 19 percent respectively compared to 9 percent among the overall population. Although, the success rates for the underrepresented groups both decreased, the declines were generally proportional to the overall population.

NSF has also continued to work to improve the number of merit reviewers who self-report demographic information. This year 17 percent of reviewers volunteered information, up from 9 percent in FY 2002. Thirty-five percent of those who responded indicated that they were part of an underrepresented group. Reviewer diversity ensures that the merit review process benefits from a wide variety of perspectives in arriving at its

decisions, while raising awareness among those who participate about the grant-making process.

In this year's report on broadening participation in the sciences and engineering, the Committee on Equal Opportunities in Science and Engineering (CEOSE) noted the increase in grant applications among underrepresented groups since FY 2000, and cited three possible causes: 1) NSF's embedded diversity policy of 1999 which made diversity a part of each research and education directorate; 2) a FY 2000 policy change requiring all proposals to address societal impacts and; 3) the implementation of outreach activities aimed at increasing awareness among women and minorities of NSF's programs.[10] CEOSE also observed that "evaluation of NSF programs with respect to broadening participation is uneven" and recommended that NSF expand its systematic and objective evaluation efforts by continuing to obtain, refine and disaggregate data and factors related to persons from underrepresented groups in STEM education and careers.[11]

Unfunded proposals. The rate at which NSF funds proposals (i.e., success rate) has declined significantly from 33 percent four years ago to 24 percent in FY 2004, the lowest in 15 years. Among proposals that undergo the competitive merit-review process[12] the funding rate is just 21.6 percent. During the past year, the rate of decline accelerated, as some key research directorates such as Computer and Information Science and Engineering were able to fund just 16 percent of the proposals they receive. Of particular concern is the increasing number of quality proposals for which there are no funds. The amount of money represented by these proposals that were rated as high as the average NSF award, increased by 46 percent in just one year from $1.44 billion requested to $2.1 billion in FY 2004.

As the agency notes, the decline of the success rate is a concern because declined proposals represent a rich portfolio of unfunded research and education opportunities. An unfavorable success rate may also discourage innovation and risk-taking among researchers who believe more risky projects are less likely to be funded. In addition, there is a significant economic cost to both NSF and the community in generating, processing and reviewing each research proposal. On average NSF conducts six reviews per proposal, a voluntary investment of time by scientists that is estimated to be in the tens of millions of dollars. Scientists must divert time from their research, training and education activities and spend more time on proposal development.[13] Ironically, the success rate has been adversely affected by NSF's efforts to increase grant size and duration, a policy initiated to reduce the amount of time scientists spend on writing proposals.

[10] Broadening Participation in America's Science and Engineering Workforce, CEOSE 04-01, p. 32
[11] Ibid. p.101
[12] 1,457 proposals were not externally reviewed, including those for SGER awards and grants for travel and symposia. Approximately 1,236 awards were made from this group.
[13] According to the *National Science Foundation Report on Efficiency of Grant Size and Duration*, the average grant proposal requires 157 hours to prepare.

NSF is considering a number of ways of improving the success rate, including 1) reducing the number of proposals submitted by making requests for proposals more focused and technically specific, and 2) implementing a two-tiered proposal submission process that includes pre-proposals. NSF may also want to reconsider its rationale for increasing grant size and duration.

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

OFFICE OF THE DIRECTOR

October 28, 2005

MEMORANDUM

To: Inspector General, NSF

From: Director, NSF

Subject: Response to the Inspector General's Memorandum on Management Challenges for NSF in 2006

Thank you for your memorandum of October 14, 2005 on the management challenges facing the National Science Foundation in 2006. NSF is widely acknowledged as a high performing organization, with a reputation for responsible stewardship of the Nation's investments in science and engineering. Challenge is a characteristic of our work. The dynamic nature of the research frontier is reflected, as well, within our organization.

NSF has recognized the linkage between excellence in advancing science, and excellence in organizational development, by establishing a fourth strategic goal as a necessary complement to goals for Ideas, Tools and People. In its FY 2005 review, the Advisory Committee on GPRA Performance Assessment found that NSF's accomplishments in the Organizational Excellence goal "demonstrate innovation in business processes; in methods of recruitment, development, retention and recognition of its staff; attention to continuous improvement in management effectiveness; and a strong commitment to continued improvements in its merit review process."

Your memorandum notes that NSF has made significant progress in several areas of challenge. We know, too, that challenges evolve as accomplishments move us forward. As new demands arise, we draw on the flexibility and agility of NSF staff and systems. Examples of a wide range of management efforts are provided in an attachment on 2005 activities. Many of these efforts are ongoing and will continue in 2006 and beyond.

NSF has a leadership role in several e-Government initiatives for improved federal performance. We are committed to excellence and innovation in our business practices, just as in the research and education we support. As we ensure effective, efficient agency operations our eye is also on the frontier, supporting research and education that continues to make significant contributions to the Nation's economic and social well being.

Arden L. Bement, Jr.

Attachment: Management Challenges for 2005

cc: Chair, National Science Board

Attachment

Management Challenges for 2005

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Arden L. Bement, Jr.

Attachment: Management Challenges for 2005

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Attachment

Management Challenges for 2005

National Science Foundation

MANAGEMENT CHALLENGES FOR 2005

This document reports agency actions corresponding to Management Challenges from the Office of Inspector General (OIG) memorandum "Management Challenges for the NSF in FY 2005."

Workforce Planning and Training

OIG Management Challenge

Workforce planning continues to be one of the most serious challenges facing NSF. Since 1999 the number of proposals processed has increased by 40 percent, while the number of program officers assigned to their review has remained relatively flat. Last year alone, the number of proposals increased by 14 percent to 40,075, the largest annual percentage increase in over a decade. The quantity of proposals transmitted to NSF is perhaps the single best indicator of its overall workload. According to NSF, program officers now spend 55 percent of their time on merit review, leaving less time available for other important responsibilities such as award management and oversight and program planning.[1]

NSF's reliance on "non-permanent" personnel is another area of concern. Forty-seven percent of NSF's 700 science and engineering staff is visiting personnel, temporary employees, or intermittent employees. Visiting personnel make an important contribution to NSF's mission by enabling the agency to refresh and supplement the knowledge base of its permanent professional staff. But managers who serve at NSF on a temporary basis frequently lack institutional knowledge and are less likely or able to make long-term planning a priority. In fact NSF's *Business Analysis* project (a multi-year review aimed at reengineering the agency's core business processes) reports that NSF in general is spending less time on forward-looking activities such as strategic planning and program development. Moreover, there are administrative costs that NSF incurs in recruiting, hiring, processing, and training personnel that rotate every 1 to 4 years. In FY 2004, we conducted an audit that identified the additional salary, fringe benefits, travel and other costs of visiting or temporary personnel, and found three areas where NSF could improve its administration of the programs.[2] Therefore, while visiting personnel are an important resource for NSF, the agency must continually balance the benefits of their services against the additional costs involved.

The agency's response to these and other workforce issues is being formulated as part of the *Business Analysis*, which is scheduled for completion by the end of FY 2005. In FY 2004, NSF initiated an agency-wide workforce planning effort based on the findings of the business analysis to date. NSF's Human Capital Management Plan, which was delivered in December 2003, integrates and links Human Capital activities to the NSF business plan and to the Human Capital Assessment and Accountability Framework provided by the Office of Personnel Management. While the current plan provides a roadmap for identifying NSF's future workforce needs, the needs themselves are still in the process of being defined.

NSF Actions

NSF's Human Capital Management Plan (HCMP) and the accompanying Human Capital Accountability Plan identify NSF human capital goals and high-level action strategies, establish a framework for evaluation of NSF human capital policy and operations, and identify key metrics associated with each of the goals in the HCMP. The HCMP includes specific strategic goals and action strategies for strategic workforce planning and educating and developing NSF managers and staff.

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[1] Report to the National Science Board on NSF's Merit Review Process FY 2003 (May 2004)

[2] *Audit of Costs Associated with Visiting Personnel*, July 23, 2004, OIG 04-2-006. Opportunities for improvement cited in the report include consulting income documentation, IPA pay computations, and VSEE cost of living adjustments.

Workforce planning and training are activities with critical strategic importance to the National Science Foundation. Capitalizing on findings from the *Business Analysis* project, NSF is currently engaged in a comprehensive agency-wide workforce planning effort that will result in an agency-wide process for workforce planning that is coordinated with the budget cycle, data-driven; and understandable to managers and staff; more effective distribution of administrative work in program directorates; better-defined roles, responsibilities, and career paths for administrative staff in these organizations; and more effective application of change management principles as NSF business processes and systems are revised and updated.

Management's difference of opinion with the OIG on the issue of agency use of rotators is well documented. Management does not agree that use of IPAs and other rotators and contractors places agency programs at risk. Rather, management believes that the use of rotators at the Foundation is critical to fulfilling NSF's statutory mandate. The National Academy of Public Administration (NAPA) recently endorsed the continued use of both permanent and temporary personnel at NSF. In an April 2003 report, NAPA noted the value of rotators to the NSF mission, and found that, generally, NSF has the right mix of rotators and career employees.[3] The report recommended that NSF continue to use rotators in the positions of program officers, managers, and assistant directors; and that NSF continue to balance the number of rotators and permanent employees based on its experience and the specific requirements of individual positions.

An Office of Personnel Management (OPM) review of NSF's use of the Intergovernmental Personnel Act was conducted in FY 2004 at the direction of Congress.[4] OPM made a number of constructive observations and recommendations in this report, and NSF is working with OPM to implement them. The OPM report states that, "…When NSF looks to universities and research centers, it is able to recruit diverse quality candidates with a wide variety of academic and professional backgrounds and demonstrated leadership skills." In addition, NSF uses IPA's "as conduits to the scientific and engineering research community and as competent employees that can manage NSF's workforce."

Administrative Infrastructure

OIG Management Challenge

A shortage of administrative resources continues to hinder NSF's staff from keeping pace with its growing workload. NSF states that over the past year it has leased an additional 26,576 square feet of space and the travel budget increased from $4.32 million in FY 2003 to $6.05 million in FY 2004 to support the merit review process and increase oversight activities. Management reports that it conducts ongoing assessments of space management and allocation in addition to its regular budget analysis and planning activities. It also encourages video conferencing and telecommuting as methods of leveraging scarce administrative resources. While these efforts provided some relief, more than a third of the management control issues noted by NSF's managers in the FY 2004 controls assessment involves a shortage of human or administrative resources.

Space remains a critical issue, impeding the recruitment of quality staff and the ability to store sensitive documents. In some cases, program officers are sharing cubicles, while contractors are located in file rooms.

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[3] *National Science Foundation: Governance and Management for the Future*, NAPA, April 2004, pp. 91-115.
[4] *The National Science Foundation's Use of the Intergovernmental Personnel Act*, Audit, released December 10, 2004, U.S. Office of Personnel Management, pp. 10-11.

Travel funds were repeatedly cited as inadequate for the purpose of properly overseeing existing awards. NSF must make it a priority to allocate more of its funding for administrative resources in order to maximize the effectiveness of staff.

NSF Actions

Management agrees that administrative resources are constrained at NSF. As reflected in the agency's budget requests since FY 2004, management continues to seek additional staff and the funds necessary to provide additional office space and travel resources. To provide relief for some of the most critical space shortages, NSF leased an additional 8,487 square feet of space in FY 2005. To continue to support the merit review process and increase oversight activities – as NSF's science and engineering and research programs continue to emphasize more complex, interrelated sets of activities – the NSF travel budget increased from $4.79 million in FY 2004 to $7.26 million in FY 2005. The FY 2006 Budget Request emphasizes this priority by investing an additional $1.49 million, or 20 percent, for a requested total of $8.75 million.

In addition to budget analysis and planning, management conducts ongoing assessments of space management and allocation, and encourages innovative and creative approaches to work management, such as video conferencing and telecommuting. Since NSF's formal telework plan went into affect on August 6, 2004, 430 staff have established signed telework agreements.

Management of Large Infrastructure Projects

OIG Management Challenge

NSF's investment in large facilities and infrastructure projects presents management with a number of budgetary and operational challenges. The construction of projects such as telescopes, research equipment, supercomputing databases, and earthquake simulators are inherently risky due to their complex design, cutting-edge technology, and expense. A disciplined project management approach is essential to success; at the same time, modifications are sometimes necessary when developing a new technological tool. NSF spends approximately $1.1 billion a year on these scientific tools, with many of the projects costing as much as several hundred million dollars each.

NSF continues to make measured progress towards addressing the recommendations we offered during two past audits of large facility projects.[5] Our audit reports identified the need to improve oversight of large projects by enhancing organizational accountability, providing better guidance (particularly in the area of financial management), and improving NSF's systems to capture complete information about project costs. During the past two years, NSF has hired a Deputy Director for Large Facility Projects and developed more detailed guidance to support its *Facilities Management and Oversight Guide.*

However, we remain concerned that NSF does not have adequate staff assigned to oversee and manage large projects, and that those assigned may not have sufficient resources or authority to carry out their responsibilities.

[5] Audit of the Financial Management of the Gemini Project, December 15, 2000, OIG 01-2001; Audit of Funding for Major Research Equipment and Facilities, May 1, 2002, OIG 02-2007

In addition, many of the modules intended to support the *Facilities Management and Oversight Guide* are still under development, including those pertaining to financial management. Finally, the problem of recording and tracking the full costs of projects has not yet been addressed. A contract to enhance the financial system for tracking life cycle costs of Major Research Equipment and Facilities Construction projects was awarded at the end of FY 2004.

NSF Actions

During FY 2005, NSF worked with contractors to develop and design an enhancement to its financial accounting system. The system will obligate funds for MREFC projects by lifecycle phases. It will also generate reports on obligation data related to MREFC projects by lifecycle phase. LFP presented and reviewed the design with program officers and budgeting representatives from each Directorate involved in construction or operation of major research facilities. Identifying beta participants for initial adoption has been completed. Completion of testing is expected before the end of the first quarter of FY 2006. A user guide and training for Phase I on the facility tracking system will be available during the first quarter of FY 2006. NSF has included the facilities tracking system in the work plan to integrate budget, cost and performance that has been approved by OMB and enables NSF to achieve success in the President's Management Agenda initiative to integrate budget and performance. Milestones have been established beginning with the fourth quarter of FY 2005.

Three additional modules to accompany the Facilities Management and Oversight Guide have been developed during this fiscal year. The Financial Management module is being written in parallel with the development of the life-cycle tracking software.

An additional staff person, with expertise in financial and administrative oversight of awardee business systems, is now onboard. Recruitment of a second person, to further strengthen project management and oversight, is planned during FY 2005. This will be a total of four, full-time permanent FTEs.

Post-Award Administration

OIG Management Challenge

Since FY 2002, independent audits of NSF's financial statements have cited weaknesses in the agency's post-award monitoring of grantee institutions as a major deficiency. An effective post-award monitoring program should ensure that: awardees are complying with award terms and conditions and federal regulations; adequate progress is being made toward achieving the objectives and milestones of the program; and expenditures listed on NSF's financial statements are accurate. While NSF has taken some steps over the past three years toward establishing a risk-based program for post-award monitoring of its grants, more needs to be done. NSF must broaden its approach to award monitoring to go beyond high-risk awardees, develop more effective award oversight guidance, and increase the coordination between program and financial officers.

In FY 2004, NSF reorganized the Office of Budget, Finance and Award Management to establish the Division of Institution and Award Support. The Division's role is to manage federal funds awarded by NSF, including providing financial and administrative assistance to institutional awardees and NSF directorates to implement business models, processes and practices.

In addition, NSF has increased its outreach to at-risk institutions and developed creative ideas for partnering with other agencies to monitor common grantees. Together these actions represent progress toward addressing post-award administration issues at NSF.

However, NSF's approach to post-award administration focuses too narrowly on high-risk awardees. Because the agency considers only 42 out of its 34,011 awards to be high-risk, the impact of the Award Monitoring and Business Assistance Program (AMBAP) is effectively limited to 0.1% of its award portfolio. To broaden the scope of its activities, NSF should apply more cost-effective monitoring procedures such as desk reviews of reports from awardees and computer-assisted screening to medium and low risk awardees on a random basis.

NSF also issued an award-monitoring guide in FY 2002 and a revised site-visit guide in FY 2003 for agency staff; however, both guides need improvement. In an assessment of NSF's post-award monitoring efforts, IBM Business Consulting commented, "the staff did not follow or only loosely followed the AMBAP guide noting that it was too broad and extensive to be implemented in a realistic timeframe." Meanwhile, the site visit guide does not address many important details for conducting a review, such as how and what types of reviews should be conducted, and therefore does not assure quality or consistency.

The site-visit guide does not standardize documentation for performing or recording the results of the review, thereby increasing the risk that procedures may not be consistently applied. IBM noted that this lack of documentation undermined the follow-up of site visits, and recommended standardized procedures for writing the report, following up, and maintaining documentation in a database for analysis of overall findings. Furthermore, in a recent audit report we cited close coordination between the program and administrative offices as an effective practice of organizations engaged in post-award monitoring and oversight, [6] NSF should seek to develop one comprehensive approach to award monitoring that would include both a financial and programmatic component.

Finally, the Improper Payments Improvement Act of 2002 requires agencies to review all programs and activities annually and identify those that are susceptible to significant improper payments. In May of 2003, the Office of Management and Budget (OMB) issued guidance requiring agencies to statistically sample those programs at high risk for improper payments and establish baseline error rates and improvement targets for future reporting. NSF, like other grant making agencies, is challenged to implement the OMB requirements. Since improper payments include those made by NSF's awardees and subawardees, designing a methodology to statistically sample the voluminous number of payments made by NSF's 2500 awardees is complex.

NSF Actions

NSF's Award Administration Enterprise

Over the past several years, the substance of the findings and attendant recommendations with regard to post-award monitoring have changed annually, owing to NSF's substantial progress in the implementation of NSF's post-award administration program. In the FY 2001 audit, the auditors recommended that NSF establish a risk-based post-award monitoring program; NSF did so the following fiscal year. For FY 2002, the auditors critiqued the program and recommended changes; NSF implemented the changes.

[6] Management Framework: Award Monitoring; September 30, 2003; OIG 03-2-015

In FY 2003, the auditors recommended that increased resources be committed to award monitoring, standardization of review processes, and full implementation of the award-monitoring program; during FY 2004, the Office of Budget, Finance and Award Management realigned its staff and resources, and established a new Division of Institution and Award Support with a primary role to monitor federal funds awarded by NSF, including providing financial and administrative assistance to institutional awardees and NSF directorates to implement business models, processes and practices. In addition, NSF has increased its outreach to at-risk institutions and developed creative ideas for partnering with other agencies to monitor common grantees.

In FY 2004, the auditors recommended 1) revision of the risk assessment model to identify all known high-risk awards; 2) development and implementation of a plan for required baseline and advanced monitoring of all grantees; 3) development of a corrective action plan to address the suggestions in the "Overall Assessment Opportunities for Improvement" section in the IBM *Post Award Monitoring Assessment Report*, dated March 2004; and 4) an increase of resources dedicated to post-award monitoring. In addition to meeting these requests, NSF management initiated a series of information exchange meetings with OIG Audit Staff and KPMG, the external auditor for the NSF Financial Statement Audit.

As of FY 2005 year end, the following strategy for post-award administration has been implemented, including 1) subjecting all awards to baseline monitoring; 2) broadening the scope of monitoring activities to include both medium and low risk awards identified on a random basis with an NSF contract in place to perform the statistically valid sample of medium and low risk awards; 3) issuing in June 2005 Standing Operating Guidance that provides a single comprehensive reference for the financial and administrative policies, procedures, and activities that comprise BFA's Post Award Monitoring program with links to several documents including a completely updated, expanded and improved Site Visit Review Guide and the Risk Assessment Guide; and 4) establishing closer coordination between the program and administrative offices to ensure effective practices with regard to post-award monitoring and oversight.

With regard to the requirement under the Improper Payments Improvement Act of 2002, it is important to note that NSF has put a contract in place to sample transactions drawn from a statistically valid sample of grant awards made under the appropriations for programs identified as being at high risk for improper payments. To be more specific in terms of the statistical validity of the sample, the universe of samples is all FCTR transactions for the review period; as such, the sample includes transactions from each of the quarterly reports by grant recipient.

Cost-Sharing

OIG Management Challenge

Cost sharing refers to the contribution of financial or in-kind support by recipients of federal grants to the cost of their research projects. Federal guidelines require that the accounting of cost-shared expenses be treated in a manner consistent with federal expenditures. However, our past audit work indicates that many awardees do not adequately account for or substantiate the value of cost-shared expenditures, raising questions about whether required contributions are actually being made.

Two years ago, NSF changed its policy to require cost sharing above the statutory requirement *only when there is tangible benefit to the awardee*, such as a facility that will outlast the life of the research project or income derived by the awardee as a result of the research. There is evidence that the new policy has effectively curtailed new cost sharing agreements. The number of new awards that include cost sharing declined from 3346 in FY 2001 to just 1556 during FY 2004. During the same period, the amount of promised cost sharing declined by 54 percent. Less cost sharing reduces the potential for compliance problems and the burden on the agency for correcting them.

While reducing cost sharing requirements mitigates the challenge, it does not eliminate it since some cost sharing is required by statute and some is voluntary. The agency states that it is providing greater oversight in the risk assessment protocol and site reviews.
Cost sharing is also identified as a high-risk factor and a focus of the new protocol. It is too early to assess the effectiveness of these efforts. In October, the agency acted to eliminate future cost sharing except for what is required by statute. The policy is likely to further reduce the amount of cost sharing entered into by the agency but to what extent is not known. We will continue to monitor the substantial amount of cost shared funds still outstanding and reassess changes brought about by the new policy.

NSF Actions

On October 14, 2004, the National Science Board (NSB) approved a major revision to the NSF cost sharing policy. The NSB eliminated program specific cost sharing; and further specified that only statutory cost sharing (1%) will be required for unsolicited proposals. Initial implementation guidance was issued in the fall and an Important Notice and Frequently Asked Questions will be issued to further inform the research community regarding this change. The relevant NSF policy documents, e.g., the *Grant Proposal Guide*, the *Grant Policy Manual*, the *Proposal and Award Manual* and the award terms and conditions, also will be updated to ensure consistency with the revised cost sharing policy.

Previously, the cost sharing line on the NSF budget (Line M) was masked from reviewers to ensure that cost sharing was not considered in the review process. To fully implement the concept of elimination of program specific cost sharing, NSF intends to modify the current NSF Budget Form to eliminate Line M and therefore, an organization's ability to include cost sharing in a budgetary submission to NSF.

All new NSF program solicitations issued after October 15 specify, "cost sharing is not required."

All previously issued (prior to October 14, 2004) program solicitations that specified a cost-sharing requirement remain in effect, unless NSF formally modifies the program solicitation to eliminate the cost-sharing requirement. The Foundation will ensure that future versions of these solicitations no longer contain a cost-sharing requirement. The award data from the past five years reveal a significant reduction in awards with required cost sharing (non-statutory):

Fiscal Year	C/S Dollars	Awards	Total Award Actions	%
FY 2000	$508 M	3109	19,789	15.71
FY 2001	$534 M	3346	20,529	16.30
FY 2002	$419 M	3188	21,369	14.92
FY 2003	$325 M	2359	22,782	10.35
FY 2004	$244 M	1556	22,862	6.80
FY 2005*	$170 M	897	22,492	3.99

*FY 2005 cost share data as of 9/30/05.

The data above will eventually fall to zero as current active awards that contain cost sharing commitments expire over the next several years. As part of NSF's Award Monitoring and Business Assistance Program, the Foundation will continue to monitor the remaining ongoing awards that have specific cost sharing requirements.

Information (IT) Security

OIG Management Challenge

NSF must have a comprehensive and effective information technology (IT) security program both to meet Federal requirements and to mitigate risks that threaten the successful operation and development of its IT systems. These systems and the information they contain need to be protected from unauthorized access, use, disclosure, disruption, modification, and destruction. Over the past several years, NSF has taken a number of steps to strengthen its IT security program. For example, it formed a Security Working Group comprised of managers from across the agency to set NSF policy and procedures, and established a new security office to implement them. All staff are required to complete security awareness training each year. NSF has undertaken penetration testing of its systems in order to find and address vulnerabilities more quickly. In addition, the agency completed the certification and accreditation of 18 of its 19 general support systems and major applications by the end of FY 2003, and in FY 2004 began a triennial cycle of recertification of all systems.

Also in FY 2004, the Office of Polar Programs completed a comprehensive inventory of the systems supporting the U.S. Antarctic Program (USAP), classifying them as one general support system and two major applications, rather than one major application as they had been classified in 2003. The agency plans to certify and accredit those systems by the end of CY 2004.

Despite these accomplishments, IT security is an ongoing challenge for NSF, as for all federal agencies, and some weaknesses remain. The OIG's FY 2004 Federal Information Security Management Act (FISMA) report issued on June 30, 2004, noted that the systems serving the USAP still had not been certified and accredited, information security policies had not been established and implemented, and required background investigations for key information security personnel had not been performed. Our review also found that NSF had not updated its risk assessments and security plans to account for the migration of its payroll and personnel systems to another federal agency, NSF's disaster recovery plan had not been fully tested, and access controls could be strengthened. These vulnerabilities could result in unauthorized access to and modification of financial, programmatic, and other sensitive information; loss of assets; health and safety risks; and disruption of critical operations and the ensuing costs associated with business downtime and recovery. NSF has reported that it has made significant progress in all these areas since our review.

NSF Actions

NSF's Information Technology (IT) Security Program is committed to assuring that the NSF infrastructure and assets are appropriately protected while maintaining an open and collaborative environment for scientific research and discovery. NSF has established a strong and comprehensive security program that is consistent with Government-wide guidance and patterned after industry best practices. NSF continued to strengthen all areas of its information security program in FY 2005, and our investment in security continues to produce excellent results. NSF maintains a balanced approach to information security based on risk management where information security risks are assessed, understood and mitigated appropriately. A comprehensive Federal Information Security Management Report (FISMA) is submitted to OMB annually describing accomplishments during the year.

NSF has invested significant time and resources to certify and accredit 100% of its general support systems and major applications. The general support systems and major applications are on a 3-year schedule for re-accreditation. NSF believes that continuous monitoring is a critical aspect of managing risk within the NSF IT infrastructure.
Continuous monitoring has been aggressively implemented through regularly scheduled vulnerability scans, internal and external penetration tests and a 24x7 intrusion detection system capability and remediation process. Leading edge tools such as enterprise automated vulnerability management applications are used to support remediation of vulnerabilities on network devices.

NSF has quickly adopted and implemented new federal guidance to categorize information systems, and assesses security controls on all nineteen major applications and general support systems. Virtually every aspect of NSF business operations is dependent on continuous, reliable availability of computing resources. NSF has a comprehensive disaster recovery program and continuity of operations plan. In FY 2005 NSF conducted two Disaster Recovery Exercises and, as a best practice, initiated an integrated Continuity of Operations and Disaster Recovery exercise.

NSF has addressed development of new security policies in 2005 by developing and publishing policies for Malware/Virus Protection, IT Privacy Policy, Security Awareness Training and updating it Personal Use for NSF's Technology and Communication Resources and Sensitive Information Policy. NSF has a process and multi-year plan in place to review personnel sensitivity levels for background investigations. Effective access control procedures are in place to remove access privileges for separated employees and contractors.

Risk assessments and security plans for the personnel and payroll migration were updated to reflect connectivity with another federal agency.

Antarctic Program: The United States Antarctic Program (USAP) made significant progress in 2005 toward strengthening its security posture. USAP certified and accredited its two major applications and resolved a number of vulnerabilities. USAP has developed security policies and is developing procedures to support its program-wide security policies. USAP conducted contingency plan testing and monitors a comprehensive Plan of Action and Milestones (POA&M). USAP is also implementing an online security awareness program. USAP has worked closely with NSF to achieve an aligned and closely integrated security program to secure the Foundation environment.

Recognizing there are always risks that must be appropriately assessed and mitigated, NSF's overall security program and posture continues to be positive and reflects our commitment to continuous and sustained improvement to what will remain complex and challenging issues in the years ahead.

GPRA Reporting

OIG Management Challenge

Congress enacted the Government Performance and Results Act (GPRA) in 1993 as a means of making government more results oriented. The Act requires each agency to develop a strategic plan that establishes specific goals against which its performance can be objectively evaluated. To further focus government agencies on results, the President's Management Agenda requires that performance be considered in funding and management decisions and that programs work toward continual improvement. In support of these objectives, OMB introduced the Program Assessment Rating Tool (PART) to provide a framework for evaluating performance and generate program effectiveness ratings for Congress to consider when making budget decisions.

GPRA poses a significant challenge to agencies involved in science or education research because the benefits are difficult to measure and may only become apparent over time. Moreover performance measures must be carefully formulated so as not to discourage appropriate high-risk research that offers the potential for a "transformational" discovery.

Because of the complexity involved in measuring the benefits of research, a full discussion of the methodology employed in reporting performance results should be prominently included in each performance report. Last year we issued an audit report on the Committee of Visitors panels that are used by NSF to provide qualitative data for GPRA reporting. We found that some of the limitations associated with the use of the data were not fully disclosed in the agency's GPRA report. Further, we noted that NSF relied on judgmentally selected "nuggets" (research success stories) as evidence that it has achieved its GPRA goals, again without full disclosure. Our report indicated that a user of NSF's performance report might infer that the nuggets are representative of the performance of the entire portfolio, and the credibility of the reports could become compromised. We recommended that NSF more clearly disclose the limitations associated with both issues.

In FY 2004, NSF expanded its disclosure of the methodology it employed and, while this disclosure has resolved the issues raised in the audit report, we continue to believe NSF should report on the performance results of its entire research portfolio. To do this, NSF will need to develop a knowledge management system to capture, categorize and analyze the research results.

NSF Actions

While GPRA and PART do pose significant challenges to agencies involved in science and education research, NSF has balanced these challenges through an integration of quantitative and qualitative metrics. OMB's approval of the "alternative format" permitted development of a multi-layered assessment approach. This approach uses multi-year Committees of Visitor evaluations as one input into the strategic goal and R&D Investment Criteria analysis of the Advisory Committee for GPRA Performance Assessment (AC/GPA). The AC/GPA process, together with all NSF's results for GPRA and PART goals in the Performance and Accountability Report, is further assessed by an external party for verification and validation (V&V). The FY 2004 V&V concluded "NSF provided information of adequate quality for the AC/GPA to reach a valid and verifiable conclusion on NSF's progress in achieving its Strategic Outcome Goal indicators."[7] As the Committees of Visitors evaluate the entire program or set of programs under their review, including random sampling of proposal and award jackets, it is incorrect to imply that the evaluation process does not encompass the entire NSF portfolio.

Budget and Performance Integration/Cost Accounting

OIG Management Challenge

An effective accounting and reporting system is essential to attaining the objectives of the President's Management Agenda and complying with GPRA. However, NSF's current information systems do not readily provide the cost accounting information necessary to link its costs to program performance. While NSF has been a leader in generating annual financial statements that have received "unqualified" audit opinions for the past six years, it is only beginning to focus on developing a cost accounting system to address its program performance evaluation and reporting needs.

For the past four years, each financial statement audit has recommended that NSF identify management cost information requirements for each organizational unit or program, establish activities/projects and corresponding outcomes within each unit, and develop and report cost efficiency measures that align with outputs and outcome goals.
The auditors have also noted that NSF's systems do not track complete cost data for projects in which the costs are borne by more than one NSF directorate or organizational unit. Consequently, program officers cannot monitor the full cost of a project.

In FY 2004, NSF management developed a Budget, Cost and Performance Integration (BCPI) work plan that was approved by OMB. The agency states that cost accounting is a key element of the BCPI plan. A crosswalk was developed between the costs accounted for in the appropriations reporting system and those in the new programmatic reporting framework.

[7] *NSF GPRA and PART Performance Measurement Validation and Verification Report on FY 2004 Results*, October 2004, IBM Business Consulting Services.

When NSF is able to interface the crosswalk with the Financial Accounting System, the agency will be able to identify the full direct costs of its programs and projects, including its large facility projects. However, the plan does not provide for tracking costs of NSF's internal business processes and activities such as the cost of soliciting grants, conducting merit reviews, or performing post-award grant administration. Identifying the costs of these internal functions is important for evaluating NSF's performance accomplishments under its organizational excellence strategic goal.

NSF Actions

In December 2004, NSF received a "Green" for the President's Management Agenda (PMA) Budget and Performance Integration Initiative. OMB noted on its website, "NSF can estimate the resources necessary to achieve its long-term strategic goals and track those resources from operating plans to obligations to expenditures."

NSF's Statement of Net Cost reports the full cost of the agency's strategic goals of People, Ideas, and Tools and NSF's 10 primary programmatic activities, which are the "investment categories" that undergo PART assessment each year. Costs are identified at the lowest program element level and aggregated to the primary program activities. Only those transactions that cannot be directly attributed to a specific program activity – less than 9% in FY 2004 Q4 – are allocated using a pre-established methodology.

A crosswalk that links the appropriations reporting system to the new reporting framework and interfaces with the Financial Accounting System allows NSF to track budgetary resources, commitments, obligations, and expenditures. NSF can identify the full costs of its programs and projects, including its large facilities projects.

With respect to NSF's internal business processes, NSF accomplishes its mission with notable efficiency. Approximately 95% of the agency's budget goes to support the actual conduct of research and education and only about 5-6% to administration and management. NSF is recognized as a leader in streamlining and implementing technological and business practices; in 2004, NSF received the President's Quality Award for Management Excellence for exemplary performance in expanding electronic government and NSF holds the longest track record for "Green" ratings for both the E-Gov and Financial Management PMA initiatives.

To develop data on the cost of internal processes such as the cost of soliciting grants, conducting merit reviews or performing post-award grant administration would require changing the Financial Accounting System and establishing a time distribution system. This would be a prohibitively large agency investment – a cost that would outweigh the benefits since there is no clear indication that this information would enable NSF managers to make better resource allocation or management decisions. In fact, the most critical information that determines how to best allocate limited resources is derived from NSF's merit review system, of which 90% of NSF annual research funding undergo. Moreover, due to separate appropriation lines, NSF managers cannot make trade-offs among administrative, program and construction resources.

Management of U.S. Antarctic Program

OIG Management Challenge

As part of its mission, NSF finances and supports Antarctic research, providing over $197 million in FY 2004 for research activities in Antarctica. Its single largest award is a contract for Antarctic logistics and support services valued at $1.116 billion over 10 years. Each year the United States Antarctic Program (USAP) deploys about 700 people to the continent to perform scientific research and another 2,500 to provide logistics in support of this research, including the operation and maintenance of year-round research stations. Those deployed include research teams from academia, industry, and government, military personnel, and contractor employees.

NSF's contract for Antarctic support contains many inherent risks and complex requirements. The contractor must have technical expertise in a variety of disciplines, including medical and environmental engineering, and is responsible for managing a number of subcontractors in the U.S. and overseas. Therefore, NSF's oversight of the programmatic and financial performance of this large contract is itself a formidable challenge, requiring considerable administrative and technical skill. The remote and harsh Antarctic landscape leaves little margin of error for many basic support activities. For example, weaknesses in the USAP information system were cited as a reportable condition during the agency's most recent IT audit since they could potentially disrupt essential life support or science activities. The agency also has yet to resolve an outstanding recommendation from an audit report issued last year aimed at strengthening the USAP's capital asset management program and renewing its aging infrastructure. The issue involves how best to assure funding is available to maintain the infrastructure in a timely manner. NSF comments that it has sustained an ongoing effort to maintain and upgrade facilities at McMurdo and Palmer Stations, albeit at a slower pace than is ideal, and affirms that the USAP is providing a safe and healthy environment.

A recent audit identified instances of over billing by the contractor. Consequently, the OIG is planning to conduct a financial and compliance audit of the Antarctic Logistics and Support Contractor that will include a review of internal controls over cash management and compliance with various fund restrictions. We will also continue to monitor its information systems.

NSF Actions

NSF addressed the recommendations made by the OIG in its 2003 audit of the occupational health and safety, and medical programs. NSF is fully committed to providing infrastructure that provides a safe and healthy environment, and we believe we have done so.

We continue to employ, though our own Program Managers as well as through arrangements for subject matter experts from other Federal Agencies, the expertise required to meet the challenges posed by supporting research in Antarctica. overseeing construction and maintenance of all infrastructure, and overseeing environmental, health, safety and medical activities. In FY 2005, the Office of Polar Programs (OPP) established a new section to address environmental, health and safety issues at the policy and oversight level for both Antarctic and Arctic research.

Also in FY 2005 OPP, continued to develop and improve its IT security posture. Certification and Accreditation of the USAP's major applications and its General Support System have been completed.

Policies were formalized and issued, and implementing procedures are due to be complete by the end of FY 2005. The IT systems have been the subject of two penetration tests, and findings from those tests have been resolved. Finally, a security awareness program, first deployed in FY 2004, will be expanded this year and it is expected that virtually all USAP participants will receive the required training.

NSF management is currently negotiating resolution of an audit of the USAP support contractor.

Broadening Participation in the Merit Review Process

OIG Management Challenge

The merit review process is a cornerstone of NSF's operations, ensuring the integrity and fairness of the proposal review process and maintaining the high standards of excellence for which NSF is known. NSF was able to fund only 27 percent of the more than 40,000 proposals it received in FY 2003. The agency decides which research, engineering and education projects to fund by subjecting most proposals to a rigorous merit review process that ensures each will receive knowledgeable and unbiased consideration based on specific criteria. It is largely through the merit review system that NSF adds value to the national research and education enterprise. One objective in NSF's Strategic Plan is to increase the participation of underrepresented groups and institutions in all NSF programs and activities, including merit review. Developing the untapped potential of underrepresented groups should lead to expanded individual opportunity and improved national competitiveness and prosperity.

During FY 2003, the percentage of underrepresented groups that received awards remained steady, with female and minority PIs funded at approximately the same rate as the overall proposer population. The number of awards made to minority PIs remains at 5 percent of total awards. Beginning in FY 2001, NSF started requesting demographic data from all merit panel reviewers to determine the extent of participation of underrepresented groups in the NSF reviewer population. However, NSF cannot legally require reviewers to provide demographic information. In FY 2003, out of a total of 40,020 reviewers who returned reviews, only 5,336 provided demographic information. Thirty-four percent of those indicated they were members of an underrepresented group. In FY 2004, NSF continued to use seminars and workshops at minority-serving institutions in an effort to expand interest in NSF's programs. Reviewer diversity is emphasized through the use of a large and expanding Foundation-wide reviewer database, explicit policy guidance, mandatory training for all program officers, and directorate-level initiatives. The agency will also continue to request demographic information and adjust the FastLane reviewer module to make it more convenient for reviewers to provide such information.

NSF Actions

NSF considers its merit review process the keystone for award selection. The agency evaluates proposals using two criteria – the intellectual merit of the proposed activity and its broader impacts. NSF staff rely on expert evaluation by selected peers when evaluating proposals and making funding decisions. Each year, approximately 250,000 merit reviews are provided to assist NSF with the evaluation of proposals.

In FY 2004, the number of proposals received from minority PIs increased by 19 percent over the previous fiscal year (from 2,141 to 2,551). The funding rate for minority PIs was 23 percent, slightly lower than the overall funding rate for NSF.

During FY 2004, the number of proposals received from women PIs increased by 15 percent over the previous fiscal year (from 7,335 to 8,427), and the funding rate was 25 percent.

Obtaining data about the gender and ethnicity of individual reviewers remains a challenge due to the fact that provision of such data is voluntary. For example, in FY 2004, out of a total of 41,263 distinct reviewers who returned reviews, 7,092 provided demographic information. Out of the 7,092 who provided information, 2,449 (35 %) indicated they were members of an underrepresented group. In FY 2004 NSF altered the FastLane reviewer module to make it more convenient for reviewers to provide demographic information. During FY 2005, for all reviewers entering or updating their demographic information on FastLane, 35 percent provided demographic data. Prior to the FastLane modification, approximately 20 percent of reviewers provided demographic information. NSF will continue to monitor the situation over time, and take additional measures as needed in order to obtain the data necessary to evaluate increased participation.

In FY 2005, NSF continued to use seminars and proposal writing workshops for the purpose of broadening participation. For example, NSF held a grants writing workshop for tribal colleges in May 2005. In addition, the Computer & Information Science & Engineering directorate (CISE) held meetings to disseminate information on Broadening Participation in Computing, a new program designed to increase the number of students receiving postsecondary degrees in computing sciences, with an emphasis on students from underrepresented groups.

In FY 2005, Dr. Thomas Windham, Senior Advisor for Science and Engineering Workforce, and NSF senior staff contributed ideas and strategies to broaden participation, promoting the sharing of effective approaches across the agency. In addition, an NSF committee of executives, managers, and staff completed "Diversity in the NSF Science and Engineering Workforce: A Report and Plan for Action" to address NSF's performance goal of increasing the diversity of the agency's science and engineering staff.

Math and Science Partnership Program

OIG Management Challenge

NSF has responsibility for the Math and Science Partnership (MSP) program, a key element of the President's initiative, *No Child Left Behind*, aimed at strengthening and reforming K-12 education. In FY 2002 and 2003, NSF awarded a total of $280 million to fund partnerships between school districts, colleges and universities, and other organizations for the purpose of improving math and science education at the K-12 level. NSF has requested an additional $80 million to support ongoing activities of the MSP program in FY 2005. The program poses several challenges for NSF, including the need to facilitate partnerships among institutions that do not normally collaborate, monitor awardees that are unaccustomed to handling federal funds, and ensure that projects are implemented as proposed and have effective evaluation plans that adequately report their impact on student achievement.

In a recent report, we reviewed the evaluation plans for nine of the first 23 MSP projects and found that five had effective evaluation plans. The other four projects in our sample were missing key elements of an effective evaluation process. In response to this finding, NSF plans to enlist the help of evaluation experts to frame a statement of practice to serve as a framework for current and future MSP award recipients. We also recommended that the agency develop a comprehensive management plan for evaluating the MSP program.

An award for an external evaluation of the MSP program consistent with the research and development nature of the program was recently made.

NSF Actions

NSF has developed a comprehensive plan for the oversight and management of all Math and Science Partnership (MSP) awards. Larger, more complex awards have been made as cooperative agreements. These cooperative agreements describe the post-award management and oversight needed to support the Partnerships in realizing their goals. In making decisions for continued funding, the MSP program draws upon NSF's strong, community-based site visit processes. With few exceptions, the lead partners responsible for both fiscal and project management of Partnerships are institutions with significant experience and a track record of responsibility in handling federal funds.

In FY 2005, the MSP program continued its oversight and management of all existing Partnerships but made no awards for new Partnership projects.

In November 2004, NSF hosted a financial management and oversight meeting of all 2004 MSP Targeted and Institute Partnership awardees to enhance awardees' fiscal management capacity and understanding of their responsibilities in such critical areas as subaward monitoring, proper documentation of time and effort, participant support, etc. **All** 2004 Partnership awardees – each Principal Investigator and a representative from his/her institutional business/accounting office – participated in this fiscal management workshop at NSF. NSF had hosted in November 2003 a similar meeting for all 2002 and 2003 Partnership awardees.

In summer 2005, critical site visits (midpoint reviews) to inform NSF decisions about continued funding were completed for the five Comprehensive Partnerships awarded in FY 2003. Two Comprehensive Partnerships awarded in FY 2002 also each received a second critical site visit. Furthermore, any questions or concerns about a grantee's financial management identified through review of annual progress reports (which include financial reports), through site visits, or by other means are pursued further as appropriate, in consultation with NSF's Division of Grants and Agreements (DGA) and/or staff in Cost Accounting and Audit Resolution, Division of Institution and Award Support (DIAS).

Ongoing Management and Oversight: MSP employs a six-pronged approach to project management and oversight: (1) site and reverse site visits to awardees; (2) Program Officer review of annual progress reports and project-specific formative evaluations; (3) use of co-operative agreements for all Comprehensive Partnerships and – starting in FY 2003 – all Targeted Partnerships, and other mechanisms, such as carefully formulated "conditions of award" in grants, that enable focused oversight; (4) technical assistance, especially for new awardees; (5) an information management system [MSP-MIS] for data collection and monitoring of awards; and (6) a substantial overall program evaluation. The award for the overall external evaluation of the MSP program was made at the end of FY 2004 to COSMOS Corporation, in partnership with Vanderbilt University, George Mason University, and The McKenzie Group.

Evaluation in the Context of a Research & Development (R & D) Effort: Because the MSP program extends beyond traditional domains and calls for innovative practices that go beyond the commonplace, its intellectual foundations and progression of work define it as an R & D effort. R&D efforts are necessarily administered and evaluated in ways that differ from implementation efforts, where the nature of the work is predetermined and where the tools and best practices needed for effective evaluation and administration are known in advance.

R & D "habits of mind" drive all aspects of the program, including project- and program-level evaluation.

In October 2004, the MSP Program convened a workshop meeting of principal investigators and evaluators of Cohort 1 and 2 projects to formulate a statement that would guide effective project-level evaluation in the context of a national R & D effort, such as the MSP.
In recognition of evaluation as an area of expertise and scholarship, the Program sought to bring together this community of evaluators and principal investigators who were experienced in the work of MSP, as well as other experts representing a range of perspectives on evaluation. The Program requested that the leadership of the MSP-funded project *Building Evaluation Capacity of STEM Projects* at Utah State University assume primary responsibility for planning the workshop and for the overall development of any resulting statement and guiding frameworks. Through the workshop discussions, subsequent discussions by the entire MSP community at its January 2005 Learning Network Conference, and a considerable amount of additional work by a team of experienced evaluators, the MSP community produced the document *Evidence: An Essential Tool – Planning for and Gathering Evidence using the Design-Implementation-Outcomes (DIO) Cycle of Evidence* (NSF 05-31), which has been posted at the NSF MSP website. All MSP Partnership projects have been asked to continue their engagement with the *DIO Cycle of Evidence* and to make intelligent use of it as a guiding framework to plan for, gather and use evidence in project-level evaluation.

On June 13, 2005, the OIG issued a memorandum pursuant to its audit of MSP evaluation, noting that the Program's actions had addressed satisfactorily the concerns/recommendations in the Audit and that all recommendations from the MSP audit report had now been closed.

PATENTS AND INVENTIONS RESULTING FROM NSF SUPPORT

The following information about inventions is being reported in compliance with Section 3(f) of the National Science Foundation Act of 1950, as amended [42 U.S.C. 1862(f)]. There were 1,141 NSF invention disclosures reported to the Foundation either directly or through NIH's iEdison database during FY 2005. Rights to these inventions were allocated in accordance with Chapter 18 of Title 35 of the United States Code, commonly called the "Bayh-Dole Act."

LIST OF ACRONYMS

AACC	American Association of Community Colleges
AC	Advisory Committee
AC/GPA	Advisory Committee for GPRA Performance Assessment
ADP	Adaptive Dynamic Programming
AFS	Administrative Functions Study
AGEP	Alliances for Graduate Education and the Professoriate
ALMA	Atacama Large Millimeter Array
AM&O	Award Management & Oversight
AP	Advanced Placement
APIC	Accountability and Performance Integration Council
ATE	Advanced Technological Education
ATLAS	A Toroidal LHC ApparatuS
AUI	Associated Universities Incorporated
AURA	Associated Universities for Research in Astronomy
BE	Biocomplexity in the Environment
BFA	Office of Budget, Finance, and Award Management
BIO	Directorate for Biological Sciences
BME	Biomedical Engineering Laboratories
CAAR	Cost Analysis and Audit Resolution Branch
CAREER	Faculty Early Career Development
CCF	Division of Computing and Communication Foundations
CCLI	Course Curriculum and Laboratory Improvement
CCR	Central Contractor Registration
CEOSE	Committee on Equal Opportunities in Science and Engineering
CFOC	Chief Financial Officer Council
CIHO	Cash and Investments Held Outside of the Treasury
CIP	Construction in Progress
CISE	Directorate for Computer and Information Science and Engineering
CMIA	Cash Management Improvement Act
CMS	Compact Muon Solenoid
CNCI	Control, Networks, and Computaional Intelligence Division (CISE)
CNS	Computer and Network Systems Division (CISE)
COO	Chief Operating Officer
COTR	Contracting Officer's Technical Representative
COV	Committee of Visitors
CPU	Central Processing Unit
CREST	Centers for Research Excellence In Science and Technology
CRIF	Chemistry Research Instrumentation and Facilities
CSRS	Civil Service Retirement System
CSU	California State University
CSUSB	California State University San Bernadino
CWA	Chemical Warfare Agents
DCAA	Defense Contract Audit Agency
DCCA	Division of Contracts and Complex Agreements
DCIA	Debt Collection Improvement Act
DIAS	Division of Institution and Award Support
DNA	Deoxyribonucleic Acid
DOI	Department of the Interior
DOE	Department of Energy
DOL	Department of Labor
EDS	Electronic Data Systems
EFT	Electronic Fund Transfer
EHR	Directorate for Education and Human Resources
EID	Ecology of Infectious Diseases
EIP	Erroneous and Improper Payments Grant Workshop
EIS	Enterprise Information System
ENG	Directorate for Engineering
EOT	Education, Outreach, and Training
ERC	Engineering Research Center
FACA	Federal Advisory Committee Act
FAS	Financial Accounting System
FAST	An alternative congestion control scheme for TCP
FCTR	Federal Cash Transaction Report
FECA	Federal Employees Compensation Act
FERS	Federal Employees Retirement System
FFMIA	Federal Financial Management Improvement Act of 1996
FIC	Fogarty International Center
FISMA	Federal Information Security Management Act
FM-LOB	Financial Management – Line of Business
FMFIA	Federal Managers' Financial Integrity Act of 1982

FMS	Financial Management Service, U.S. Department of Treasury
FSML	Field Stations and Marine Laboratories
FY	Fiscal Year
GAAP	Generally Accepted Accounting Principles
GAO	Government Accountability Office
GBIF	Global Biodiversity Information Facility
GDEP	Geoscience Diversity Enhancement Project
GEO	Directorate for Geosciences
GFRS	Government-wide Financial Reporting System
GK-12	Graduate Teaching Fellows in K-12 Education
GPA	GPRA Performance Assessment
GPRA	Government Performance and Results Act
GPS	Global Positioning System
GRF	Graduate Research Fellowships
GSA	Government Services Administration
HBCU	Historically Black Colleges and Universities
IBMBCS	IBM Business Consulting Services
IERI	Interagency Education Research Initiative
IGERT	Integrative Graduate Education and Research Traineeships
IIS	Information and Intelligent Systems Division (CISE)
IMA	Institute for Mathematics and its Applications
INT	Office of International Science and Engineering
IOC	Innovation and Organizational Change program
IPIA	Improper Payments Information Act of 2002
ISEA	*In Situ* Electrochemical Analyzer
IT	Information Technology
ITR	Information Technology Research
LMS	Learning Management System
LOB	Lines of Business
LSS	Law and Social Science Program (SBE)
MCC	Management Controls Committee
MPS	Directorate for Mathematical and Physical Sciences
MR	Merit Review
MREFC	Major Research Equipment and Facilities Construction
MSP	Math and Science Partnerships
MTBI	Mathematical and Theoretical Biology Institute
MTS	Federal Measurement Tracking System
MVO	Montserrat Volcano Observatory
NA	Not Applicable or Not Available (see context)
NAIC	National Astronomy and Ionosphere Center
NAPA	National Academy of Public Administration
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NCAR	National Center for Atmospheric Research
NMR	Nuclear Magnetic Resonance
NNI	National Nanotechnology Infrastructure
NNIN	National Nanotechnology Infrastructure Network
NNUN	National Nanofabrication Users Network
NOAO	National Optical Astronomy Observatory
NPACI	National Partnership for Advanced Computational Infrastructure
NRAO	National Radio Astronomy Observatory
NS	Nanoscale Science
NSB	National Science Board
NSBF	National Scientific Balloon Facility
NSBP	National Society of Black Physicists
NSE	National Science and Engineering
NSEC	National Science and Engineering Centers
NSF	National Science Foundation
NSO	National Solar Observatory
NUE	Nanotechnology Undergraduate Education
NWCET	National Workforce Center for Emerging Technology
OCI	Office of Cyberinfrastructure
ODS	Online Document System
OE	Organizational Excellence
OIG	Office of Inspector General
OIRM	Office of Information and Resource Management
OISE	Office of International Science and Engineering
OMA	Office of Multidisciplinary Activities (MPS)
OMB	Office of Management and Budget
OPM	United States Office of Personnel Management

OPP	Office of Polar Programs
OSTP	Office of Science and Technology Policy
PACI	Partnerships for Advanced Computational Infrastructure
PAR	Performance and Accountability Report
PARS	Proposal and Reviewer System
PART	Program Assessment Rating Tool
PBGF	Photonic Band Gap Fiber
PBS	Public Broadcasting System
PECASE	Presidential Early Career Awards for Scientists and Engineers
PETM	Paleocene-Eocene Thermal Maximum
PI	Principal Investigator
PITO	People, Ideas, Tools and Organizational Excellence
PMA	President's Management Agenda
POAM	Plan of Actions and Milestones
POGIL	Process Oriented Guided Inquiry Learning
PPD	Programs for Persons with Disabilities
PRAGMA	Pacific Rim Applications and Grid Middleware Assembly
R&RA	Research and Related Activities Appropriation
RET	Research Experience for Teachers
RETA	Research, Evaluation, and Technical Assistance Program
REU	Research Experiences for Undergraduates
SARS	Severe Acute Respiratory Syndrome
SBE	Directorate for Social, Behavioral and Economic Sciences
SBIR	Small Business Innovation Research
SCI	Division of Shared Cyberinfrastructure
SDSC	San Diego Supercomputing Center
SDSS	Sloan Digital Sky Survey
SES	Division of Social and Economic Sciences
SFFAS	Statement of Federal Financial Accounting Standards
SGER	Small Grant for Exploratory Research
SMETE	Science, Mathematics, Engineering and Technology Education
SMIG	Senior Management Integration Group
SRS	Division of Science Resources Statistics
STC	Science and Technology Center
STEM	Science, Technology, Engineering and Mathematics
STEP	Systemic Teacher Excellence Preparation
SUNY	State University of New York
TBSR	Total Business Systems Review
TCP	Transmission Control Protocol
TE	Teacher Enhancements
TIN	Taxpayer Identification Number
UC	University of California
UCAR	University Corporation for Atmospheric Research
UCI	University of California, Irvine
UCLA	University of California, Los Angeles
UCSC	University of California, Santa Cruz
UCSD	University of California, San Diego
UNAVCO	University NAVSTAR Consortium
USAID	U.S. Agency for International Development
USAP	U.S. Antarctic Program
WBS	Work Breakdown Structures