

I. MANAGEMENT'S DISCUSSION AND ANALYSIS





A MESSAGE FROM THE DIRECTOR

I am pleased to present the National Science Foundation's *Performance and Accountability Report* for FY 2003. This report summarizes the Foundation's programmatic achievements, core business priorities and accomplishments as well as its financial status of the past year.

For more than 50 years, NSF has invested in a wide range of research and education programs in fundamental science and engineering. These investments have generated discoveries and advances in science and engineering that have enhanced every facet of our lives – from computing and communications to transportation, national security and the arts, architecture, design and countless other areas.

Today, the progress of science and engineering is not only more central to our lives but has also taken on new dimensions of complexity and integration, making NSF's role both more vital and more challenging. Advances in science and engineering are integral for strengthening the Nation's economic future and overcoming the challenge of securing the homeland and reducing international threats of all types. As an example, in May 2003, computer researchers around the Pacific Rim were mobilized to fight the SARS epidemic, helping to establish a cutting-edge communication grid among quarantined hospitals across Taiwan. In addition to linking the hospitals to each other the grid connected doctors to global sources of health information. NSF's support for the PRAGMA (Pacific Rim Applications and Grid Middleware Assembly) partnership that responded to this call for help from Taiwan's National Center for High-performance Computing has fostered a spirit of trust and cooperation among the sites. Clearly, NSF investments not only transform scientific research and learning but also the handling of critical global events.

Underlying the Foundation's programmatic achievements is NSF's commitment to organizational excellence and sound financial management. In FY 2003, for the sixth consecutive year, NSF received an unqualified "clean" audit opinion on our financial statements. NSF also continued to provide leadership in achieving government-wide goals under the President's Management Agenda. NSF remains the only agency to achieve two "green" successful ratings, for financial management and E-government, and this year advanced to "yellow" status for budget and performance integration. Last spring, the U.S. General Accounting Office (GAO) identified NSF as one of five exemplary federal agencies that successfully demonstrated evaluation capacity in their performance reports due to its evaluation culture, data quality, analytical expertise and collaborative partnership. With respect to the Improper Payments Information Act of 2002, NSF is committed to ensuring that taxpayer money is appropriately spent; the agency's draft action plan was recently submitted to OMB.

As required by section 1116(e) of title 31 of the United States Code, I am pleased to report that the financial and performance information contained in this report is complete and reliable. I am also 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 that there are no material weaknesses in the agency's management controls. My assessment is based on an independent external consulting firm's recent verification and validation review of the agency's GPRA performance results; NSF Management Controls Committee's organizational review conducted in late summer; and the Independent Auditor's Report received on November 6, 2003.

It is our job here at NSF to ensure that U.S. capabilities are the best in the world and that the returns to the American people who support these activities with their tax dollars meet their highest expectations. It is the dedication of an outstanding staff here at NSF that makes all this possible.

Dr. Rita R. Colwell

November 13, 2003

AGENCY PROFILE

The National Science Foundation (NSF) supports and promotes progress in science and engineering to ensure that our nation maintains its global leadership in science and technology. Congress, recognizing the important contributions made by science and engineering in World War II, established the National Science Foundation (NSF) through the National Science Foundation Act of 1950 (P.L. 81-507), to “promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.” Unlike other federal agencies whose support of research and development is mission-focused, NSF is the only federal agency responsible for advancing research and education across all disciplines of science and engineering. Over the years, the agency has acquired additional responsibilities, including fostering and supporting the development and use of computers and other scientific methods and technologies; providing Antarctic research, facilities and logistic support; and addressing issues of equal opportunity in science and engineering.

Despite its small size, NSF has had an extraordinary impact on America’s scientific and engineering knowledge and capacity. With an annual budget of about \$5 billion, NSF represents only four percent of the total federal budget for research and development (Figure 1). However, NSF accounts for 13 percent of federal support for basic research and 20 percent of federal support for basic research conducted at colleges and universities (Figure 2). In many fields, NSF is a major source of federal funding to academic institutions, including math and computer sciences (75 percent), the social sciences (64 percent), the environmental sciences (49 percent), engineering (42 percent) and the physical sciences (35 percent).¹

Figure 1.

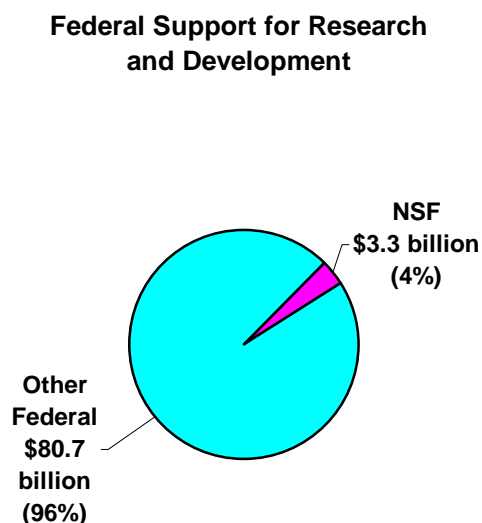
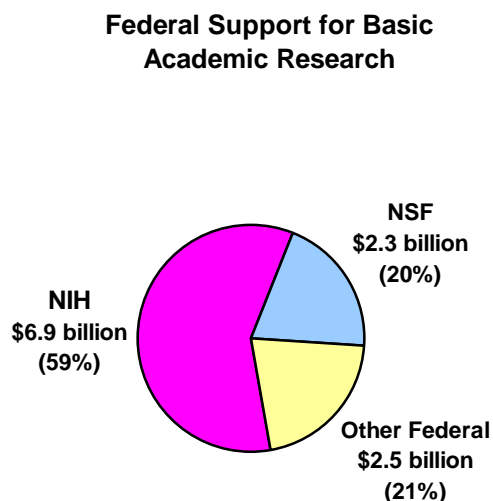


Figure 2.



¹ Source: NSF/SRS/R&D Statistics Program, Survey of Federal Funds for Research and Development, FY 2001-2003.

The NSF Vision: Enabling the Nation's Future through Discovery, Learning and Innovation

Since the end of World War II, the world has received a continuous stream of benefits from science and technology. Economic growth has been driven by high technology industries and advances in science and engineering have enhanced every aspect of our lives – from computing and communications to transportation, national security and the arts, architecture, design and countless other areas.

NSF support of basic research, the source of discoveries and new capabilities, is wide-ranging – from developing new superconducting and super hard materials; understanding climate change to facilitate policy decisions; building better earthquake prediction models; to developing information technology systems that secure privacy and ensure data integrity. NSF's focus on emerging fields – like nanotechnology where work is at a scale one thousand times smaller than most of today's human-made devices; terascale computing, that takes us three orders of magnitude beyond prevailing computing capabilities; and cognition, where focus on the science of learning can advance our capability in everything from teaching children how to read to building human-like computers and robots – has the potential to revolutionize our lives.

Moreover, not since World War II has progress in science and engineering been more important for ensuring our national security. Research on the ecology of infectious diseases and microbial genome sequencing can contribute to a better understanding of potential bioterrorism threats and how to combat them. NSF's Scholarship for Service program trains students in information security and assurance in exchange for service in federal government agencies, thus increasing the nation's capacity to protect vital information. Identifying vulnerabilities in the nation's critical infrastructures like power grids, communications and transportation networks and the water supply systems will allow strengthened protection. Today, in a society defined by and dependent on science and technology, advances in science and engineering are integral to overcoming the challenge of securing the homeland and reducing international threats.

What NSF Does and How We Do It

To achieve its mission to promote the progress of science, NSF invests in three strategic areas: People, Ideas, and Tools.

People: NSF's first priority is to facilitate the creation of a diverse, internationally competitive and globally engaged workforce of scientists, engineers and well-prepared citizens. NSF supports efforts 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. NSF is also committed to enhancing diversity in the science and engineering workforce.

Figure 3.

Estimated Number of People Involved in NSF Activities in FY 2003	
Senior Researchers	30,000
Other Professionals	12,000
Postdoctoral Associates	6,000
Graduate Students	27,000
Undergraduate Students	32,000
K-12 Students	14,000
K-12 Teachers	85,000
Total	206,000

Broadening the participation of individuals who are members of underrepresented groups in the science and engineering workforce as well as the institutional base that trains them will not only further scientific progress by drawing on all intellectual talent but also help meet the need for a broad-based technically trained workforce. Across its science, mathematics, engineering, technology research and education programs, NSF investments support over 200,000 people, including students, teachers, researchers, post-doctorates and trainees.

Ideas: NSF supports cutting edge research and education that yield new and important discoveries and promote the development of new knowledge and techniques within and across traditional fields of study. These investments help maintain the nation's academic institutions at the forefront of science and engineering. The results of NSF-funded projects provide a rich foundation for broad and useful applications of knowledge and the development of new technologies. Support for Ideas also promotes the education and training of the next generation of scientists and engineers by providing students with an opportunity to participate in discovery oriented research.

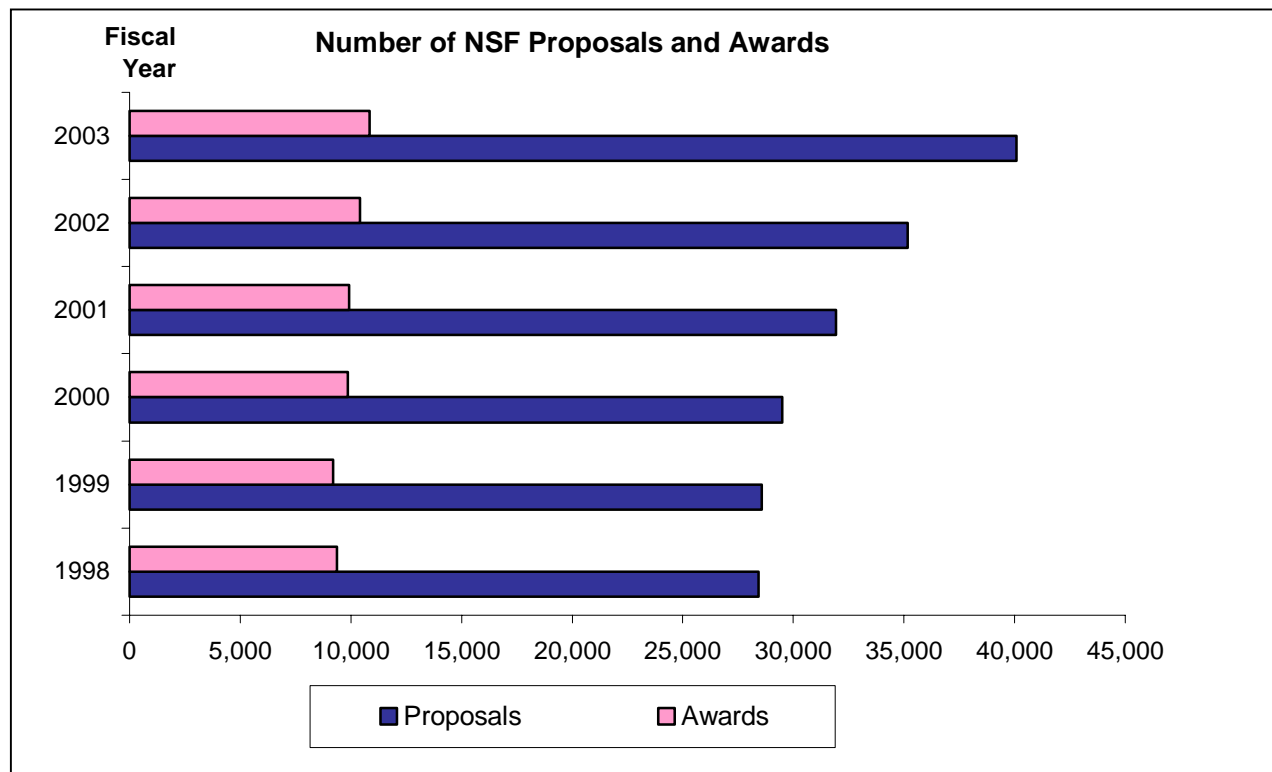
Tools: NSF investments provide state-of-the-art tools for research and education, such as instrumentation and equipment, multi-user facilities, digital libraries, accelerators, telescopes, research vessels and aircraft, and earthquake simulators. In addition, resources support large surveys and databases as well as computation and computing infrastructures for all fields of science, engineering and education. Support for these unique national facilities is essential to advancing U.S. research and education, with the need driven predominately by research opportunities and priorities. NSF-supported facilities also stimulate technological breakthroughs in instrumentation and are the site of research and mentoring for many science and engineering students.

Except for the South Pole Station and other Antarctic Program facilities, NSF does not conduct research or operate laboratories. Instead, the Foundation seeks and funds the best ideas and most capable people, to produce the fundamental knowledge base that enhances progress and promotes discovery in all of science and engineering. In addition, NSF fosters partnerships that connect discovery and learning to innovation and service to society.

In FY 2003, the Foundation processed a record number of proposal actions – over 40,000 – and made 10,844 competitive awards. With a 14 percent increase in proposals in FY 2003, the NSF's funding rate dropped to 27 percent – nearly five percentage points below the average 32 percent rate of the last five years (Figure 4.).

Nearly 90 percent of NSF funding is allocated through a merit-based competitive process that is critical to fostering the highest standards of excellence and accountability – standards for which NSF is known the world over. Reviewers focus on two primary criteria – the intellectual merit of the proposed activity and its broader impacts, e.g., how well the activity promotes teaching, training, and learning and what may be the benefits of the proposed activity to society. Reviewers also consider how well the proposed activity fosters the integration of research and education and broadens opportunities to include a diversity of participants, particularly underrepresented groups.

Figure 4.

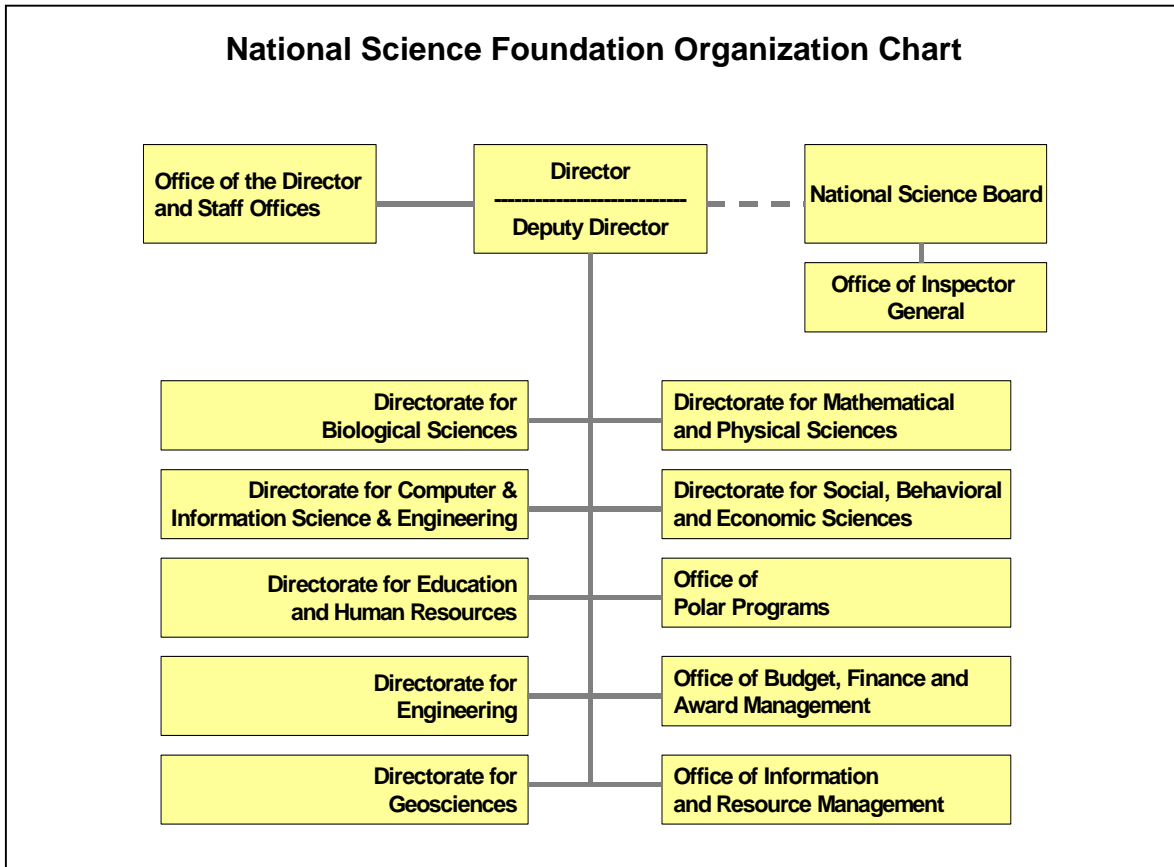


Organizational Structure

NSF is headed by a Director appointed by the President and confirmed by the U.S. Senate. In 1998, distinguished biologist Dr. Rita R. Colwell became the Foundation's eleventh Director and the first woman to head the Foundation. A 24-member National Science Board (NSB) establishes policies and reviews programs of the Foundation. NSB members, prominent contributors to the science, mathematics, engineering and education communities, are appointed by the President with the consent of the Senate. The NSF director is a member *ex officio* of the Board. Both the director and NSB members serve six-year terms. The Board 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 structured much like an academic institution, with directorates organized by discipline and fields of science and engineering, and for science, math, engineering and technology education. There are seven program directorates, an Office of Polar Programs and two business offices (Figure 5). Appendix 1 provides a detailed description of each directorate and business office.

Figure 5.



NSF is funded primarily by Congressional appropriations and maintains a staff of about 1,250. To ensure that the science and engineering projects funded by the Foundation remain at the frontier of the research enterprise, NSF regularly recruits visiting scientists, engineers, mathematicians and educators who are at the forefront of their fields, to spend one to three years with the agency to complement the permanent workforce.² These individuals bring valuable perspectives to NSF's investments in science and engineering.

Operations Management: Doing Business More Efficiently and Effectively

Underlying NSF's commitment to advancing the progress of science and engineering is its commitment to excellence in administration and management. NSF is recognized as a well-managed agency with a long record of success in leveraging its agile, motivated workforce, management processes and technological resources to enhance productivity and effectiveness. NSF is also recognized as a leader in financial management and electronic government (E-Gov), and remains the only federal research agency routinely receiving and processing virtually all its full and complete proposals electronically. However, although NSF's budget has nearly doubled in the last ten years, the agency's staffing level has only increased by about four percent.

² These appointments are made under the Intergovernmental Personnel Act (IPA) and funded through program accounts. In FY 2003, there were 148 IPA appointments at NSF.

Maintaining operations overhead at five percent of the agency's budget is an ongoing challenge, as workload complexity has increased with the increase in multi-disciplinary, collaborative and international activities, as well as new large research facility projects and increased interest in oversight and accountability.

Cost Efficiencies Realized

As a consequence, the Foundation continually strives to do more with less and work smarter by instituting more efficient and cost-effective business processes. In FY 2003, technological and business practices implemented in recent years continued to yield cost efficiencies for the agency. For example, in FY 2003, costs efficiencies realized from electronic dissemination of publications, decrease postage costs and use of videoconferencing totaled nearly \$250,000.

- *Electronic dissemination:* NSF launched its external business web site in 1994. As customer access to the Internet expanded over the years, NSF began offering its most requested documents online. Today, virtually all NSF publications are electronically available, and since FY 2002, all program announcements have been available online. A comparison of FY 2002 and FY 2003 demonstrates the effectiveness of the electronic dissemination program. In FY 2002, nearly \$348,000 was spent on print dissemination; in FY 2003, that number dropped to about \$268,000 – a decrease of \$80,000 or 23 percent. This is a notable accomplishment considering that in FY 1998, agency costs for printing publications was about \$745,000. Thus, over the last five years, NSF printing costs have decreased by 64 percent.
- *Postage costs:* Postage costs continued to decline this year from a record decline last year. In FY 2003, NSF postage costs were \$199,098 – a \$102,339 or 34 percent decrease from prior year FY 2002 costs of \$301,437. Since FY 1999, NSF postage costs – which were \$742,000 – have dropped a remarkable 73 percent.
- *Videoconferencing:* Videoconferencing has become a mainstream meeting technology at NSF. It is estimated that from the 96 tracked videoconferences that were held in FY 2003, NSF realized savings of nearly \$60,000 in travel and per diem expenses. Moreover, an additional unquantified benefit of videoconferencing is that it allows wider staff participation at meetings – those from offices with limited travel budgets or staff whose schedules would not have allowed time for travel.

Overall, in FY 2003, NSF engaged considerable efforts in a wide range of management issues. NSF's efforts to improve management and oversight of its complex and diverse portfolio included establishing a formal Award Monitoring and Business Assistance Program (AMBAP); conducting site visits at 32 awardee institutions with nearly 1,400 active awards representing \$700 million in NSF support; and the drafting of the Award Monitoring and Business Assistance Program Guide. To enhance large facilities management, a new Deputy Director for Large Facilities position was filled in June 2003, and a Facilities Management & Oversight Guide was released.³ NSF enhanced the agency's overall security posture in FY 2003 by implementing an agency-wide information technology security program that encompasses all aspects of information security including policy and procedures, risk assessments and security plans, managed intrusion detection services, vulnerability assessments, and technical and management

³ www.nsf.gov/pubsys/ods/getpub.cfm?nsf03049

security controls. Significant time and resources were devoted to the certification and accreditation of NSF's general support systems; by year-end, 18 of 19 systems were completed. NSF also invested considerable efforts to address workforce planning and training issues, including development of a strategic plan for human capital management and initiation of an agency-wide workload analysis. The following discussion of the President's Management Agenda addresses many of NSF's current management issues.⁴

Meeting Future Challenges

The current environment in which NSF operates is changing. NSF faces an unprecedented opportunity over the next five to 15 years to influence the course of the nation. NSF's achievements have the potential to make a profound impact on the strength of the U.S. and world economy and on the continued leadership of the U.S. well into the 21st century. Moreover, NSF faces an invaluable opportunity to influence the number, quality and focus of America's student population. A key need is to increase the number of degree candidates in science, mathematics, engineering and technology thereby contributing to the number of citizens qualified to participate in the nation's science and technology workforce.

This year, NSF is undergoing several major organizational reviews, all of which should yield significant information to help re-structure and re-position the agency to meet the challenges of the 21st century. In response to Congressional guidance provided in House Report 107-740, the National Academy of Public Administration is conducting a review of NSF's organizational, programmatic, and personnel structures to assure that the agency is positioned to maximize opportunities that may accrue from future increased funding. Results from this study are expected in early 2004. The National Academy of Science is conducting a study of NSF's priority setting for major facilities projects at NSF and its report is expected in April 2004.

NSF itself, as part of its Administration and Management Strategic Plan, is currently engaged in a major multi-year comprehensive Business Analysis that is examining the agency's core business processes, workforce management and information technology architecture.⁵ In FY 2002, NSF began working with an external management consulting firm, undertaking a three-year project that will highlight agency needs and opportunities. The outcomes of this Business Analysis will help guide NSF's long-term administration and management investments.

⁴ Included in the appendix is a report, "NSF's Management Challenges and Reforms," which also addresses many of NSF's current management issues.

⁵ http://www.nsf.gov/od/am/StrategicPlan/am_fullreport.htm

PRESIDENT'S MANAGEMENT AGENDA

In September 2001, the President's Management Agenda (PMA) launched a government-wide strategy to improve the management, performance and accountability of federal agencies.¹ The PMA consists of management initiatives in five areas: Strategic Management of Human Capital; Competitive Sourcing; Improved Financial Performance; Expanded Electronic Government (E-Gov); and Budget and Performance Integration.

The White House Office of Management and Budget (OMB) has closely monitored the implementation of the PMA initiatives by establishing a stoplight scoring system to track the progress of agencies in meeting specific criteria under each of the PMA initiatives. In FY 2001 and FY 2002, NSF was the only federal agency to receive a "green" successful rating for any of the PMA initiatives – for financial performance in FY 2001 and for both financial performance and E-Gov in FY 2002.

In FY 2003, NSF retained its "green" successful status for financial performance and E-Gov and advanced from a "red" to "yellow" status for the Budget and Performance Integration initiative. NSF continued to work closely with OMB to clarify specific management improvements, establish accountability and develop useful management tools and a set of milestones for each initiative to achieve success in future years. NSF's current priority is to achieve a green rating on the Human Capital initiative. Figure 6 shows NSF's current PMA status; a discussion of each of the initiatives follows.

Figure 6.

	Baseline 09/30/01	Status: 09/30/02	Status: 9/30/03	Progress FY 2003- Q4
Strategic Management of Human Capital	R	R	R	Y
Competitive Sourcing	R	R	R	R
Improving Financial Performance	G	G	G	G
Expanded E-Gov't.	Y	G	G	G
Budget and Performance Integration	R	R	Y	Y

Note: Green (G) represents success; yellow (Y) for mixed results; and red (R) for unsatisfactory. Ratings are issued quarterly by the Office of Management and Budget. For more information on the President's Management Agenda, see www.results.gov/agenda/scorecard.html.

¹ www.whitehouse.gov/omb/budget/fy2002/mgmt.pdf

PMA Initiative 1 – Strategic Management of Human Capital: Build, sustain, and deploy a skilled, knowledgeable, diverse and high performing workforce; develop human capital strategies that are linked to agency mission and goals; develop a vision and roadmap for strategically managing the agency workforce to better accomplish the agency's mission.

Status as of September 30, 2003: Red
Progress as of September 30, 2003: Yellow

Progress: NSF is developing a Human Capital Management Plan that will provide the strategic framework for achieving the PMA Human Capital initiative. To date, NSF has completed the overview and outline for the initial Human Capital framework that 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 (OPM). An inventory of business functions and activities for the NSF-wide workload analysis has been completed and the competencies for all key occupations have been defined. Competency models have been developed for 90 percent of NSF positions; the remainder is scheduled to be completed in early FY 2004.

Upcoming Action/Challenges: Portions of the Human Capital Management Plan are already being implemented; for instance, a major research directorate is currently undergoing reorganization and is serving as the pilot/model for other implementations recommended by the Business Analysis. Implementation of the remaining action plans and strategies is scheduled to begin in early FY 2004.

PMA Initiative 2 – Competitive Sourcing: Use competitive sourcing to perform commercial functions more efficiently.

Status as of September 30, 2003: Red
Progress as of September 30, 2003: Red

Progress/Upcoming Action: NSF is developing a strategic approach to workforce planning and deployment. Initial results from the NSF Business Analysis, including the initial version of an agency Human Capital Plan, will be available during the first quarter of FY 2004. Based on its assessment of the Business Analysis, which will inform possible structural or functional realignments across the agency, NSF will develop a preliminary strategy for addressing the competitive sourcing initiative.

PMA Initiative 3 – Improved Financial Performance: Provide accurate and timely financial information that will enhance better management decisions; integrate financial and performance management systems that support daily operations; maintain financial systems that meet federal requirements; prepare clean and timely financial statements with no material weaknesses.

Status as of September 30, 2003: Green
Progress as of September 30, 2003: Green

Progress: NSF has successfully met all the core criteria for financial performance and has been rated “green” for success since 2001. NSF is a leader in federal financial management and expects to retain this position.

Upcoming Action/Challenges: NSF is required to submit audited financial statements to the Office of Management and Budget on an accelerated schedule of 45 days after the end of the fiscal year beginning in FY 2004. This is approximately two months earlier than is currently required. NSF has developed an automated data warehouse environment from our financial system that will allow the agency to compile automated financial statements virtually on demand for timely and accurate reporting. NSF piloted the new reporting in FY 2003 and is well positioned to meet the upcoming accelerated timeframes.

PMA Initiative 4 - Expanded Electronic Government (E-Gov): Using technology to the fullest to provide services and information focused on citizens.

Status as of September 30, 2003: Green

Progress as of September 30, 2003: Green

Progress: NSF has maintained a green status in electronic government since FY 2002. NSF has a long and distinguished history of electronic grants management efforts and since October 2000, has conducted virtually all business interactions electronically with its external grantee community. NSF is actively engaged in supporting numerous E-Government initiatives such as E-Payroll, the E-Human Resources Initiatives, E-Travel, Integrated Acquisition Environment, E-Authentication, and is integrating existing systems into government-wide capabilities when they become available. The Foundation is a full-fledged Grants.gov Partner Agency, contributing both financial and staff support to participate in technology evaluations, technical panels, steering committees, stakeholder committees, and working groups. NSF is continuing to evolve FastLane, the agency’s interactive real-time system that is used to conduct business with the grantee community over the Internet, to seamlessly integrate with Grants.gov. In addition, a new Electronic Jacket System (E-Jacket) is being developed and released in phases as a path-finding effort for NSF’s back office grants management functions. The implementation of E-Jacket will significantly reduce paper documents by maintaining proposal and award records electronically and allowing the electronic signing of official documents by staff.

Security of information technology (IT) systems is a management issue of the highest priority for NSF. In FY 2003, the Foundation made significant investments to enhance an already strong security program and produced remarkable results. At the close of FY 2003, NSF had completed the 19 major milestones and 54 subtasks planned for the year, and is on schedule to complete the remaining tasks. Equally important, 18 of 19 general support systems were certified and accredited (C&A) in FY 2003. In addition, for the second consecutive year, over 90 percent of NSF staff and contractors completed security awareness training. Based on an audit and review of the Foundation’s security program, the NSF Office of Inspector General (OIG) closed out three prior year findings and reported three new findings that they consider to be “significant deficiencies.” The three new findings and recommendations address certification and accreditation; the United States Antarctic security program; and security policies and procedures. Management generally agrees with the recommendations and, in fact, has already taken or completed action in many of the areas. We strongly disagree, however, with the “significant

deficiency” classification of each of the three findings, as they do not represent a weakness in a policy, procedure, or practice that materially impacts the effectiveness of the entity-wide security program.

Upcoming Action/Challenges: All of NSF’s investments in information technology are guided by and consistent with the Federal Enterprise Architecture. NSF continues to ensure that its five-year IT Plan is consistent with government-wide E-Gov efforts. NSF will continue to focus its efforts on planning and integrating next generation technology initiatives with E-Government initiatives and implementation of initiatives to address security needs. 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 a commitment to continuous and sustained improvement to what will remain complex and challenging issues in the years ahead.

PMA Initiative 5 – Budget and Performance Integration (BPI): Align planning, budgeting and performance, in order to develop an integrated process in which strategic planning drives budgetary decisions and tracks accountability for performance and cost.

Status as of September 30, 2003: Yellow

Progress as of September 30, 2003: Yellow

Progress: NSF has made steady progress toward Budget and Performance Integration (BPI). Its score on the PMA scorecard rose from “red” to “yellow” on the most recent scorecard issued in October 2003. This improvement was driven largely by the update of NSF’s Strategic Plan, as the plan now aligns NSF’s strategic outcome goals with ten “investment categories.” These investment categories provide the framework both for completing the PART (Program Assessment Rating Tool) and for the linkage of full budgetary and proprietary cost accounting. In addition, the agency’s FY 2005 Budget submission to OMB incorporated the new alignment and included a presentation of the request with full budgetary costing.

Upcoming Action/Challenges: NSF is now in the process of aligning its Financial Accounting System with these investment categories so that budgeted cost, actual cost, and performance can be tracked in tandem for NSF’s investments.

GPR A PERFORMANCE RESULTS

NSF is engaged in a wide range of assessment activities and has a long-standing practice of conducting evaluation projects. In May 2003, the U.S. General Accounting Office (GAO) identified NSF as one of five exemplary federal agencies successfully conducting evaluative activities.⁷ Committees of Visitors (COVs) and Advisory Committees (AC) reporting on Directorate/Offices are two review panels that the Foundation has used for over 20 years to conduct independent assessments of the quality and integrity of NSF's investments. With respect to broader issues, NSF often uses external third parties such as the National Academy of Sciences for outside review. NSF may also convene an external panel of experts for a special study.⁸ In FY 1999, NSF began reporting on the agency's annual GPR A (Government Performance and Results Act of 1993) performance goals and in FY 2002, NSF began using a new assessment tool – the Program Assessment Rating Tool (PART). PART is an evaluative questionnaire developed by the White House Office of Management and Budget (OMB) for rating federal programs.

As required by the Reports Consolidation Act of 2000, NSF's FY 2003 GPR A performance results are reported here in an integrated agency Performance and Accountability Report. This report includes a two-part presentation of NSF's GPR A performance results. The GPR A discussion included in this Management's Discussion and Analysis (MD&A) chapter highlights some of NSF's GPR A performance results. Pertinent background information and a brief discussion of some relevant GPR A performance issues are included to help put NSF's GPR A results in proper context for those who may not be familiar with the GPR A process. For a comprehensive discussion of each GPR A goal see Chapter II, "Detailed Performance Information." Chapter II also includes a summary table of NSF's GPR A results as well as other performance information specified in OMB Circular A-11, "Preparation, Submission and Execution of the Budget."

NSF began implementation of GPR A in 1997 by developing an agency GPR A Strategic Plan.⁹ The plan was updated in October 2000 and established three strategic outcome goals – People, Ideas and Tools (PIT) – that provided the guiding framework for NSF's FY 2003 Annual Performance Plan as well as NSF's FY 2003 Budget Request. The FY 2003 Annual Performance Plan¹⁰ and the FY 2003 Budget Request¹¹ were developed concurrently to ensure a direct link between programmatic activities and the achievement of NSF's strategic outcome goals.

GPR A implementation has been a particular challenge for agencies like NSF whose mission involves long-term investments like research and education. This is primarily due to: (1) the difficulty of linking outcomes to annual investments and the agency's annual budget; it is not unusual for the benefits of research to appear years or even decades after the initial investment,

⁷ GAO-03-454, GAO Report to Congressional Committees: *Program Evaluation: An Evaluation Culture and Collaborative Partnerships Help Build Agency Capacity*, May 2003.

⁸ See Appendixes 5, 6, and 7 for more detailed information on NSF's assessment activities, a list of evaluations completed in FY 2003 and a schedule of NSF program evaluations.

⁹ Both the recently updated strategic plan (*NSF's GPR A Strategic Plan, FY 2003-2008*) and the prior plan (*NSF's GPR A Strategic Plan, FY 2001-2006*) are available on NSF's website. See www.nsf.gov/od/gpra/Strategic_Plan/FY2003-2008.pdf and www.nsf.gov/pubs/2001/nsf0104/start.htm .

¹⁰ www.nsf.gov/od/gpra/perfplan/fy2003/FY2003RevisedFinalPlan.pdf

¹¹ <http://www.nsf.gov/bfa/bud/fy2003/start.htm>

and (2) the fact that assessing the impact of advances in science and engineering is inherently retrospective and is best performed through the qualitative judgment of experts. Nonetheless, as previously noted, NSF was one of five exemplary federal agencies recently identified by the GAO as having demonstrated evaluation capacity in their performance reports due to its evaluation culture, data quality, analytic expertise, and collaborative partnerships.

NSF has developed an alternative GPRA reporting format that has been approved by OMB, using an external expert review panel to assess program results and achievement with respect to research outcome goals on a qualitative rather than a quantitative basis. The use of external expert panels to review results and outcomes is a common, long-standing practice used by the academic research and education community. NSF's use of such panels (e.g., Committees of Visitors) predates GPRA and was specifically cited as an example of a good quality assessment tool in the GAO report as well as in a memorandum on research and development investment criteria issued jointly by OMB and the Office of Science and Technology Policy (OSTP) on June 5, 2003, to all federal agency heads.¹²

In FY 2002, in response to the Administration's mandate to accelerate the reporting of agency performance results, NSF reengineered its GPRA assessment and reporting process. An Advisory Committee for GPRA Performance Assessment (AC/GPA) was established, comprising experts from various disciplines and fields of science, engineering, mathematics and education. The AC/GPA was charged with evaluating agency performance with respect to NSF's FY 2002 GPRA strategic outcome goals. In June 2003, the AC/GPA was reconvened to evaluate the Foundation's FY 2003 outcomes of prior investments in People, Ideas and Tools. However, as the reporting and determination of results for performance goals are inherently governmental functions, NSF makes the final determination on achievement using the Advisory Committee as one critical input.

Because it was impractical for an external committee to review the contributions to the associated performance goals by each of the over 22,000 active awards, NSF Program Officers provided the Committee with about 875 summaries of notable results relevant to the GPRA goal performance indicators. The Committee also had access to three years of Committee of Visitor (COV) reports – program assessments conducted by external programmatic expert panels that are routinely used by NSF program management, and the Project Reports on NSF-funded awards submitted by Principal Investigators.

Collections of outstanding accomplishments and examples (“nuggets”) from awards obtained from expert sampling by Program Officers, together with COV reports and investigator 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 with respect to its FY 2003 GPRA Strategic Outcome Goals for People, Ideas and Tools. The Committee, which included experts in statistics and performance assessment, had thorough discussions on the sampling technique used for the nuggets. 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

¹² June 5, 2003 memoranda from John H. Marburger III and Mitchell E. Daniels to the Heads of Executive Departments and Agencies, “FY 2005 Interagency Research and Development Priorities.”

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. It is possible that the Committee could incorrectly conclude that NSF failed to show significant achievement, due to the limited set, when it actually achieved the goals. That is, the Committee could conclude that NSF did not show sufficient achievements based upon only hundreds of results while, if time permitted, reviewing hundreds or thousands more would add enough to show sufficient total results.

The inverse, however, could not occur. If a subset were sufficient to show significant achievement, then adding more results would not change that outcome. Therefore, the limitation imposed by using a "judgmental" sample is that there is a possibility, though likely small given hundreds of examples, that significant achievement would not be sufficiently demonstrated while a larger sample would show otherwise.

Regarding sampling, the Committee noted in their report that "The Committee believes that a purposeful sampling technique, i.e., one that relies on the judgment of internal experts (NSF program staff) combined with review by an external group of experts, is appropriate, reasonable and useful for GPRA reporting purposes. Such a technique will provide adequate data on which to base conclusions about performance relative to NSF's outcome goals."¹³

The process of assessment by our external advisory committee was itself assessed by IBM Consulting, our verification and validation contractor (V&V). Their report concluded that "We also verified and validated that the AC/GPA process to evaluate NSF's achievement against its Strategic Outcome Goals 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 assessments."¹⁴

While NSF will continue to monitor whether there are significant gaps in nuggets from segments of our portfolio, IBM Consulting studied the materiality, relevance and significance of the nugget sample. For materiality, they "conclude that the nuggets materially represent a sufficient share of overall NSF resources, committed to funding research, for the AC/GPA to rely upon to make its assessments."¹⁵ Regarding relevance, IBM concluded "that the judgmentally selected nuggets roughly represent an equivalent level of NSF resources devoted to each directorate. This provides some assurance that relevant elements of NSF's program awards portfolio are being reflected in the nuggets provided to the AC/GPA."¹⁶ For significance, IBM determined that NSF is using the appropriate approach for sampling and that significance would be impacted if judgmental sampling were replaced, for example, by random sampling: "On the issue of judgmental verses random sampling of nuggets, we believe that the use of judgmental sampling is appropriate for the purposes of the AC/GPA. Judgmental sampling assures that those programs that NSF professional staff judge as scientifically significant are included in the nuggets for use by the

¹³ "Report of the Advisory Committee for GPRA Assessment," September 12, 2003; see

<http://www.nsf.gov/od/gpra/reports/ACGPA%20Report%20for%20FY%202003%20accessible.pdf>

¹⁴ "Government Performance and Results Act (GPRA) Performance Measurement and Verification. Report on FY 2003 Results." IBM Consulting, October 2003.

¹⁵ *Ibid.*

¹⁶ *Ibid.*

Committee. Because of the importance of applying professional judgment in the selection process, the traditional audit approach of random sampling would not meet the standard of "significance" in this instance."¹⁷

The Committee had access to over 50,000 project reports and three years of COV reports in addition to nuggets. While it is correct that some COV reports do not address all three strategic outcome goals, the volume of information covering the NSF portfolio from these various sources vastly overshadows these minor gaps. The work of COVs is well known to the Committee membership as most currently and formerly served as COV members. IBM Consulting concluded that "Given the charge of the AC/GPA to provide a qualitative, rather than quantitative, judgment on NSF's outcomes, we believe that NSF fulfilled its responsibility to provide adequate performance information by giving the committee access to all available sources of information via the AC/GPA website and allowing the committee to determine for themselves how best to use this information."¹⁸ NSF will continue to fulfill its responsibility in this area and to work to improve this process.

Selected Performance Goals and Results

For FY 2003, NSF's annual performance goals are organized into two categories – Strategic Outcome Goals and Management Goals.

- The Strategic Outcome Goals focus on the long-term results of NSF grants and programs. They represent what the agency seeks to accomplish with the investments that are made in science and engineering research and education. NSF's outcomes from its awards provide evidence of the success of its investments in People, Ideas and Tools. For a more detailed discussion of each of the Foundation's FY 2003 Strategic Outcome Goals, see Chapter II.
- NSF's Management Goals focus on the factors and strategies that enable the Foundation to successfully implement and attain its strategic outcomes. The Management Goals address five performance areas: proposal and award processes; award portfolio; award oversight and facilities management; business practices; and human resources and workplace issues. For a more detailed discussion of each of the Foundation's FY 2003 Management Goals, see Chapter II.

FY 2003 Strategic Outcome Goals: Among agency achievements were the following:

- NSF demonstrated significant achievement in developing a diverse, internationally competitive and globally-engaged workforce of scientists, engineers, and well-prepared citizens.
- NSF demonstrated significant achievement in enabling discovery across the frontier of science and engineering, connected to learning, innovation and service to society, and

¹⁷ "Government Performance and Results Act (GPRA) Performance Measurement and Verification. Report on FY 2003 Results." IBM Consulting, October 2003.

¹⁸ *Ibid.*

- NSF demonstrated significant achievement in providing broadly accessible, state-of-the-art and shared research and education tools.

The following examples illustrate the impact and success of NSF's investments in People, Ideas and Tools. Because many research results appear long after the period when the investment is made, these are outcomes and results of NSF support of research and education projects made in prior years that emerged in FY 2003. Additional examples can be found in Chapter II.

- ✓ **PEOPLE: *Digital Libraries for Children: Computation Tools That Support Children as Researchers***: This was a three-year demonstration project¹⁹ to develop a children's digital library environment. A team working with children ages 7-9 years and teachers as "design partners," developed new digital library technologies focusing on multimedia information resources donated by the Discovery Channel and the Patuxent Wildlife Research Center. The project has resulted in: (1) development of a digital library prototype (SearchKids) that can be used by multiple children at the same time, thanks to a special interface that enables multiple mice to be used simultaneously on one computer; (2) a linked zoomable presentation tool (KidPad); (3) evaluation of the software with 120 second- and third-grade children, demonstrating that young children not normally capable of complex Boolean searches can do so more efficiently and accurately given a visual interface; and (4) generalization of the technology to work with other databases. The team is collaborating with the Library of Congress and the Internet Archive to develop the largest international children's book digital library in the world. The research has attracted media coverage, e.g. *Online Library Project Plans a Cultural Trove for Children* (The New York Times Online, December 5, 2002) and *Library for Kids Goes Online* (National Public Radio, November 18, 2002).
- ✓ **PEOPLE: *Louis Stokes Alliances for Minority Participation Program (LSAMP)***: Collectively, the reach of the LSAMP program is extensive, including Alaska, Washington, Montana, Texas, Florida, Puerto Rico, Massachusetts, New York, Rhode Island, Pennsylvania, the Carolinas, Illinois, Indiana, Ohio, Missouri, Oklahoma, Tennessee, Colorado, New Mexico, Arizona, California and Hawaii.²⁰ In 2002, more than 22,000 under-represented minority students received science, technology, engineering and mathematics (STEM) baccalaureate degrees via the LSAMP program. The program now includes 31 alliances representing nearly 400 individual institutions. Beginning Fall 2003, 130 new LSAMP graduates are expected to enter graduate school programs in STEM disciplines at 13 graduate institutions across the country. These outcomes of the LSAMP program indicate progress toward addressing the long-term goal of increasing the production and diversity of Ph.D.s in science, technology, engineering and mathematics with an emphasis on entry into faculty and research positions.
- ✓ **IDEAS: *African Ice Cores Reveal Prolonged Tropical Droughts***: Ohio State University professors Lonnie Thompson and Ellen Mosley-Thompson led an

¹⁹ www.cs.umd.edu/hcil/kiddesign/searchkids.shtml

²⁰ <http://www.ehr.nsf.gov/hrd/amp.asp>

international team of researchers to the summit of Mt. Kilimanjaro to collect glacial ice cores in order to study the history of tropical climate and the African monsoon system. What they discovered was completely astonishing. Through careful analyses, the researchers recreated an unprecedented and highly detailed record of three catastrophic droughts that plagued the region 8,300, 5,200 and 4,000 years ago. Glaciers at the top of Mt. Kilimanjaro in Tanzania began forming 11,700 years ago. Data from the ice cores reveal a wetter landscape in the region some 9,500 years ago than compared to today. Lake Chad, now the fourth largest body of water on the African continent with an area of 17,000 square kilometers, then covered 350,000 square kilometers – an area larger than the modern day Caspian Sea. But beginning around 8,300 years ago, the ice cores reveal a climate of recurring and prolonged droughts, some lasting 300 years. While the causes of such climatic events are under active study by the Thompsons and colleagues, their recurrence is of major concern because 70 percent of the world's population now lives in the tropics, and social systems can be dramatically stressed by climate events of the magnitude recorded in the ice. The study of paleoclimates from ice cores is at the cutting edge of new insights and technologies that enable broader understanding of the interaction of climate and society.

- ✓ IDEAS: *Discovering How Some Plants Resist Insects May Lead to Safer Insect Control*: When plants are chewed by insects, they often respond by producing proteins that protect them from being eaten. Doctors Dawn S. Luthe, Peter Ma, and Tibor Pechan of Mississippi State University, have discovered an enzyme in corn that drastically slows the growth of caterpillars by damaging their midgut. This is a fundamentally new mechanism of plant resistance to insects that could greatly benefit the agricultural industry. It may be possible, in the future, to use this to genetically engineer plants to resist insect feeding, which is currently responsible for 15 percent of the world's crop losses, a major economic and ecological problem that decreases the supply of food to a growing human population. The availability of effective and environmentally safe insect control is important to everyone. The discovery of this fundamentally new mechanism of plant resistance could revolutionize the control of insect damage to crops.
- ✓ IDEAS: *Research across disciplines – earthquakes and supershear*: Jean Carlson is a condensed matter theorist who has discovered a new phenomenon involved in earthquake rupture dynamics: locally stronger fault sections, rather than slowing ruptures, drive them forward at velocities exceeding the shear wave speed. This work helps us to understand not only the damage mechanism of earthquakes but also the failure of engineering materials. The research involved performing computer simulations of models for the rupture process that occurs during an earthquake, taking into account variations in stresses or the presence of non-uniform geophysical materials that have different strengths. This research has yielded a possible explanation of earthquake phenomena observed in the earthquakes of 1999 in Turkey and in 1984 at Morgan Hill, California, and possibly others, while at the same time providing insight into the shear fracture failure of materials.
- ✓ TOOLS: *High-Performance Probes Developed at NHMFL*. A unique capability of the National High Magnetic Field Laboratory (NHMFL) at Florida State University is

to develop high-performance probes for nuclear magnetic resonance (NMR) spectroscopy and imaging. These probes, which are used, for example, to study membrane proteins and materials chemistry under high magnetic fields, are not commercially available. The unique magnets at the NHMFL generate unique instrumentation requirements; the NHMFL instrumentation staff works with an international group of application scientists, users, academic and industrial collaborators to meet user needs. Probes have been developed for NMR studies of inorganic solids and for magnetic resonance imaging (MRI). More probes are in development for biological and inorganic solids. One such probe has been used to obtain spectra sensitive enough to resolve different valence states in a solid sample. Other probes used for solid-state NMR provide measurements over a wide temperature range for samples smaller than 5 mm. High-sensitivity cryoprobes for solution NMR experiments are in great demand, and probes are currently being developed for NMR at the highest fields available. These probes enable investigations of the behavior of a wide variety of materials that would otherwise be impossible or much too time-consuming.

- ✓ **TOOLS: *Most Detailed Images of the Early Universe:*** Using a powerful new instrument deployed at the South Pole, a team of cosmologists led by the University of California at Berkeley has produced the most detailed images of the early Universe ever recorded. The new results provide additional evidence to support the currently favored model of the Universe in which 30 percent of all matter is in the form of dark matter. Sixty-five percent is in the form of dark energy that appears to be causing the expansion of the Universe to accelerate. Only the remaining five percent of the Universe takes the form of familiar matter like that which makes up planets and stars. This new information was made possible by a new sensitive instrument – the Arcminute Cosmology Bolometer Array Receiver (ACBAR). ACBAR was specifically designed to take advantage of the unique capabilities of the 2.1-meter Viper radio telescope, installed by NSF at the Amundsen-Scott South Pole Station in Antarctica. The receiver is an array of 16 detectors that create images of the sky in 3-millimeter wavelength bands near the peak in the brightness of the Cosmic Microwave Background.

FY 2003 Management Goals: Among agency achievements were the following:²¹

- Despite a 14 percent increase in the number of proposals to over 40,000 received this year, nearly 80 percent of award/decline decisions were made within six months of receipt. From customer satisfaction surveys conducted in the past, the amount of time it takes to process a proposal is one of the most significant concerns of the science and engineering research community; NSF has exceeded its 70 percent target goal for the second consecutive year.

²¹ For more detailed information about each of NSF's GPRA performance goals and results, including baseline data, recent trends, performance targets, explanations of unachieved goals and the agency's plans to meet these goals in the future, see Chapter II.

- Allocated nearly 90 percent of funds to projects reviewed by external peers and selected through merit-based competition. This is the sixth consecutive year that the Foundation has exceeded the goal of 85 percent, a target that was set consistent with OMB guidance.
- Ninety-nine percent of the agency's program announcements were available at least three months prior to proposal submission deadline. This is the second time that the agency has achieved its 95 percent target goal since its establishment in 1999. Last year the goal was missed by one percentage point; clearly the additional efforts made towards achieving this goal, which included better planning for competitions requiring individual announcements and solicitations and improved clearance processes, were successful.
- Nearly 100 percent of Principal Investigator (PI) award transfers were received and processed electronically through FastLane, substantially exceeding the target goal of 90 percent. This goal focuses on award transfers between organizations, a process that is initiated when a PI moves from one institution to another. The capability to process PI award transfers was a frequent request of the grantee community. This was a new goal established in FY 2003.

Among the Management Goals that were not achieved were the following:

- NSF did not achieve its goal to increase the average duration of awards for research projects to at least three years. This largely reflected the limited resources available to Program Directors who must balance competing needs of increasing award size and duration and/or making more awards. Although this is the third consecutive year that the agency failed to achieve this goal, NSF has made progress over the last five years in increasing the average duration rate – from the FY 1998 baseline of 2.7 years to the FY 2003 rate of 2.9 years. The Foundation is committed to its long-term goal of increasing award duration to five years; even though the Foundation was not able to reach the target for FY 2003, there is now a much higher level of awareness and appreciation of the importance of continuing to work toward the long-term goal.
- NSF did not fully implement Phase III of the Electronic Jacket (E-Jacket) application. The E-Jacket is part of the Foundation's effort to create an integrated, paperless proposal and award-processing environment; E-Jacket extends NSF's paperless processing environment to internal systems and allows staff to process a proposal from submission through closure, and eventually, will also have the ability to archive all proposals electronically. Although Phase III capabilities were developed as planned, implementation was delayed to ensure staff was properly trained and ready to use the new capabilities. Additional efforts for outreach and training, and testing for pilot deployments are underway to assure a smooth transition in FY 2004.

Data Verification and Validation

Foundation staff verified and validated all NSF performance data. In addition, for the fourth consecutive year, NSF engaged an independent, external consulting firm to conduct verification and validation review of all the performance measures. The assessment was based on criteria established by the General Accounting Office's *Guide to Assessing Agency Annual Performance Plans* ([GAO/GCD-10.1.20](#)).

Their review of the Management Goals included assessing the accuracy of NSF's performance data and reported outcomes of performance goals and indicators; describing the reliability of the processes NSF uses to collect, process, maintain and report data; reviewing system controls to confirm that quality input results in quality output; creating detailed process descriptions and process maps for those goals being reviewed for the first time; and identifying changes to processes and data for those goals undergoing an update review. The final verification and validation review report stated the following:

“We commend NSF for undertaking this fourth-year effort to confirm the reliability of its GPRA data and results and its processes to collect, process, maintain, and report data for its performance goals. From our FY 2003 review, we conclude that NSF has made a concerted effort to assure that it reports its performance results accurately and has effective systems, policies, and procedures to promote data quality. Overall, we verify that NSF relies on sound business practices, internal controls, and manual checks of system queries to report performance. NSF maintains adequate documentation of its processes and data to allow for an effective verification and validation review. Further, we validate the reliability of NSF's third and fourth quarter results through our successful recalculation or reconfirmation of these results based on processes, data and systems.”²²

The consulting firm was also asked to review the work of the AC/GPA. The team verified that the AC/GPA process of evaluating NSF's achievements against its Strategic Outcome Goals involved a robust collection of performance information and that this performance information was 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 assessments.

The Linkage Between Budget, Performance and Costs

NSF's budget is funded through six Congressional appropriations:²³ Research and Related Activities (R&RA); Major Research Equipment and Facilities Construction (MREFC); Education and Human Resources (EHR); and Salaries and Expenses (S&E). A fifth appropriation funds the Office of the Inspector General. In FY 2003, Congress authorized and provided a separate sixth appropriation to fund the National Science Board.

Approximately 95 percent of NSF's budget goes directly to the investments it makes in support of its Strategic Outcome Goals of People, Ideas and Tools. The remaining five percent of the budget goes toward Administration and Management, which provides support for the immediate activities of the agency, e.g., processing proposals, issuing awards and overseeing projects.

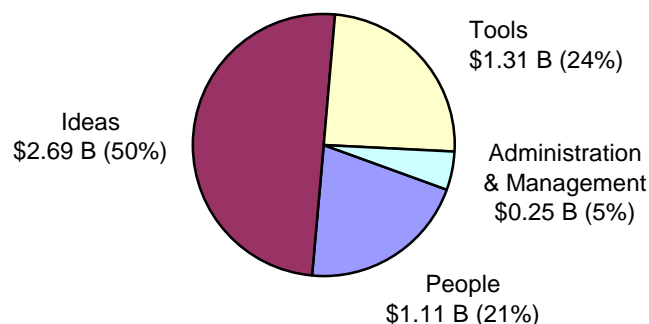
²² “Government Performance and Results Act (GPRA) Performance Measurement and Verification. Report on FY 2003 Results.” IBM Consulting, October 2003, page 1.

²³ Other revenue sources such as reimbursable authority, appropriations transfers from other federal agencies, donations and H-1B Nonimmigrant Petitioner receipts account for a minor portion of NSF's budget.

As shown in Figure 8, NSF's the Strategic Outcome Goals were supported at the following levels: \$1.11 billion for People, \$2.69 billion for Ideas and \$1.31 billion for Tools. Support for Administration and Management activities, which are addressed by the Management Goals, is at \$250.63 million.

Figure 7.

NSF FY 2003 Budget Obligations- \$5.37 Billion



[Note: Total does not add due to rounding.]

Figure 9 shows how each of NSF's budget accounts support the agency's Strategic Outcome and Management Goals. The Research and Related Activities and Education and Human Resources accounts have components distributed among all three strategic outcome goals. The deployment of funds in these two accounts to the People, Ideas or Tools goals is done on a program-by-program basis. In practice, each of NSF's several hundred programs is assigned to one of the People, Ideas or Tools strategic areas based on the program's principal objective. A list of programs associated with each strategic outcome goal can be found in the NSF Strategic Plan. NSF's Statement of Net Cost is also presented in terms of the agency's three strategic outcome goals of People, Ideas and Tools. Cost data are also developed at the programmatic level, by tracking the program elements and their alignment with the People, Ideas, and Tools goals.

However, this view of how NSF deploys its budget does not reflect a key facet of NSF's approach – the multiple purposes each investment serves. 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 NSF program officers are expected to take such potential contributions into account when making awards. The synergy attained across the three strategic goals attests to the real strength of the NSF process.

Figure 8.
FY 2003 Support of NSF's Strategic Outcome and Management Goals
(Obligations in Millions of Dollars)

Account	Strategic Outcome Goals			Management Goals	Total
	<i>People</i>	<i>Ideas</i>	<i>Tools</i>	<i>Administration & Management</i>	
R&RA	\$365.83	\$2,539.81	\$1,111.24	\$37.55	\$4,054.43
EHR	748.21	152.15	22.43	12.09	934.88
MREFC	-	-	179.03	-	179.03
S&E	-	-	-	189.42	189.42
OIG	-	-	-	8.70	8.70
NSB	-	-	-	2.88	2.88
Total	\$1,114.04	\$2,691.96	\$1,312.70	\$250.64	\$5,369.34

Note: R&RA=Research & Related Activities; EHR=Education and Human Resources; MREFC=Major Research Equipment and Facilities Construction; S&E=Salaries and Expenses; OIG=Office of Inspector General; and NSB=National Science Board. 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 being reported here in the agency's *FY 2003 Performance and Accountability Report*, consistent with the provisions of the Reports Consolidation Act of 2000.

The National Science Foundation's Management Controls Committee (MCC), chaired by the Chief Financial Officer, is responsible for reviewing and reporting on management controls to the Director. The Committee requires that NSF Assistant Directors and Staff Office Directors provide annual statements on FMFIA reviews and the status of management controls within their organizations. These statements serve as the primary basis for the Foundation's assurance that management controls are adequate.

Based on the organizational reviews conducted in late summer 2003, MCC reported to the Director, NSF, 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 2003, 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 123 (Management Accountability and Controls) and OMB Circular 127 (Financial Management Systems).

During the FY 2003 management controls evaluation process, MCC did not identify any material weaknesses as defined by OMB guidance. The Committee's review did identify two issues that have risen to a significant level of concern across the agency: human resource support and IT security. While not of the magnitude to put them within the boundary conditions of FMFIA as material weaknesses, the concerns are serious and widespread, and have the potential to impact the agency's ability to accomplish its mission. NSF already gives high priority to addressing these issues. Steps taken include an ongoing business analysis, with plans for the development and implementation of human capital strategies; a strengthened IT security management structure and the continual improvement of IT security; the certification and accreditation of information systems; and budget requests for additional resources. NSF has also elevated its commitment by establishing a new goal for organizational excellence in its recently updated Strategic Plan, addressing human capital, business processes, and technology and tools for the workplace.

As in previous years, during the FMFIA assessment process senior management also identified other management challenges. These challenges are not of the magnitude of those of noted above. They are, nevertheless, important to NSF. They are complementary to the challenges identified by the Office of Inspector General, and in line with the initiatives covered by the President's Management Agenda, including Human Capital Management; Financial Management; Expanded Electronic Government; Budget and Performance Integration; and Competitive Sourcing. Several of the challenges noted in the FY 2003 reports have been or can be resolved through processes already in place. Other challenges will be addressed by increased management attention. MCC also noted that, following GAO recommendations, NSF changed the way it apportioned Salaries and Expenses funds during a period covered by one of the FY 2003 Continuing Resolutions, to base apportionment on calendar rather than compensable days.

In the FY 2003 Independent Auditors' Report, NSF received an unqualified opinion on its financial condition, with no material weaknesses and one reportable condition: post-award monitoring. The Foundation has made substantial progress in the development of policies and procedures for post-award management. The reportable condition, cited also in two previous audits, focuses now on the need for resources to ensure full implementation of the agency's plans. NSF is committed to continuing to enhance its activities for post-award monitoring and to seek additional resources.

The Director of NSF has determined that the National Science Foundation is in substantial compliance with FMFIA and FFMIA. Her statement of assurance is included in the Director's letter, on page I-1.

DISCUSSION AND ANALYSIS OF THE FINANCIAL STATEMENTS

The National Science Foundation is committed to providing quality financial management to all its stakeholders. It honors that commitment by preparing annual financial statements in conformity with generally accepted accounting principles in the United States and then subjecting the statements to an independent audit to ensure their reliability in assessing the performance of NSF. For FY 2003, NSF received an unqualified opinion that the principal financial statements were fairly stated in all material respects. The independent auditors did not report any material weaknesses. However, there was one reportable condition related to post-award management.

Understanding the Financial Statements

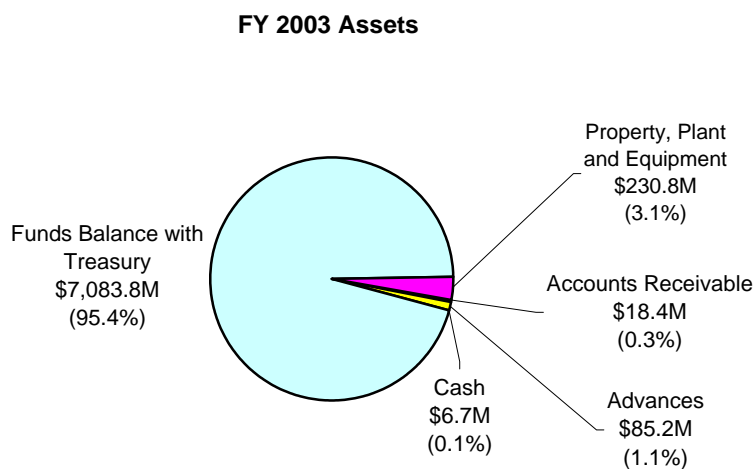
NSF's FY 2003 financial statements and notes are presented in the formats required for the current year by OMB Bulletin No. 01-09, *Form and Content of Agency Financial Statements*, dated September 25, 2001, and OMB Memorandum entitled *FY 2003 Financial and Performance Reporting*, dated August 13, 2003. NSF's current year financial statements and notes are presented in a comparative format providing financial information for FY 2003 as well as for FY 2002. The Stewardship Investment Statement presents information over the past five years.

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

Balance Sheet: The Balance Sheet presents the combined amounts available for use by NSF (assets) against the amounts owed (liabilities) and amounts that comprise the difference (net position).

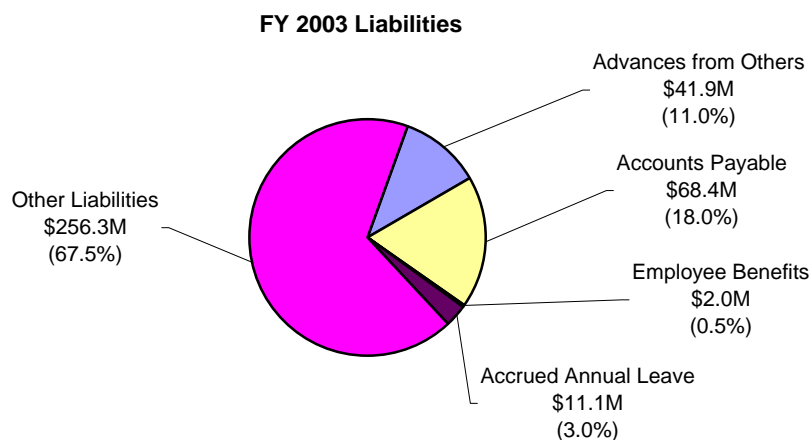
Three line items consisting of *Fund Balance with Treasury*; *Property, Plant and Equipment*; and *Advances* represent 99 percent of NSF's current year assets. *Fund Balance With Treasury* is funding available through the Department of Treasury accounts from which NSF is authorized to make expenditures 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 support the United States Antarctic Program (USAP). *Advances* are funds advanced to NSF grantees, contractors, and other government agencies.

Figure 9.



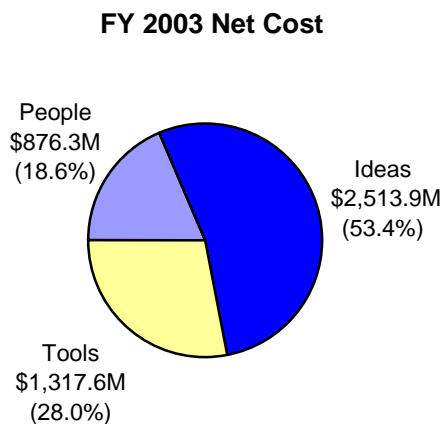
Three line items, *Advances From Others*, *Accounts Payable* and *Accrued Liabilities (Other Liabilities)* represent 95 percent of NSF's current year liabilities. *Advances From Others* are prior year amounts remaining advanced to NSF from other federal entities for the administration of grants on their behalf. NSF maintains the expertise and automated systems for the administration of research grants upon which other federal entities rely to assist in the administering of their grants. *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, although payment has not been rendered.

Figure 10.



Statement of Net Cost: This statement presents the annual cost of operating NSF programs. The 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 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.

Figure 11.



Note: Included in *People*, *Ideas* and *Tools* is approximately four percent of *Salaries & Expenses*, *National Science Board* and *OIG costs*.

Approximately 96 percent of all current year NSF costs incurred were directly related to the support of NSF People, Ideas and Tools programs. Costs were incurred for indirect general operation activities – e.g., as salaries, training, activities related to the advancement of NSF information systems technology, and the activities of the National Science Board and the Office of Inspector General. Salaries and Expenses activities account for slightly more than four percent of the total current year NSF Net Cost of Operations. NSF is continually committed to administrative efficiency.

Statement of Changes in Net Position: This statement presents those 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 \$7,045 million in FY 2003 – an increase of 11 percent – due to the \$15.6 million increase in *Cumulative Results of Operations* and the \$682.5 million increase in *Unexpended Appropriations*. *Cumulative Results of Operations* is affected mainly by *Appropriations Used* and *Net Cost of Operations* with minor impact from *Donations* received and *OPM Imputed Financing Costs*. *Unexpended Appropriations* is affected mainly by *Appropriations Received* and *Appropriations Used*, with minor impact from *Appropriation Transfers from 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 2003, Budgetary Authority for Research and Related Activities, Education and Human Resources, Major Research Equipment and Facilities Construction, the National Science Board, OIG and Salaries & Expenses were \$4,083 million, \$974 million, \$150 million, \$3 million and \$200 million, respectively. *Total Budgetary Resources* and *Net Outlays* both increased by 12 percent in FY 2003 and are consistent with NSF's increase in appropriated funds. 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 Trust Fund receipts, to include donations and interest received by NSF.

Statement of Financing: This statement illustrates a 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. The result of the relationship adjustments is a *Net Cost of Operations* total that reconciles to the Statement of 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 shown in this statement as the number of awards made and the number of researchers, students and teachers supported in the pursuit of discoveries in science and engineering and in

science and math education. Stewardship investments from FY 2002 to FY 2003 showed consistent incremental increases in research and human capital activities in support of NSF's overall mission as reported in monetary investments and measured output/outcomes. This is also in line with overall funding increases over the past four years.

Budgetary Integrity: NSF Resources and How They Are Used

NSF is funded primarily through six Congressional appropriations that totaled \$5.3 billion in FY 2003, a 10.4 percent increase from the prior year.²⁴ As of September 30, 2003, other FY 2003 revenue sources included \$108.9 million in reimbursable authority, \$13.1 million in appropriation transfers from other federal agencies, and \$42.2 million in donations to support NSF activities. Additional resources were also received from the Department of Justice under the American Competitiveness and Workforce Improvement Act, enacted in 1998, which provides for a temporary increase in access to skilled personnel from abroad under the H-1B visa program. As of September 30, 2003, NSF had received \$65.3 million from H-1B nonimmigrant petitioner fees, to support education activities and scholarships for financially disadvantaged students in computer science, engineering, and mathematics.

As indicated in the Statement of Net Cost, the Foundation made investments in education and fundamental research in support of its three strategic outcome goals of People, Ideas and Tools. Administrative support for the Foundation is provided through five appropriation accounts: Salaries and Expenses, Research and Related Activities, and Education and Human Resources. The Office of Inspector General is funded under a separate appropriation, and this year there is a new account for funding the Office of the National Science Board.

In FY 2003, in addition to funding disciplinary research, the Foundation supported five key multidisciplinary priority areas: Biocomplexity in the Environment, Information Technology Research, Nanoscale Science and Engineering, Mathematical Sciences, and Human and Social Dynamics. Support was also provided for polar programs, major research instrumentation, as well as education activities that span from pre-K to the post-doctoral level. Among major research and equipment and facilities construction projects funded were the Atacama Large Millimeter Array (ALMA) aperture-synthesis radio telescope; the High-Performance Instrumented Airborne Platform for Environmental Research (HIAPER); the IceCube Neutrino Detector Observatory in Antarctica; and the Large Hadron Collider.

At the time of this report, NSF had not yet received an FY 2004 appropriation. However, NSF's FY 2004 Request includes ongoing support for the five FY 2003 priority areas. Among the research and education activities slated for support in FY 2004 are: investments in cyberinfrastructure, to bring next-generation computer and networking capabilities to researchers and educators nationwide; fundamental research that will help address new homeland security challenges facing the nation; the Administration's Climate Change Research Initiative; and ongoing research on the genomics of plants of major economic importance. NSF will maintain its long-term goal to increase the size and duration of research grants and special emphasis is being focused on investments in the mathematical and physical sciences. Ongoing support is also being provided for several major research equipment and facilities construction projects.

²⁴ Includes a government-wide 0.65 percent rescission.

Improper Payments Information Act of 2002

In May 2002, Congress enacted legislation that requires federal agencies to identify and reduce improper payments in government programs and activities. In OMB Circular A-11, Exhibit 57B, Information on Erroneous Payments, the Office of Management and Budget identified NSF research and education grants and cooperative agreements as the programs for which erroneous payment information is required on an annual basis. While NSF has pre-award internal controls to effectively reduce any risk of improper payments to a low level on all programs, adopting expanded techniques to reduce improper payments made by third party recipients of NSF funds is also an important part of our plans to address this issue. NSF performed a full inventory assessment of all our appropriation activities and determined the Exhibit 57B programs and major research equipment awards present the most significant risk to NSF for third party improper payments. For NSF commercial activities, contracts are significantly less than \$500 million annually, which is the OMB threshold requirement for recovery audits. The level of incorrect payments for purchase and travel cards is minimal, and we are expanding monitoring activities in these areas.

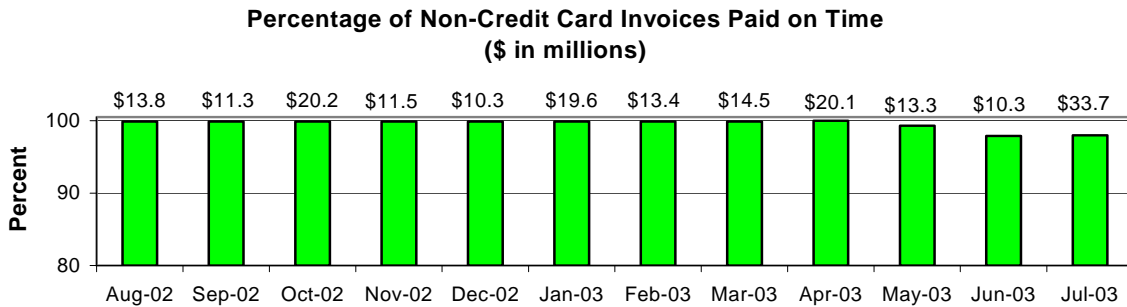
On October 17, 2003 NSF submitted to OMB a draft action plan for preventing and reducing improper payments in compliance with the Improper Payments Information Act of 2002 . We requested OMB provide any comments to our draft action, which can be considered and included in our final plan. The final NSF plan to prevent and reduce improper payments will be submitted to OMB by November 30, 2003.

Financial Metrics.

This section is intended to relate key financial measures of NSF's core business of awarding grants and our progress in associated electronic processes. NSF is always striving to leverage automation to accomplish our mission. Figures 13, 14, and 15 focus on the agency's Federal Cash Transaction Report (FCTR) process, a key part of our core award business. Figures 16, 17 and 18 depict the latest available information on key measures for NSF as reported in the federal Measurement Tracking System (MTS) sponsored by OMB's Office of Federal Financial Management.²⁵ The third chart summarizes some of NSF's key workload and financial indicators.

²⁵ <http://www.fido.gov/mts/>

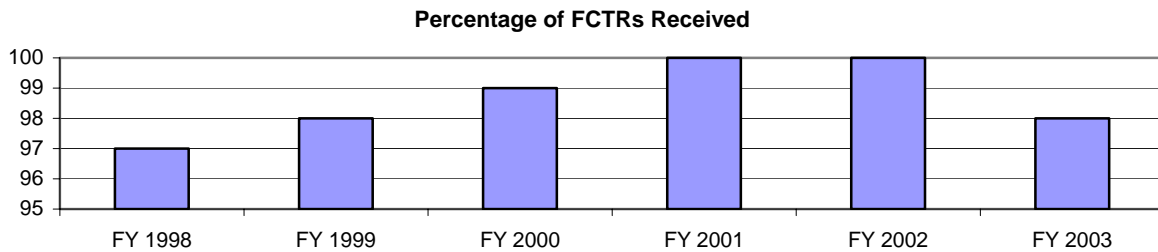
Figure 12.



In FY 1998, NSF established the capability for grantees to go online through a web-based "FastLane" system to electronically transmit Federal Cash Transaction Reports (SF 272), required by nearly all federal grant-making agencies. Within two years, virtually 100% of NSF grantees were submitting FCTR reports online.

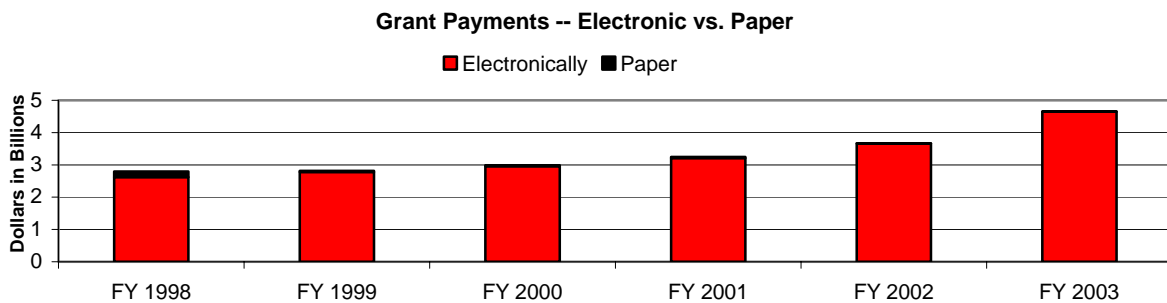
Figure 13.

NSF receives close to 100% of FCTR reports from those grantees eligible to use



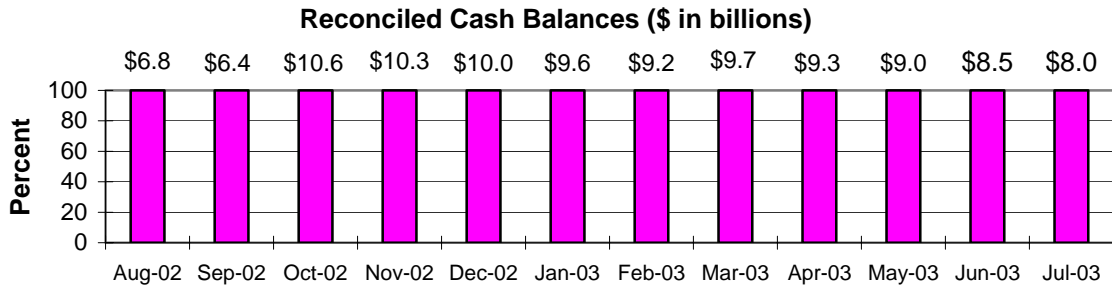
electronic transmission of the report. Foreign grantees without U.S. banks are not eligible to use FastLane Cash Request.

Figure 14.



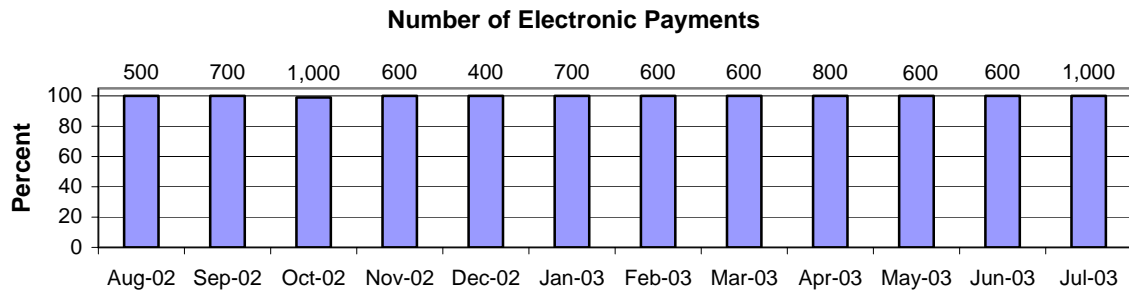
Customer-friendly enhancements to the FastLane FCTR module have greatly enhanced the efficiency of payments to grantees. Nearly 100% of grantee payments are transmitted electronically.

Figure 15.



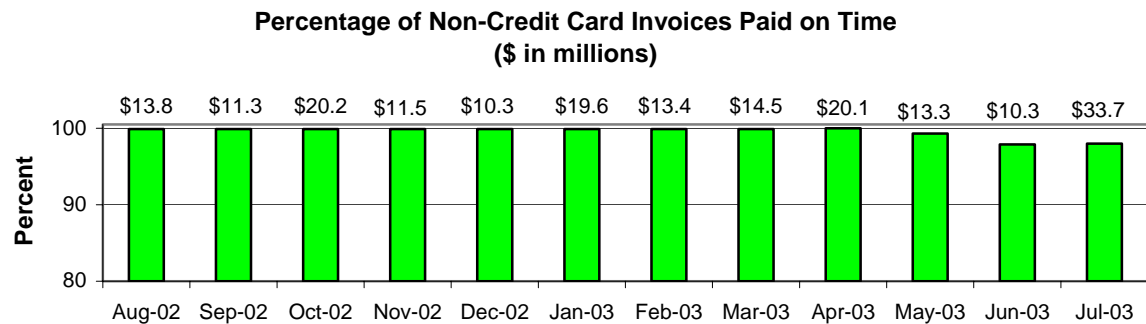
NSF continually reconciles our Fund balances with Treasury. (Note: July 2003 is currently most recent data available.)

Figure 16.



NSF requires all commercial vendor payments be made through EFT, except foreign ones. (Note: July 2003 is currently most recent data available.)

Figure 17.

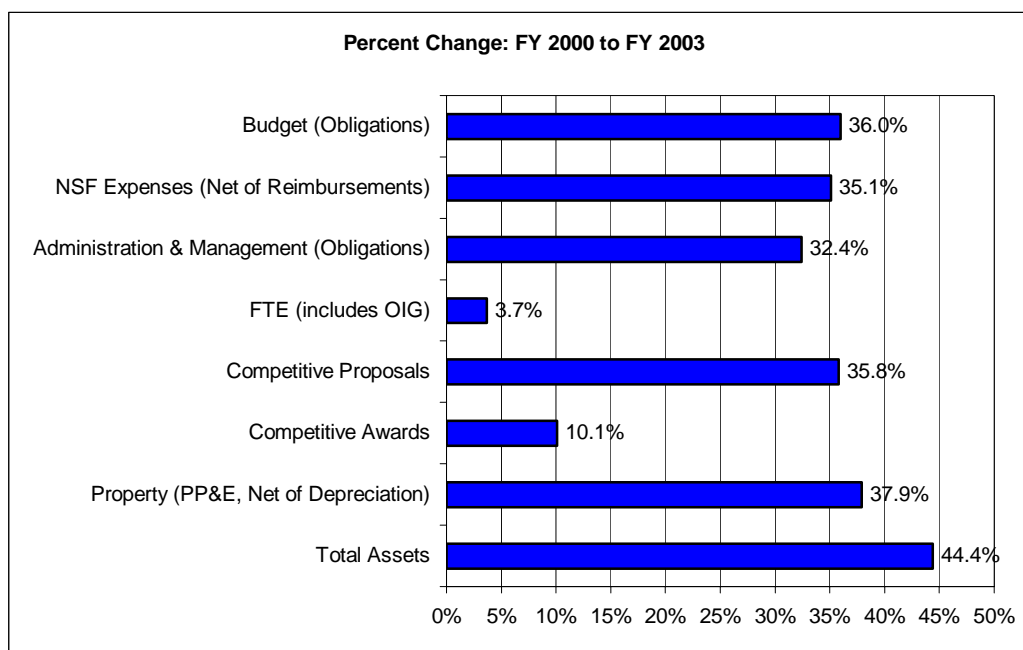


NSF has implemented an accounts payable module in its financial accounting system which ensures that Prompt Payment Act requirements are met. (Note: July 2003 is currently most recent data available.)

Figure 18.
Recent Trends

The following table summarizes several of NSF's key workload and financial indicators. For the period FY 1999-2003, NSF's expenses, administrative and management costs, competitive proposals and competitive awards all increased, reflecting the increase in NSF's budget. However, over this period, there has been only a small increase in staff. NSF property increased substantially due to the Antarctic South Pole Station Modernization multi-year project that is underway. NSF's total assets increased mainly due to a larger cash balance with Treasury, which is also related to NSF's budget increase.

	FY 2000	FY 2001	FY 2002	FY 2003	% Change FY 00-03
Budget (Obligations)	\$3,948.43 M	\$4,532.32 M	\$4,774.06 M	\$5,369.34 M	36.0%
NSF Expenses (Net of Reimbursements)	\$3,484.51 M	\$3,698.14 M	\$4,132.27 M	\$4,707.77 M	35.1%
Administration & Management (Obligations)	\$189.32 M	\$213.72 M	\$230.58 M	\$250.64 M	32.4%
FTE (incl. NSB & OIG)	1,200	1,220	1,242	1,244	3.7%
Competitive Proposals	29,508	31,942	35,164	40,075	35.8%
Competitive Awards	9,850	9,925	10,406	10,844	10.1%
Average Annual Research Grant Size	\$105,800	\$113,601	\$115,666	\$135,609	28.2%
Average Research Grant Duration (in yrs)	2.8	2.9	2.9	2.9	3.6%
Property (PP&E, Net of Depreciation)	\$167.36 M	\$203.24 M	\$224.14 M	\$230.78 M	37.9%
Total Assets	\$5,140.31 M	\$6,001.90 M	\$6,713.15 M	\$7,424.92 M	44.4%



Future Business Trends and Events

NSF is continuously evolving as we focus on new priorities and challenges. The future will require NSF to focus on demonstrating management excellence through sharpened attention to specific financial operational issues. For example, the President's Management Agenda (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, will need to engineer constant improvements in achieving ever evolving management and policy initiatives. NSF is also committed to improving service to its stakeholders and leveraging technology. In addition, the agency also pro-actively addresses management challenges identified through internal review and oversight. Some of the areas NSF will focus on in both the immediate future and long term are:

- *Accelerated and Interim Reporting:* The Administration has set aggressive criteria to measure agency success in improving financial performance as part of the PMA. The goal is for agencies to produce accurate, timely, and reliable financial information on a regular, recurring basis and use that information to make informed decisions. The first part of the "improving financial performance" PMA initiative was to produce reliable financial information more than once a year. OMB Bulletin 01-09, *Form and Content of Agency Financial Statements*, provided guidance on interim reporting requirements for financial statements. OMB Bulletin 01-09 requested semi-annual financial statements to be prepared in FY 2002 and quarterly financial statements in FY 2003 and thereafter. NSF was able to achieve the first part of this initiative and produce interim statements by implementing many changes in its financial statement process to include: on-demand general ledgers, automated year-end and closing entries, accrual automation, and automated financial statements generated from a crosswalk in a data warehousing environment.

The second part of the initiative was to produce more timely financial information by accelerating due dates for reporting from March 31 to November 15. OMB Circular A-11 and OMB Bulletin 01-09 provide instructions on accelerated reporting dates. Agency Performance and Accountability Reports (PAR) are due to the President, OMB, and Congress on January 31, for FY 2002 and FY 2003 and November 15, for FY 2004. NSF met the January 31 date last year and the current report for FY 2003 was prepared as a "dry run" to meet the November 15 date. NSF is currently implementing major changes in order to meet the accelerated reporting deadlines. A significant effort was undertaken in FY 2002 to re-tool and re-schedule NSF's GPRA process and for FY 2003 related advisory committee and validation efforts were moved three months earlier. NSF's Performance and Accountability Report preparation schedule and work plan were also revamped. Meetings were held early in the year with OMB and the OIG regarding efforts on an accelerated schedule. The outcome was a jointly signed CFO and OIG correspondence to OMB dated April 24, 2003 that detailed NSF's pilot attempt in FY 2003 at accelerating the PAR process. A key factor has been working collaboratively with the agency's OIG and external auditors to reengineer [our combined schedule](#). Overall, this Herculean effort significantly increased demands on human capital resources across-the-board and at a small agency like NSF, required innovative ideas to achieve.

- *Budget, Cost and Performance Integration:* NSF has taken a broader, systemic view of the PMA initiative in Budget Performance Integration by including the cost element, thereby establishing a fully integrated process that provides the agency with more complete information to make informed resource allocation decisions. In developing its plan for Budget, Cost and Performance Integration (BCPI), NSF sought input from OMB, the OIG and the NSF Advisory Committee on Budget and Operations. A key step to developing the BCPI Plan has been the update of the agency's GPRA Strategic Plan, which was completed in September 2003. The updated plan establishes a framework for integrating budget, cost and performance by identifying a set of investment categories under NSF's strategic outcome goals. These investment categories represent the "programs" that are used to align NSF's portfolio, as each can be clearly identified with resources and performance goals. NSF is now beginning to map this new budget and program framework to its financial system and its, Statement of Net Cost, and developing methodologies for full budgetary costing. FY 2005 OMB Budget Request incorporated the new alignment and an illustration of full budgetary costing, and NSF expects the FY 2005 Congressional justification will as well.
- *E-Grants:* NSF continues our support as a full-fledged Grants.gov partner agency among the eleven partner agencies in the Government-wide Grants.Gov Initiative, and we continue to be a leader in this important President's Management Agenda activity. See PMA discussion on E-Gov.
- *E-Payroll:* OMB has charged the Office of Personnel Management (OPM) with leading the E-Payroll effort to transform the current federal payroll service environment into a more efficient system, as mandated by the President's Management Agenda. Currently, 22 executive branch payroll providers use varying customized capabilities and technology. The initiative plans to standardize and consolidate payroll processing and reduce the number of payroll systems. NSF selected the Department of Interior, National Business Center (DOI) to convert both our payroll and personnel process. NSF currently has separate payroll and personnel systems that interface to process payroll. The new DOI system will be completely integrated in capturing payroll and personnel information. This outsourcing initiative will require NSF to undergo a substantial effort to transition agency employees involved in personnel and payroll to the new system processes. NSF has created a steering committee to oversee the process and workgroups to accomplish the many required tasks, including developing new internal management plans, a robust communication plan, as well as a detailed migration plan with DOI. NSF's migration to the new system is scheduled for March 2004. The agency is making a large commitment of resources to ensure this effort is successful and has minimal impact on all employees, while seamlessly integrating the new system into NSF's enterprise technology system architecture.
- *E-Travel:* NSF is working with GSA in FY 2003 as a participating pilot agency on the E-Travel solution (E-TS). This project, one element of the President's Management Agenda E-Gov initiative, will provide a government-wide, integrated state of the art web-based solution for travel authorization; reservation and ticketing; and vouchering and payment processes. NSF has been a participating agency in the E-Travel initiative from the beginning, providing both financial and personnel support to this effort. Benefits expected from the new E-TS include a significant savings of staff time, reduced costs, elimination of paperwork, better customer service, improved internal controls and faster reimbursement to travelers. NSF plans to implement the staff portion of the travel solution in FY 2004. By participating

in the government-wide commercial solution, NSF ensures that the technology will remain current and changes in travel policy will be implemented quickly. This initiative will require a commitment of NSF personnel resources throughout the pilot initial planning, testing and implementation at the agency. GSA was recently awarded the E-Travel contract and NSF implementation of the staff portion of the travel solution is planned for FY 2004.

Limitations of the Financial Statements

In accordance with OMB Bulletin 01-09, *Form and Content of Agency Financial Statements*, we are disclosing the following limitations of NSF's FY 2003 financial statements, which are contained in NSF's FY 2003 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 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 statements should be read with the realization that they are for a component of the U.S. Government, a sovereign entity.