

## XII. - MANAGEMENT CHALLENGES AND REFORMS

Federal agency management challenges are discussed in the President's Management Agenda (PMA). For NSF, they are also identified internally by NSF staff and by OMB, GAO, and the NSF Office of the Inspector General (OIG).

The **President's Management Agenda** lists five government-wide initiatives. The first four of these initiatives (Strategic Management of Human Capital, Competitive Sourcing, Improved Financial Performance, and Expanded Electronic Government) are discussed in NSF's FY 2003 Performance Plan. NSF's implementation of the remaining initiative, Budget and Performance Integration, is currently under discussion within NSF and between NSF and OMB. We have contracted with PricewaterhouseCoopers (PwC) to provide formal recommendations to improve our approach on integrating the budget, performance and cost of performance, within the intent of the Government Performance and Results Act (GPRA), Statement of Federal Financial Accounting Standard (SFFAS) 4, and Managerial Cost Accounting Concepts and Standards for the Federal Government.

The **OIG** issues addressed below are those included in a November 2000 statement by the Inspector General on NSF's management and performance challenges. This statement was released on January 4, 2001 and is contained in the NSF FY 2000 Accountability Report. In many instances, the management and performance challenges contained in the PMA, OMB, GAO, and the OIG documents are very similar.

For FY 2001, the NSF OIG identified 10 areas for NSF to monitor:

### FY 2001 OIG Major Management Challenges

1. FastLane
2. GPRA Data Quality
3. Merit Review
4. Cost Sharing
5. Award Administration
6. Management of Large Infrastructure Projects
7. Management of U.S. Antarctic Program
8. Work Force Planning and Training
9. Fostering a Diverse Scientific Workforce
10. Data Security

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### 1. FASTLANE

**NSF OIG COMMENT:** “In the FY 2001 budget, OMB identifies streamlining and simplifying grants management as one of the most important management challenges facing the federal government. At NSF, the development and implementation of FastLane, which began in 1994, has moved the agency closer to the goal of establishing a widely accessible paperless proposal and award process. In many respects the implementation has been successful and NSF serves as a leader within government in electronic innovation. The increase in the use of FastLane by those seeking grants each year has been encouraging and has undoubtedly helped contribute to the increase in productivity NSF has achieved in recent years. However, problems remain, as reflected by the inability of the help desk to cope with the high volume of incoming questions and problems. Because FastLane serves as the primary interface between NSF and its grantees and is critical to many of NSF's administrative plans and goals, we believe that management must continue to monitor its progress and assure that the system is as user-friendly and reliable as possible.”

**FROM THE PRESIDENT’S MANAGEMENT AGENDA:** An expanded electronic-government is one of the government-wide initiatives presented in *the President’s Management Agenda for 2002*. That document states that “the administration’s goal is to champion citizen-centered electronic government.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** NSF’s FastLane system uses the Internet to allow its customers, the grantee community, to exchange information with NSF. It permits users to prepare and submit proposals, proposal reviews and project reports, determine the status of funding actions, submit post-award requests, interactively participate in panel evaluations of proposals, initiate cash requests, view reviews and award letters, and perform other basic interactions. Over 200,000 scientists, engineers, educators, technology experts and academic administrators use FastLane, with over 99 percent of proposals submitted electronically in FY 2001. In addition, the public can access titles, authors, funding amounts and abstracts of NSF awards.

A past challenge for FastLane was to make the system more user-friendly and reliable. In January 2001, FastLane implemented a conversion process to allow Word, WordPerfect, TeX and other documents to be uploaded and converted in real-time to PDF files. This significant, and technically challenging, change to the system was greeted by FastLane’s user community with more positive responses than any other user-oriented change in the system. In March 2001, FastLane included a detailed manual, available through the web, for electronic preparation and submission of proposals.

The implementation in FY 2000 of a toll-free phone number to the FastLane Help Desk made it easier for NSF’s user-community to obtain assistance – while at the same time increasing significantly the call volume. In June and July 2001, the FastLane Help Desk was able to handle peak loads without, for the first time, supplementing the Help Desk with staff from program offices. This improvement is attributed to better Help Desk practices, increase in the operating hours of the Fast Lane Help Desk and the number of trained Help Desk staff, improved on-line documentation, implementation of a word processor conversion tool, work on the web interface to make the system more user-friendly, and spreading out proposal deadlines.

## 2. GPRA DATA QUALITY

**NSF OIG COMMENT:** “GPRA seeks to improve the effectiveness, efficiency and accountability of federal programs by requiring agencies to set goals for performance and report on annual performance compared with the goals. In addition, it requires agencies to “describe the means to be used to verify and validate measured values” of performance in their performance plans. A recent GAO study, Managing for Results: Opportunities for Continued Improvements in Agencies Performance Plans (GAO/GGD/AIMD-99-215), said that a key weakness of NSF’s FY 2000 Performance Plan is that it “provides limited confidence in the validation and verification of data.” Meanwhile, the agency has contracted with several firms to assist in validating the performance data it reports. However, if uncertainty persists about data validity, decision-makers will be reluctant to rely on the information, and its usefulness will be diminished.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** For FY 2000 and FY 2001 GPRA reporting, NSF engaged an external party, PricewaterhouseCoopers LLP (PwC), to provide an independent verification and validation (V&V) of selected GPRA goals. The V&V focused on reliability of data, on processes to collect, process, maintain, and report the data, and on program reports prepared by external experts. PwC mapped NSF procedures against GAO guidance for polices and procedures that underlie GPRA performance reporting.

For FY 2000 PwC reviewed a limited set of our goals and concluded that NSF “relies on sound business processes, system and application controls, and manual checks of system queries to confirm the accuracy of reported data. We believe that these processes are valid and verifiable.”

For FY 2001 PwC reviewed the goals it had reviewed in FY 2000 and additional goals (see Appendix IV.). In their report they state: “We commend NSF for undertaking this second year effort to confirm the reliability of its data and the processes to collect, process, maintain, and report this data. From our FY 2001 review, we conclude that NSF has made a concerted effort to ensure that it reports accurately to the federal government and has effective systems, policies, and procedures to ensure data quality. We have noted some areas for improvement, particularly in the area of data collection for the goals related to facilities management. However, overall NSF relies on sound business practices, system and application controls, and manual checks of system queries to report performance. Further, our efforts to re-calculate the Foundation’s results based on these systems, processes and data were successful.”

FY 2001 progress on NSF’s data quality program included completion of an extensive analysis of the existing data dictionary designed in Access and recommendations for improving the functionality of the data dictionary.

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### **3. MERIT REVIEW**

**NSF OIG COMMENT:** “Because of its importance to the success of NSF's mission, the merit review system remains on our list of management challenges. Operating a viable, credible, efficient merit review system is one of four critical factors identified by the agency in managing for excellence. NSF must continue to ensure that: reviewers correctly apply NSF's review criteria; due consideration is given to ideas, individuals and institutions that have not received past support; and that the process is fairly and effectively administered.

In particular, we believe that the agency has opportunities to improve in two areas. We believe that NSF should enhance its effort to expand the peer review community with regard to race, gender, geography, and type of school, providing the chance to participate to all who are qualified. In our view, the selection of peer reviewers is an opportunity for NSF to reach out to underrepresented segments of the scientific community and educate them about the process of obtaining federal support for their research. This will help to generate proposals from those who may have worthy research ideas but are unfamiliar with, or intimidated by, the system. Secondly, we are concerned about the agency's ability to maintain the confidentiality of proposals in an electronic environment. As more proposal review functions migrate to the internet, NSF must be able to ensure that the intellectual property contained in a proposal is secure.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** NSF considers its merit review process the keystone for award selection. The agency evaluates proposals using two criteria – intellectual merit of the proposed activity and broader impacts of the proposed activity. NSF focuses its management activities on a wide variety of issues related to merit review – including use of both merit review criteria by reviewers and program officers, broadening participation, and enhancing customer service.

In FY 2001 NSF established an internal task force to examine strategies to improve both proposer and reviewer attention to the broader impacts criterion. The group assessed the characteristics and quality of reviewer responses to this criterion and found that, based on a sample of FY 2001 reviews, approximately 69% of reviews provided evaluative comments in response to the broader impacts criterion. The group also developed examples of broader impacts that may be useful to proposers in developing proposals and reviewers in evaluating proposals. In FY 2002, NSF will continue to develop and apply recommendations that focus on strategies that stress the importance of using both criteria. It will also make available examples of broader impacts.

With respect to increasing the diversity of the peer review pool, this was addressed as part of our Investment Process Goal V-8. FY 2001 marks the first time we have focused attention on reviewer pool data. To establish the baselines for this goal, we have begun to gather the appropriate voluntary data from the reviewers, which will be added to the reviewer pool database. A baseline for FY 2002 will be derived from this data.

We will address the challenge of proposal security below in our response to the challenge of data security.

#### 4. COST SHARING

**NSF OIG COMMENT:** “In accordance with Congressional requirements, NSF requires that each grantee share in the cost of NSF research projects resulting from unsolicited proposals. In addition to this statutory requirement, NSF can require additional cost sharing when it believes there is tangible benefit to the award recipient, such as infrastructure development or the potential for program income. When cost sharing is provided for in the approved award budget, it is presumed that the funds are necessary to accomplish the objectives of the award. The commitment becomes a condition of the award and subject to audit to the same extent as the costs borne by NSF. Therefore, if promised cost sharing is not realized, then either the awardee has not met its programmatic objectives, or the project costs less than originally projected. In either case, NSF should have at least a portion of its funds returned to it.

We have been finding significant problems with awardees who are failing to meet their cost sharing requirements. In the past semi-annual period, we found several awardees with significant problems in this regard, discussed in more detail in our September 2000 Semiannual Report. We are continuing to focus our efforts in this area and are currently conducting a broad review of cost sharing at numerous institutions. Because of the importance of these research efforts to the scientific and engineering community, and the detrimental impact a shortfall can have on a project, we consider improvements in administering cost sharing to be among the most important priorities for NSF management.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** In June 1999 an “Important Notice” was sent to Presidents of Universities and Colleges and Heads of National Science Foundation Grantee Organizations. This notice transmitted the “National Science Foundation Policy Statement on Cost Sharing” as approved by the National Science Board. In addition to providing a definition of cost sharing, the policy states that: (1) NSF-required cost sharing is considered an eligibility rather than review criterion; (2) NSF cost sharing requirements beyond the statutory requirement (1%) will be clearly stated in the program announcement, solicitation or other mechanism which generates proposals; (3) for unsolicited research and education projects, only statutory cost sharing will be required; and, (4) any negotiation regarding cost sharing will occur within NSF-stated parameters. NSF has a long-standing policy requiring cost-sharing certification when cost sharing exceeds \$500,000.

This “Important Notice” was also distributed to NSF staff. During the past year, NSF has held several training sessions on cost-sharing for NSF staff and has also conducted sessions on cost-sharing for NSF customers at regional conferences, seminars and workshops.

The Foundation recently conducted an analysis of grantee audits that contain findings related to cost-sharing. It showed that while some grantees have often provided cost-sharing, they may not have had financial and accounting systems able to document their activities. NSF is now conducting more pre-award reviews of grantee financial and accounting systems to assess their capability to report on cost-sharing. Post-award reviews are also conducted to assure compliance with agreed upon cost-sharing requirements. In this analysis, over half of the audit activity (both in number of audit reports and dollar amount of findings cited) reported by the NSF OIG in its Semiannual Reports to Congress since 1997, when the NSF OIG first reported separate statistics on cost-sharing, was for grantee organizations that are “non-traditional” (e.g., public school systems). NSF is currently developing an appropriate strategy for reviewing cost-sharing by these types of grantee organizations and providing outreach and instruction as necessary.

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### **5. AWARD ADMINISTRATION**

**NSF OIG COMMENT:** “NSF's mission is to fund research and education in science and engineering by issuing different types of awards (primarily grants, contracts, and cooperative agreements) thereby strengthening U.S. science and engineering. Assessing scientific progress and ensuring effective financial/administrative management are critical elements in managing NSF's grant programs. Program officers in each of NSF's seven science Directorates are responsible for monitoring the scientific progress of NSF's grants while the Division of Grants and Agreements (DGA) and the Division of Contracts, Policy, and Oversight (CPO) oversee grantees' financial management of NSF awards.

At any one point in time NSF is administering as many as 30,000 ongoing awards. NSF relies on a total staff of 1,150 employees to carry out this oversight responsibility. This is in addition to their responsibility of soliciting and awarding approximately 10,000 grants and cooperative agreements annually amounting to over \$3.5 billion. Given this sizeable workload, NSF is challenged to adequately monitor its awards for scientific accomplishments and compliance with the award agreement and federal regulations. For the most part, NSF relies on interim reports from grantees to monitor progress, but is unable to test the reliability of these reports. NSF also needs to establish a more coordinated oversight effort between its program officers and its grant and contract officers to ensure better sharing of information and more effective action to address compliance issues.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** NSF program portfolios have become more diverse and more complex; however, there has not been a concomitant increase in the staffing complement to provide additional program and administrative oversight functions. The Draft NSF Administrative and Management Strategic Plan currently under development presents a framework for Award Management and Oversight that focuses on a collaborative, multi-functional award management and oversight process that is informed by risk management strategies and verifies that projects are in compliance.

On-site post-award monitoring is one of the most effective methods of ensuring awardee compliance with award agreements and federal regulations. However, it is least often employed because of staff resource constraints, including the availability of travel funds. In order to leverage NSF administrative oversight capability, NSF will develop and initiate in FY 2002 a risk assessment/risk management plan for awards. A GPRA management goal covering these activities has been added to the FY 2002 Revised Final Performance Plan for NSF.

## 6. MANAGEMENT OF LARGE INFRASTRUCTURE PROJECTS

**NSF OIG COMMENT:** “NSF is increasing its investments in large infrastructure projects such as astronomy centers, research equipment, supercomputing databases, and earthquake simulators. The agency spends approximately \$1 billion a year on these research facilities and equipment projects, with each of these projects costing several hundred million dollars. Projects of this scale and complexity are becoming more common for NSF, which historically has administered awards averaging less than \$100,000 each. Successful management of these projects and programs requires a more disciplined project management approach. Management of these projects is particularly challenging for NSF because of its limited number of staff. Although NSF recently issued guidelines for managing these larger projects, the guidelines are interim and have not been fully tested for adequacy.”

**FROM OMB:** OMB has noted that NSF has several multi-year, large facility projects awaiting approval for funding. Although the agency has done well in keeping past projects on schedule and within budget, OMB believes that NSF’s capability to manage proposed projects needs to be enhanced given the magnitude and costs of future projects. NSF was asked to develop and submit a plan to OMB that documents its costing, approval, and oversight of major facility projects.

**FOCUSED NSF ACTIVITIES IN THIS AREA:** In order to mitigate the risks attendant to large facilities management, and to comply with the President’s mandate in *A Blueprint for New Beginnings: A Responsible Budget for America’s Priorities* (February 2001), NSF developed a Large Facility Projects Management & Oversight Plan. The plan was submitted to OMB in September 2001.

This new facilities plan has four major foci:

- Enhance organizational and staff capabilities and improve coordination, collaboration, and shared learning among NSF staff and external partners;
- Implement comprehensive guidelines and procedures for all aspects of facilities planning, management and oversight;
- Improve the process for reviewing and approving Large Facility Projects; and
- Practice coordinated and proactive oversight of all facility projects.

Further development and implementation of the plan is continuing.

In FY 2002 the agency is also initiating development of a risk assessment protocol focused towards on-site monitoring activities.

### 7. MANAGEMENT OF U.S. ANTARCTIC PROGRAM

**NSF OIG COMMENT:** “NSF plays a leadership role among federal agencies involved in supporting research and logistics in the Antarctic through its Office of Polar Programs (OPP). Charged with managing all U.S. activities in the Antarctic as a single program, OPP not only funds research, but also is responsible for operating the infrastructure and logistics necessary to conduct scientific experiments in the harsh polar environment. In this role, it faces a number of unique challenges such as transporting and housing scientists and support staff, assuring their safety and health, protecting the near pristine polar surroundings, ensuring U.S. compliance with the international Antarctic Treaty, and promoting the national interest in maintaining an active and influential presence in Antarctica.

While OPP operates like other NSF directorates in making awards for polar research, its responsibilities do not end there. In providing science, operations, and logistics support to the research projects it funds, it is significantly different than other NSF units. OPP staff must not only know the science, but must also be able to manage contractors engaged in delivering a broad range of services to the American scientific community located in a difficult and dangerous environment. Our audit work has focused on reviewing these activities because of their many inherent risks. From our perspective, NSF’s polar programs involve not only a large expenditure of money, but also the safety of scientists and workers, environmental concerns, and the prestige of the U.S. government. The successful operation of the United States Antarctic Program requires certain management and administrative skills that are responsive to the special needs of Antarctic scientific research.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** Our staff provides special expertise in:

- Coordinating Department of Defense, NASA, USGS and DOE activities;
- Overseeing environmental, health, safety, and medical activities;
- Overseeing construction and maintenance of all infrastructure at three U.S. stations in Antarctica (roads, fire stations, clinics, power stations, heating, communications, ground stations, air traffic control, ground vehicles, food services, sewage treatment, water supplies, etc.);
- Coordinating support of scientists in Antarctica, construction of specialized science instrumentation, etc.;
- Budgeting for the above activities; and
- Selecting science projects for deployment on the basis of merit review and ability to meet logistics requirements.

## 8. WORK FORCE PLANNING AND TRAINING

**NSF OIG COMMENT:** “Although NSF has had healthy increases in its program responsibilities and budgets in recent years, salaries and expenses have remained relatively flat. NSF received an increase of 13.6 percent in its FY 2001 budget; however an increase of only 6 percent was obtained for salaries and expenses. While we commend the agency for successfully controlling its administrative overhead, the small increases allocated for administration and management over the past few years raise questions about whether NSF can successfully manage future growth without adding more staff. Concerns about the adequacy of staffing come at a time when the government as a whole is facing succession planning and recruiting problems. In addition, NSF's reliance on the Intergovernmental Personnel Act (IPA) personnel, who serve on a term basis, poses a challenge to the agency to make certain that personnel are adequately trained to administer grants. We are planning audit work in this area to ensure that the agency has a reasonable strategy for managing its human capital.”

**THE PRESIDENT'S MANAGEMENT AGENDA** (2002) includes strategic management of human capital as a government-wide initiative.

**GAO** (*GAO-01-236, April 2001*) has identified shortcomings of many agencies involving key elements of modern strategic human capital management, including (1) strategic planning and organizational alignment; (2) leadership continuity and succession planning; and (3) acquiring and developing staff whose size, skills, and deployment meet agency needs.

**FOCUSED NSF ACTIVITIES IN THIS AREA:** NSF's flexible and motivated workforce currently includes approximately 600 permanent and visiting scientists and engineers (about 65% of whom are permanent government employees), 450 administrative personnel (who provide business operations support), and approximately 350 program support personnel.

NSF has a steadfast commitment to empower a workforce of teams and individuals who are continuously expanding their capabilities to shape the agency's future. To sustain its high-performing workforce, NSF is exploring ways to recruit and retain excellent employees. New initiatives include an updated telecommuting program, strategic recruiting techniques that also seek to increase representation of underrepresented groups in the NSF science and engineering workforce, a renewed focus on continuous learning and an increased emphasis on leadership and succession planning.

NSF's draft Administration and Management Strategic Plan (submitted to OMB in March 2002) will examine organizational alignment and the workforce size, skill mix, and deployment necessary to ensure mission accomplishment.

### 9. FOSTERING A DIVERSE SCIENTIFIC WORKFORCE

**NSF OIG COMMENT:** “NSF is committed to increasing the diversity of the nation's science and engineering workforce by embedding diversity concerns in all of its programs. In its strategic plan, NSF says it aims at new strategies for improving diversity and broadening participation in NSF-funded activities. NSF's most recent performance plan promises that the agency will begin implementing new strategies to increase diversity. NSF executives and managers frequently stress the importance of diversity in presentations to internal and external audiences. Because diversity programs are difficult to implement in a society challenged by economic, legal, and cultural constraints, NSF faces numerous challenges and should clearly define its diversity strategies and develop concrete steps (beyond giving general encouragement to its program managers) for attaining its goals in this area.”

**FOCUSED NSF ACTIVITIES IN THIS AREA:** NSF recognizes that a diverse workforce – one that includes members of underrepresented groups and reflects institutional and geographic differences – broadens the agency outlook and talent base and enables it to better serve its research and education communities and ultimately all citizens.

The FY 2003 NSF Performance Plan includes two goals related to the agency's science and engineering (S&E) staff. This S&E group includes program officers, division directors, the majority of staff assigned under the provisions of the Intergovernmental Personnel Act, limited term Visiting Scientists appointments, and others in management and scientific positions. In aggregate, this group is the one most intensively involved with the agency's external customers, the award community. It is also the group involved within the Foundation in development of new programs, in merit review and review analysis, and in making recommendations to fund or decline proposals. It is thus particularly important that these staff be diverse, with an ability “to identify best practices that are appropriate to a diverse [research and education] community” (Committee on Equal Opportunities in Science and Engineering, 2000<sup>37</sup>).

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<sup>37</sup> Enhancing the Diversity of the Science and Engineering Workforce to Sustain America's Leadership in the 21<sup>st</sup> Century, Committee on Equal Opportunities in Science and Engineering, 2000 Biennial Report to the United States Congress.

## 10. SECURITY AND CONTROLS

**NSF OIG COMMENT:** “Data Security: Electronic information and automated systems are essential to NSF's operations. Next year NSF will depend on its automated computer systems to manage over \$4 billion in funds, receive and process over 35,000 grant proposals, handle over \$3 billion in cash transactions to NSF awardees, generate its agency wide financial statements, and support a government wide website for federal financial management initiatives and activities. Therefore, it is imperative that NSF's systems are developed and operated with appropriate security controls to reduce the ever increasing risk of unauthorized access. NSF must be able to protect the availability, integrity, and confidentiality of its computer based information. Improvement is most needed in the areas of access controls and change controls. Access controls limit or detect inappropriate access to computer resources, while change controls prevent unauthorized modifications to programs from being implemented. The audit of NSF's financial statements has identified several internal control weaknesses related to security of NSF's automated systems, although none were material or rose to the level of a reportable condition.”

**GAO (01-758)** noted that recent audits continue to show that federal computer systems are riddled with weaknesses that make them highly vulnerable to computer-based attacks and place a broad range of critical operations and assets at risk of fraud, misuse, and disruption.

**FOCUSED NSF ACTIVITIES IN THIS AREA:** The NSF Information Technology Security (ITS) Program is focused on assuring that NSF infrastructure and critical assets are appropriately protected while maintaining an open and collaborative environment for science and engineering research and education. NSF's approach is based on a fundamental philosophy of risk management where ITS risks are assessed, understood, and mitigated appropriately.

An agency-wide ITS program had been implemented 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 security controls. The NSF Chief Information Officer provides overall leadership for the ITS Program, and assures that policies, procedures, and activities are coordinated with NSF program management and research and education initiatives.

In FY 2001, NSF placed significant priority on ITS and initiatives to assure adequate protection of resources. In December 2000, NSF appointed an ADP Security Officer to coordinate ITS program plans and initiatives with the NSF Chief Information Officer. The majority of NSF's significant assets are managed within the Division of Information Systems in the Office of Information and Resource Management. This organization is responsible for managing the NSF Computer Center and providing telecommunications, e-mail, and agency-wide applications and services.