National Science Foundation

FY 2001 GPRA
Final Revised Performance Plan
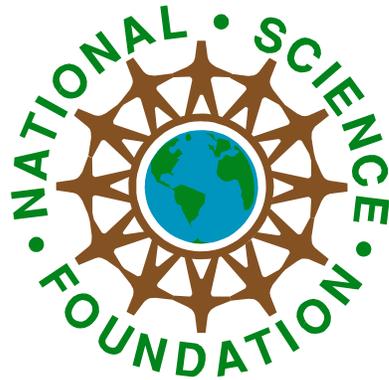
March 30, 2001

ABOUT NSF

Created in 1950, NSF is an independent U.S. government agency responsible for advancing science and engineering in the United States across a broad and expanding frontier. Operating no laboratories itself, NSF carries out its mission primarily by making merit-based grants and cooperative agreements to individual researchers and groups, in partnership with colleges, universities, and other institutions -- public, private, state, local, and federal -- throughout the U.S.

NSF invests in the best ideas from the most capable people, determined by competitive merit review. NSF evaluates proposals for research and education projects using two criteria: the intellectual merit of the proposed activity and the broader impacts of the activity on society. NSF uses merit review to select about 10,000 new awards each year from about 30,000 competitive proposals submitted by the science and engineering research and education communities.

NSF provides the funding that sustains many research fields as advances in these fields expand the boundaries of knowledge. Equally important, the agency provides seed capital to catalyze emerging opportunities in research and education. NSF supports a portfolio of investments that reflects the interdependence among fields, promoting disciplinary strength while embracing interdisciplinary activities. The investments promote the mergence of new disciplines, fields, and technologies. By providing these resources, NSF contributes to the health and vitality of the U.S. research and education enterprise, which enables and enhances the nation's capacity for sustained growth and prosperity

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I. INTRODUCTION

In response to the mandate provided by the Government Performance and Results Act of 1993 (GPRA) to account for program results through the integration of strategic planning, budgeting, and performance measurement, the National Science Foundation presents this third GPRA Performance Plan. This plan is based on NSF's updated GPRA Strategic Plan FY 2001 - 2006[1], finalized in September 2000, and upon newly developed strategic outcomes included therein. In developing this revised final plan, NSF made several changes that are reflected in new goals for FY 2001. The structural linkage between the new goals and those utilized in previous NSF documents are presented in a chart in the Appendix (Section VII) to this FY 2001 plan. The changes also reflect Congressional action on the NSF budget request. The mission, new strategic outcomes, and updated factors for success outlined below are based on the new strategic plan. This version of the FY 2001 performance plan contains minor corrections, additions, and deletions that were added to the February 14, 2001 copy. This version also contains a more fully developed appendix on changes to goals.

A. NSF MISSION

NSF's continuing mission is set out in the preamble to the National Science Foundation Act of 1950 (Public Law 810507):

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

The Act authorizes and directs NSF to initiate and support:

- basic scientific research and research fundamental to the engineering process;
- programs to strengthen scientific and engineering research potential;
- science and engineering education programs at all levels and in all the various fields of science and engineering; and
- an information base for science and engineering appropriate for development of national and international policy.

The NSF Act conferred on the Presidentially appointed National Science Board the responsibility for establishing the policies of the Foundation and serving as its governing board. The Act also directs the Board to advise the President and Congress to assure the productivity and excellence of the Nation's Science and Engineering Enterprise.

B. NSF GOALS

NSF has organized its annual performance goals for FY 2001 into three categories -- Strategic Outcomes, Management, and the Investment Process. The Strategic Outcomes anticipate long-term results derived from NSF awards. The Management Goals address efficiency and effectiveness of administrative activities in support of the NSF mission whereas the Investment Goals focus on means and strategies.

GOALS FOR STRATEGIC OUTCOMES

To accomplish the NSF mission to promote the progress of science, NSF invests in the best people, with the best ideas, and provides them with the tools they need. NSF's outcomes from its grants and cooperative agreements

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[1] For convenience, we will refer to this document as the Strategic Plan in the remainder of this plan.

provide evidence of the success of NSF's investments in people, ideas, and tools. In developing the FY 2001 NSF award portfolio, NSF staff is guided by the NSF Strategic Plan and this GPRA Performance Plan, which includes outcome goals related to:

- **People** – *Development of "a diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens."*

  NSF invests in the best and brightest students and researchers to ensure a well-prepared workforce and citizenry. It provides NSF support for formal and informal science, mathematics, engineering and technology (SMET) education at all levels – pre K-12, undergraduate, graduate – in addition to professional development and public science literacy projects that engage people of all ages in life-long learning. This strategic outcome related to people supports the parts of NSF's mission that are directed at (1) programs to strengthen scientific and engineering research potential; and (2) science and engineering education programs at all levels and in all fields of science and engineering.

- **Ideas** – *Enabling "discovery across the frontier of science and engineering, connected to learning, innovation and service to society."*

  NSF invests in ideas to provide a deep and broad fundamental science and engineering knowledge base. It provides support for cutting-edge research that yields new and important discoveries and promotes the development of new knowledge and techniques within and across traditional boundaries. This strategic outcome supports the parts of NSF's mission directed at basic scientific research and research fundamental to the engineering process.

- **Tools** – *Providing "broadly accessible, state-of-the-art information-bases and shared research and education tools.*

  NSF invests in tools to provide widely accessible, up-to-date science and engineering infrastructure. It provides support for a wide range of instrumentation, multi-user facilities, digital libraries and computational infrastructure. This strategic outcome supports the parts of NSF's mission directed at (1) programs to strengthen scientific and engineering research potential and (2) an information base on science and engineering appropriate for development of national and international policy.

These three broad themes are described in a format that requires *qualitative* assessment of associated achievements. Long-term outcomes identified for each provide the basis for retrospective, results-oriented performance assessment. Annual performance goals are determined by assessing past performance and by making reasonable projections for future levels of performance.

GOALS FOR MANAGEMENT

Excellence in managing the agency's processes underpins successful performance in all NSF goals. This performance plan includes five management goals that were developed using Appendix 1 of the NSF Strategic Plan. The following are highlighted in the Appendix as critical factors in NSF's managing for excellence:

- operating a viable, credible, efficient merit review system;
- exemplary use of, and broad access to, new and emerging technologies for business application;
- a diverse, capable, motivated staff that operates with efficiency and integrity; and
- implementation of mandated performance assessment and management reforms in line with agency needs.

GOALS FOR THE NSF INVESTMENT PROCESS

NSF organizes its investment processes in three functional categories: the proposal and award process, broadening participation, and facilities oversight. This plan describes 13 goals for the NSF investment process. Examples of activities in each of these categories include:

- **Proposal and Award Process:**

  > merit review – projects reviewed by appropriate peers external to NSF and selected through a merit-based competitive process;
  > customer service – anticipating and responding to customer concerns related to merit review, time to prepare proposals, and time to decision;
  > award size and duration – increasing the average award size and duration for research projects; and
  > maintaining openness in the system – keeping the proposal and award process open to new investigators and new ideas.

- **Broadening Participation:**

  > increased participation of members from underrepresented groups[2] in NSF activities – e.g., on review panels, in workshops and conferences; and
  > increased number of proposals submitted and awards made to members of underrepresented groups[2].

- **Facilities Oversight:**

  > construction and upgrades – financially responsible construction and operating plans and schedules; and
  > operations – maintaining efficient and reliable science and engineering facilities.

C. MEANS AND STRATEGIES

NSF's primary business is to make merit-based grants and cooperative agreements to individual researchers and groups, in partnership with colleges, universities, and other institutions – public, private, state, local and federal – throughout the U.S. By providing these resources, NSF contributes to the health and vitality of the U.S. research and education enterprise, which enables and enhances the nation's capacity for sustained growth and prosperity.

The means and strategies NSF uses to accomplish its mission of promoting the progress of science have both process and programmatic components. The process-based aspect focuses mostly on merit review, including expert evaluation by selected peers, to make NSF funding decisions. NSF uses merit review to select about 10,000 new awards each year from about 30,000 competitive proposals submitted by the science and engineering research and education communities. More than 200,000 merit reviews are conducted each year to assist NSF program officers in evaluating these proposals. NSF's merit review process is critical to fostering the highest standards of excellence and accountability – standards for which NSF is known the world over.

The Strategic Plan for NSF outlines three core strategies that cut across all Foundation programs and are critical to achieving NSF's strategic outcomes. These three strategies – developing intellectual capital, integrating

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[2] Underrepresented groups include women, underrepresented minorities (American Indians/Alaskan Natives, Black, Hispanic, Pacific Islanders) and persons with disabilities.

research and education, and promoting partnerships – guide the agency in establishing priorities, identifying opportunities, and designing new programs and activities.

In addition to the three over-arching strategies noted above, the Strategic Plan for NSF presents five-year implementation strategies that focus on programmatic aspects of portfolio development. These include: (1) support for competitive investigator-initiated research along a broad, expanding frontier of science and engineering; (2) identification and support for "unmet opportunities" that will strengthen and cross-fertilize the science and engineering disciplines and promise significant future payoffs for the nation; and (3) emphasis on several "transcendent" areas of emerging opportunity that enable research and education across a broad frontier of science and engineering. The transcendent areas identified are information technology, biocomplexity in the environment, and nanoscience and engineering – all included in the NSF 2000 Performance Plan – and the 21st century workforce initiative, which is new in FY 2001.

With guidance derived from a variety of strategic planning documents and activities, NSF staff manages toward an optimal mix of awards to achieve a balanced portfolio, given the available human and financial resources.

D. RESOURCES

NSF investments in support of its strategic outcomes – People, Ideas, and Tools -- serve multiple purposes. For example, the involvement of graduate students in research projects not only generates new ideas and prepares them for entry into the workforce, but it often involves them in the development of new tools. Approximately 95 percent of NSF's budget go directly to these investments. The remaining 5 percent of the budget goes toward a fourth function -- administration and management -- which provides operating support for the immediate activities of the agency: processing applications and issuing awards.

The FY 2001 Current Plan leads to the following distribution of NSF budget resources. Resources related to People total $888 million; those related to Ideas total $2,251 million; and those for Tools total $1,061 million.

20%	51%	24%	5%
People	**Ideas**	**Tools**	**A & M**
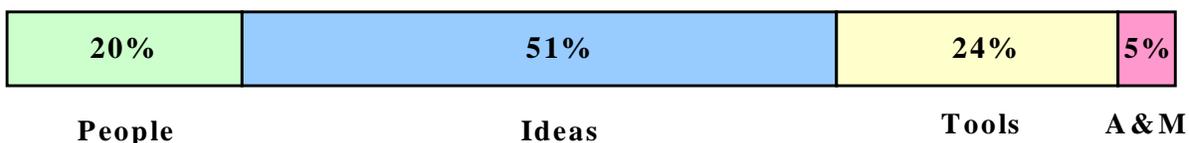
Proposals and awards are managed through nine programmatic organizations (or budget lines), seven directorates, the Office of Polar Programs and the Office of Integrative Activities. The following table presents a crosswalk of the strategic outcomes for FY 2001. Dollar estimates are made at a programmatic level based on the principal objectives of the activity. The FY 2001 Current Plan for Administration and Management of $216 million provides support for salaries and benefits of persons employed at the NSF; general operating expenses, including key activities to advance the agency's information systems technology and to enhance staff training; and audit and Inspector General activities.

PROGRAMMATIC CROSSWALK FOR STRATEGIC OUTCOMES: FY 2001

(Estimated Millions of Dollars)

| | STRATEGIC OUTCOMES | | | | Administration & |
	PEOPLE	IDEAS	TOOLS	Total[3]	Management
BIO[1]	47	369	64	480	6
CISE	49	304	118	471	7
ENG	68	353	3	424	7
GEO	17	327	215	559	3
MPS	87	547	211	845	6
SBE	9	122	28	160	5
OPP	2	71	197	270	3
IA	0	19	79	98	0
EHR	609	139	25	773	12
Other[2]	0	0	121	121	167
	$888	$2,251	$1,061	4,200	$216

[1]BIO = Biological Sciences; CISE = Computer and Information Science and Engineering; ENG = Engineering; GEO = Geosciences; MPS = Mathematical and Physical Sciences; SBE = Social, Behavioral, and Economic Sciences; OPP = Office of Polar Programs; IA = Integrative Activities; EHR = Education and Human Resources.
[2]Other budget items include Major Research Equipment ($121 million, Tools); Salaries and Expenses ($161 million, Administration and Management); and Office of Inspector General ($6 million, Administration and Management)
[3] Numbers may not add due to rounding.

Human resources utilized in fulfilling the NSF mission include a staff of about 1,200 government employees, approximately 126 scientists and engineers on various types of visiting appointments, and 192 contractors who support the agency's work. Members of the science and engineering community who provide expert evaluation of proposed projects in the more than 200,000 reviews they prepare each year are another critical human resource component. They donate tens of thousands of hours each year to assist NSF program officers in evaluating the research and education proposals submitted to NSF.

NSF's outstanding information management systems are critical in enabling the agency to process annually approximately 30,000 competitive proposals, 10,000 new awards and 10,000 continuing awards in an effective and efficient manner. NSF information and data sources include central databases such as the electronic Project Reporting System, the Enterprise Information System, the FastLane system, the Proposal system, the Awards system, the Reviewer System, the Integrated Personnel System, the Finance System, Online Document System, and the Performance Reporting System. An extensive database on the use of FastLane is maintained by the Division of Information Systems in the Office of Information and Resource Management. Other aspects of NSF's information management systems are presented in the Verification and Validation section (VI) of this plan.

E. CROSS-CUTTING ACTIVITIES AND PROGRAMS

Collaboration and partnerships between disciplines and institutions and among academe, industry, and government enable the movement of people, ideas, and tools throughout the public and private sectors. NSF recognizes that this is important as a core strategy as described in Appendix 4 of the NSF Strategic Plan.

The FY 2001 government-wide performance plan for research and development contains a number of common performance goals related to like sets of activities. These common goals relate to (1) the use of merit review in the awarding of funds for research and (2) the construction and operation of research facilities. These performance goals focus on investment issues and are discussed in more detail later in this NSF plan.

Federal agencies may also share similar programmatic goals. Mission and general goals guide the specific research and education activities of each agency. Agencies may at times define strategic outcomes and performance goals that are similar. NSF often jointly funds research and education activities with other agencies – it partners where there are shared interests and takes complementary approaches where appropriate. NSF actively participates in many interagency initiatives and planning activities coordinated by the National Science and Technology Council (NSTC). NSF staff also works with staff of other agencies during the review of proposals for joint initiatives to ensure that the role of each agency is clearly identified and supported appropriately.

EXAMPLES OF CROSS-CUTTING ACTIVITIES – PEOPLE:

- **The Interagency Education Research Initiative (IERI).** The President's Committee of Advisors on Science and Technology has made recommendations with respect to establishing a strong research base for education and learning, particularly in investigating the role of learning technologies. NSF, the National Institutes of Health (NIH), the National Institute of Child Health and Development, and the Department of Education have worked to establish a joint research activity, the Interagency Education Research Initiative, to address those recommendations.

- **Interagency Action Plan for Increased Achievement in Mathematics and Science.** Results from the Third International Mathematics and Science Study's report led to a call for developing an interagency action strategy to optimize the effectiveness of federal funding aimed at increasing achievement in math and science. NSF and the Department of Education shared responsibility for developing and implementing the strategy. Other agencies participated in the process, but do not have extensive programmatic activities aimed at K-12 mathematics and science education.

- **Fellowship/Traineeship Activities for Graduate Education.** Many other agencies support research and education activities in academic institutions, usually with a specific mission orientation. Their activities contribute to developing the workforce in science and engineering, both directly and indirectly. Most work indirectly through support of research assistants. In addition to NSF, the following agencies have dedicated fellowship or traineeship activities for graduate education: National Institutes of Health, Department of Education, Department of Defense, Department of Agriculture, Department of Energy, among others.

- **Best Practices Study to Increase Participation of Underrepresented Groups.** NSF staff is working to coordinate a best practices study of programs aimed at increasing the participation of underrepresented groups in science, mathematics, engineering and technology (SMET). Cooperating with other federal agencies – Department of Health and Human Services (HHS), Department of Energy (DOE), Department of Education (ED), Department of Commerce (DOC), National Aeronautics and Space Administration (NASA), and Department of Agriculture (USDA) – in this study will provide information on what programs have been effective and how others might take advantage of the lessons these agencies have learned.

EXAMPLES OF CROSS-CUTTING ACTIVITIES – IDEAS:

- **Interagency Planning Activities Linking Research to National Priorities.** NSF is an active participant in many interagency planning activities coordinated through the National Science and Technology Council (NSTC), which links fundamental research to national priorities. In all of these activities, NSF's role is at the fundamental end of the research and development spectrum. These include:
  > Information Technology Research,
  > Interagency Working Group on Nanoscience,
  > Engineering and Technology,
  > U.S. Global Change Research Program,
  > High Performance Computing and Communications,
  > Partnership for a New Generation of Vehicles,
  > Education Research,
  > Integrated Science for Ecosystems Challenges,
  > Children's Research,
  > Plant Genome Research, and
  > National Oceanographic Partnership, among others.

- **Information Technology Research**: NSF has been designated the lead Federal agency for an initiative on Information Technology R & D (IT R&D) – a six agency initiative which includes DOE, DOD, NASA, NIH, and the National Oceanic and Atmospheric Administration. IT R&D grew from the efforts of several agencies and responds to recommendations made by the President's Information Technology Advisory Committee (PITAC). NSF's FY 2001 investment includes a substantial increase for research in software systems, scaleable information infrastructure, high-end computing, and socioeconomic and workforce impacts of IT.

- **Nanoscience, Engineering, and Technology**: In FYs 1999 and 2000, NSF continued to work in partnership with other Federal agencies in planning nanoscale science and engineering activities. NSF chairs the interagency working group on Nanoscience, Engineering and Technology, under the guidance of the NSTC, in cooperation with DOD, DOC, National Institute for Science and Technology, Air Force Office of Scientific Research (AFOSR), DOE, Department of Transportation/Volpe Center, Department of Treasury, NASA, and NIH.

- **Interagency Research in Biological Sciences.** NSF is involved with numerous agencies in support of research in the biological sciences, including:
  > Interagency Arabidopsis Genome Project (USDA/DOE/NIH/NSF as lead agency), which has a goal of understanding biological processes underlying plant growth and development;
  > NSF/NIH/USDA International Cooperative Biodiversity Groups;
  > NSF/NASA Neurolab, which also involves NIH, the Office of Naval Research and international partners to support ground based research leading to experiments flown on the NASA space shuttle;
  > the Human Brain Project (NIH/NSF/DOD/DOE/NASA), which is a broad Federal research initiative to support research in the neurosciences and the new field of neuroinformatics;
  > Ecology of Emerging Infectious Diseases (NSF/NIH/USDA/NASA/DOI).

- **Interagency Arctic Research and Logistics.** NSF is one of twelve federal agencies supporting Arctic research and logistics. NSF provides interagency leadership for research planning as directed by the Arctic Research Policy Act of 1984.

- **Integrated Research Activities in the Antarctic.** NSF is charged with managing all U.S. activities in the Antarctic as a single, integrated program. The U.S. Antarctic Program (USAP) implements national policy to

maintain Antarctica as an area of international cooperation reserved for peaceful purposes, to preserve and pursue unique opportunities for scientific research to understand Antarctica and its role in global environmental systems, to protect the environment, and to assure the conservation and sustainable management of the living resources in the surrounding oceans.

- **Complementary Research Functions**. A variety of federal agencies support basic research in academic institutions. Even though some of this research has a mission orientation, the resultant outcomes contribute to developing areas related to NSF's strategic outcomes. NSF's general approach is to work with other agencies to ensure development of a complementary sets of activities. Interactions with the agencies identified below are particularly important for fundamental research:
  - > National Institutes of Health (NIH): biosciences, genomics, biomedical research, chemistry, behavioral sciences, cognitive development;
  - > Department of Energy (DOE): high energy and nuclear physics, materials, high end computing, genomics;
  - > Department of Defense (DOD): engineering, computer and information science and engineering, mathematics;
  - > Department of Commerce (DOC): ocean and atmospheric sciences, global climate change, meteorology, atomic and molecular physics;
  - > National Aeronautics and Space Administration (NASA): astronomical sciences, global climate change;
  - > Department of Agriculture (USDA): biosciences, genomics;
  - > Department of Education (ED): education research; and,
  - > Environmental Protection Agency (EPA): environmental research.

EXAMPLES OF CROSS-CUTTING ACTIVITIES – TOOLS:

- **Facility Sharing.** Facilities, with their large capital construction base and continuing operating costs, are particularly important elements of interagency planning. NSF has both formal and informal agreements with several other agencies to ensure that needed infrastructure is available to U.S. researchers without inappropriate overlap or duplication. For example, NSF and the Department of Energy cooperate in support for U.S. involvement with the Large Hadron Collider at the European Organization for Nuclear Research (CERN). This is a formal agreement between the two agencies on behalf of the U.S. with the international partnership building the Collider. On a more informal level, generally NSF develops and supports ground-based astronomy facilities, while NASA does the same for space-based facilities.

- **Support of the U.S. Academic Research Fleet.** The U.S. Academic Research Fleet provides essential support to enable productive basic research in oceanography. NSF provides a majority of the support for operation, maintenance, and upgrade of the Academic Research Fleet. NSF, in partnership with the Office of Naval Research (ONR), supports and manages a ship inspection program to oversee safety practices, crew training, maintenance, operational procedures, and shipboard science laboratory facilities. Ship operations are coordinated through the University-National Oceanographic Laboratory Systems (UNOLS), a consortium of 57 institutions, 20 of which currently operate ships. Other federal agencies using these vessels coordinate through NSF and UNOLS.

- **Interagency Access to Leading-Edge Computing Capabilities.** The Terascale Computing Systems project, a part of the Information Technology Research initiative, will enable U.S. researchers to gain access to leading edge computing capabilities. The project will be connected to NSF's existing Partnerships for Advanced Computational Infrastructure (PACI), and will be coordinated with the activities of other agencies, such as DOE, to leverage the software, tools, and technology investments.

EXAMPLES OF CROSS-CUTTING ACTIVITIES -- BUSINESS PRACTICES:

- **Federal Demonstration Partnership**. NSF is an active participant with other agencies in the Federal Demonstration Partnership, a joint effort of government and academe to address commonality of processes and reporting requirements to facilitate federally funded research and education activities in academe.

- **Federal Committee on Statistical Methodolog**y. NSF is one of many public and private agencies with responsibilities for obtaining statistical information on areas of important national interest. NSF and other agencies share information on statistical, information technology, and other methods and resources through this committee and related groups.

Appendix 4 of the NSF Strategic Plan discusses crosscutting areas with other agencies. It describes and acknowledges the importance of cooperation between NSF and other agencies in addressing a broad spectrum of activities, while avoiding duplication and inappropriate overlap.

F.   EXTERNAL FACTORS AFFECTING SUCCESS

External factors bearing on NSF's ability to achieve its strategic outcomes are discussed in Appendix 2 of the Strategic Plan. These factors stem largely from the fact that NSF does not conduct research and education activities directly and, therefore, *influences* results rather than *controls* them. In particular, the circumstances of institutional partners in academe, the private sector, and the government affect how individuals and groups are able to respond in both proposing and conducting research. Also, the information used in evaluating NSF outcome goals is derived from reports submitted by awardees, and is evaluated by external committees.

For example, NSF cannot control the current condition and quality of research facilities and platforms throughout the country, even though it may support the infrastructure. Likewise, the characteristics of the science and engineering workforce are dependent on the systems in which they were educated and trained. Other factors that exist beyond NSF's control include appropriations, indirect cost rates, government-wide policies, inflation, budget and plans of other R&D agencies, uncertainty and risk inherent in research, and availability and pace of technology.

G.   ASSESSING AGENCY PROGRESS TOWARD STRATEGIC OUTCOMES

Implementing the Government Performance and Results Act of 1993 (GPRA) has been a challenge for NSF and other agencies with missions involving research and education activities. Both the substance and timing of outcomes from research and education activities are unpredictable. This creates difficulty in linking research outcomes to annual investments and the agency's annual budget. The true value of NSF is seen in the outcomes –- the results of research which are long-term results and must be judged retrospectively.

NSF developed and obtained Office of Management and Budget (OMB) approval for use of the "alternative form", which allows NSF to assess progress annually using a retrospective approach and a qualitative scale for its outcome goals. In using the alternative form, NSF depends on external experts who use their collective experienced-based norms in determining the level of "success" of the agency in achieving its goals.

For the assessment of outcome goals, NSF defines the goals using a qualitative standard that describes expected "successful" performance. In FY 1999, NSF applied a two-level set of standards in the assessment process which allowed programs to be judged either "successful" or "minimally effective" in meeting NSF's goals. Based on feedback in FY 1999, NSF revised the two-level standard to one level, which allowed programs to be judged

"successful" or not successful in meeting NSF's goals. For FY 2001 outcome goals, NSF performance is deemed <u>successful</u> when, in the aggregate, results reported in the period demonstrate significant achievements for specified indicators.

NSF's goals are agency-wide goals. Assessment results provided by committees of external experts are aggregated across the agency to report progress in meeting each goal. Assessment of goal achievement takes into account such factors as (1) identified performance indicators for each performance goal; (2) the success to which NSF strategies and plans are implemented; (3) the level of resources invested; and (4) external factors, and (5) the agency's capability to be flexible and respond rapidly to emerging opportunities.

NSF utilizes information obtained during the following long-standing activities to support performance assessment:

MERIT REVIEW AND AWARD PROCESS:

All applicants and grantees provide results from previous NSF support, information about existing facilities and equipment available to conduct the proposed research, where the research is to be conducted, biographical information on the primary investigators, other sources of support, and certifications specific to NSF. Information is required at the time of application, at the time of an award, and in annual and final project reports. All information is reviewed by NSF staff.

PROGRAM EVALUATION BY COMMITTEES OF VISITORS (COVS):

NSF has a long-standing practice of reviewing its programs on a three-year cycle for their performance in administering the merit review process. This includes disciplinary programs in the nine directorates and offices, and some cross-disciplinary programs managed across directorates. Agency-wide programs may be subject to additional external evaluation. The reviews are performed by a Committees of Visitors (COVs), usually set up as a subcommittee of a directorate advisory committee. The COV members form an independent group of credible, external experts, selected to ensure an independent review that reflects a diversity of perspectives and balanced programmatic coverage. COV reports are submitted for review and approval through the Advisory Committees to the directorates and NSF's Director.

In FY 1997, FY 1998, and early FY 1999, NSF ran a series of experiments with advisory committees and their subcommittees to determine how to adapt existing processes to obtain effective assessments of outcomes. At that time, the scope of the COV review was expanded to include the integrity and efficiency of processes leading to awards, the relationships between award decisions, program goals, and Foundation-wide programs and goals, and also the results of awards in the form of outputs and outcomes as they relate to the GPRA performance goals. These experiments led in FY 1999 and FY 2000 to the development of standard reporting guidelines for COVs and advisory committees to use in assessing results.

DIRECTORATE ASSESSMENT BY ADVISORY COMMITTEES:

Directorate Advisory Committees review COV reports, available external evaluations, and annual directorate performance reports. They judge program effectiveness, describe strengths and weaknesses, and provide advice on priorities. Their recommendations are reviewed by management and considered by NSF when evaluating existing programs and future directions for the Foundation. Advisory committees have full access to a variety of data sources necessary to carry out their assessment. The credibility of these advisory committee reports rests on the provision of qualitative detail about program results and the COV process. All advisory committees are subject to Federal Advisory Committee Activity (FACA) rules.

NSF manages its research and education activities through nine programmatic organizations, the directorates for Biological Sciences (BIO), Computer and Information Science and Engineering (CISE), Education and Human Resources (EHR), Engineering (ENG), Geosciences (GEO), Mathematical and Physical Sciences (MPS), Social, Behavioral, and Economic Sciences (SBE), the Office of Polar Programs (OPP), and the Office of Integrative Activities (OIA). All of these units, except for OIA, have a standing external advisory committee—made up of members representing universities, industry, and other federal agencies—that reviews the activities of the directorate and makes recommendations on program priorities and funding. With the implementation of GPRA, the directorate advisory committees also take on the role of assessing the progress of the directorate in relation to the NSF-wide GPRA goals.

The reports of COVs and advisory committees are reviewed by NSF management. The assessments they provide are used in determining the success of the agency in achieving its outcome goals and are used in developing the annual GPRA Performance Report.

II. SUMMARY TABLE OF ANNUAL PERFORMANCE GOALS

NSF annual performance goals for FY 2001 fall into three categories:
- Strategic Outcomes (rationale, measurement approach, and baseline information found in Section III);
- Management (rationale, measurement approach, and baseline information found in Section IV); and
- Investment process (rationale, measurement approach, and baseline information found in Section V).

ANNUAL PERFORMANCE GOALS FOR NSF'S STRATEGIC OUTCOMES [5,6,7]

Strategic Outcome	FY 2001 Annual Performance Goals	FY 2001 Areas of Emphasis
	NSF is successful when, in the aggregate, results reported in the period demonstrate significant achievement in one or more of the following indicators:	
People -- Development of "a diverse, internationally competitive and globally-engaged workforce of scientists, engineers, and well-prepared citizens."	❖ Improved mathematics, science, and technology skills for U.S. students at the K-12 level and for citizens of all ages, so that they can be competitive in a technological society. ❖ A science and technology and instructional workforce that reflects America's diversity. ❖ Globally engaged science and engineering professionals who are among the best in the world. ❖ A public that is provided access to the benefits of science and engineering research and education.	◗ K-12 systemic activities ◗ Enhancing Instructional Workforce - Centers for Learning and Teaching - Graduate Teaching Fellows in K-12 Education ◗ Broadening Participation - Tribal Colleges - Partnerships for Innovation ◗ Addressing near-term workforce needs - Advanced Technological Education
Ideas -- Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."	❖ A robust and growing fundamental knowledge base that enhances progress in all science and engineering areas including the science of learning. ❖ Discoveries that advance the frontiers of science, engineering and technology. ❖ Partnerships connecting discovery to innovation, learning, and societal advancement. ❖ Research and education processes that are synergistic.	◗ Appropriate balance of high risk, multidisciplinary or innovative research across all NSF programs. Investments in three initiatives: ◗ Information Technology Research ◗ Nanoscale Science and Engineering ◗ Biocomplexity in the Environment Investments in non-initiative fundamental research: ◗ Mathematical Sciences Research ◗ Functional Genomics ◗ Cognitive Neuroscience
Tools -- Providing "broadly accessible, state-of-the-art information-bases and shared research and education tools."	❖ Shared-use platforms, facilities, instruments, and databases that enable discovery and enhance the productivity and effectiveness of the science and engineering workforce. ❖ Networking and connectivity that take full advantage of the Internet and make science, mathematics, engineering and technology information available to all citizens ❖ Information and policy analyses that contribute to the effective use of science and engineering resources.	Investments in Major Research Equipment Continue investments in: ◗ Terascale Computing System ◗ Major Research Instrumentation ◗ S&E information/reports/databases ◗ New types of scientific databases & tools for using them

[5] These strategic outcomes are stated in the alternative format provided for by GPRA legislation. How performance will be assessed and how the areas of emphasis will be addressed can be found in Section III.

[6] Elements in italics are highlighted in the FY 2001 federal performance plan.

[7] Additional Information on these strategic outcomes can be found in Section III.

Performance Areas	FY 2001 Annual Performance Goal
NSF Business Practices	
Electronic Proposal Submission	95 percent of full proposals will be received electronically through FastLane, improving upon the FY 1998 result of 17.5 percent, the FY 1999 achievement of 44 percent and the FY 2000 result of 81 percent.
Electronic Proposal Processing	NSF will conduct ten pilot paperless projects that manage the competitive review process in an electronic environment. (New goal)
Video-Conference/Long Distance Communications	By the end of FY 2001, NSF will increase usage of a broad-range of video-conferencing/long distance communications technology by 100 percent over the FY 1999 level. (New goal)
NSF Staff	
Diversity	NSF will show an increase over 1997 in the total number of hires to S&E positions from underrepresented groups. FY 1997 baseline: 16 females and 15 members of underrepresented minority groups were hired. FY 2000 result: 35 females and 19 members of underrepresented minority groups were hired.
Work Environment	NSF will establish various baselines that will enable management to better assess the quality of worklife and work environment within the Foundation. (New goal)

ANNUAL PERFORMANCE GOALS FOR NSF'S INVESTMENT PROCESS [9,10]

Performance Area	FY 2001 Annual Performance Goal
Proposal and Award Processes	
Use of Merit Review	*At least 85 percent of basic and applied research funds will be allocated to projects which undergo merit review. (Revised goal)*
Implementation of Merit Review Criteria - Reviewers[11]	NSF performance in implementation of the merit review criteria is successful when reviewers address the elements of both generic review criteria. (Revised goal)
Implementation of Merit Review Criteria - Program Officers[11]	NSF performance in implementation of the merit review criteria is successful when program officers address the elements of both generic review criteria when making their award decisions. (Revised goal)
Customer Service - Time to Prepare Proposals	Maintain the FY 2000 goal that 95 percent of program announcements will be available to relevant individuals and organizations at least three months prior to the proposal deadline or target date. FY 1998 baseline: 66%. FY 1999 goal: 95%. FY 1999 result: 75%. FY 2000 result: 89%.
Customer Service - Time to Decision	For 70 percent of proposals, be able to tell applicants whether their proposals have been declined or recommended for funding within six months of receipt, improving upon the FY 1997 baseline of 61%. FY 1998 result: 59%. FYs 1999 and 2000 goal: 70%. FY 1999 result: 58%. FY 2000 result: 54%.
Award Size	NSF will increase the average annualized award size for research projects to $110,000. (New goal) FY 1998 baseline: $90,000. FY 1999 data: $94,000. FY 2000 data: $105,800.
Award Duration	NSF will increase the average duration of awards for research projects to at least 3.0 years. FY 1999 goal: 2.8 years. FY 1999 result: 2.8 years. FY 2000 goal: N/A. FY 2000 data: 2.8 years.
Maintaining Openness in the System	NSF will award 30 percent of its research grants to new investigators. FY 1997 baseline: 27%. FY 1998 data: 27%. FYs 1999 and 2000 goal: 30%. FY 1999 result: 27%. FY 2000 result: 28%.
Broadening Participation	
Reviewer Pool	NSF will begin to request voluntary demographic data electronically from all reviewers to determine participation levels of members of underrepresented groups in the NSF reviewer pool. (New goal)

[8] In FY 2001, NSF continues to emphasize the area of managing information technologies. For details, see Section V.

[9] Additional information on performance goals in this section can be found in Section IV.

[10] Performance goals in italics are highlighted in the FY 2001 federal performance plan and apply to science, space, and technology agencies.

ANNUAL PERFORMANCE GOALS FOR NSF'S INVESTMENT PROCESS [12],[13] (continued)

Performance Area	FY 2001 Annual Performance Goal
Facilities Oversight	
Construction and Upgrade of Facilities	*For 90 percent of facilities, keep construction and upgrades within annual expenditure plan, not to exceed 110 percent of estimates. (Revised goal)*
	Ninety percent of facilities will meet all annual schedule milestones by the end of the reporting period. (Revised goal)
	Maintain FY 2000 goal: For all construction and upgrade projects initiated after 1996, keep total cost within 110 percent of estimates made at the initiation of construction. FY 1999 result: No projects completed in FY 1999. FY 2000 result: No projects completed in FY 2000.
Operations and Management of Facilities	*For 90 percent of facilities, keep operating time lost due to unscheduled downtime to less than 10 percent of the total scheduled operating time. (Revised goal)*

[12] Additional information on performance goals in this section can be found in Section IV.

[13] Performance goals in italics are highlighted in the FY 2001 federal performance plan and apply to science, space, and technology agencies.

III. GOALS FOR STRATEGIC OUTCOMES

For each of the research and education strategic outcomes, there is a single performance goal covering performance outcomes that NSF regards as most important in the current environment. NSF has developed performance goals for results of its investments in research and education as descriptive standards, under the GPRA option to set performance goals in an alternative format. The descriptive standards characterize successful performance. In some instances there are a few related performance goals stated in a more standard format.

A. PEOPLE STRATEGIC OUTCOME

OUTCOME GOAL III-1:   Development of "a diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens."

NSF investments in People enable the Foundation to meet its mission of promoting the progress of science, while facilitating the creation of a diverse, internationally competitive and globally engaged workforce of scientists, engineers and well-prepared citizens. In order to achieve the People Strategic Outcome, NSF supports formal and informal science, mathematics, engineering and technology (SMET) education at all levels – pre K-12, undergraduate, graduate, - in addition to professional development and public science literacy projects that engage people of all ages in life-long learning. The Foundation also supports programs that integrate research and education, such as Integrative Graduate Education and Research Training (IGERT), Research Experiences for Undergraduates (REU) and the Faculty Career Early Development Program (CAREER). In partnership with the research and education community, state and local education agencies, civic groups, business and industry, and parents, NSF fosters the invigoration of research-informed standards-based SMET education at all levels.

FY 2001 Performance Goal III-1a: NSF's performance is successful when, *in the aggregate*, results reported in the period demonstrate significant achievement for one or more of the following indicators:

- Improved mathematics, science, and technology skills for U.S. students at the K-12 level, and for citizens of all ages, so that they can be competitive in a technological society;
- A science and technology and instructional workforce that reflects America's diversity;
- Globally engaged science and engineering professionals who are among the best in the world; and
- A public that is provided access to the benefits of science and engineering research and education.

Baseline: Goal III-1a. is a new performance goal. The baseline will be established in FY 2001.

The FY 2001 government-wide performance plan contains a performance goal that is particularly relevant to achieving this outcome goal. It is related to NSF's systemic activities in K-12 education. At the start of the decade, NSF initiated major programs for the systemic reform of science, mathematics, engineering, and technology education. Based on the belief that all students can learn and achieve in science and mathematics at much higher levels than then obtained, systemic projects treat whole systems and build much needed educational capacity at state, urban, rural, school-district, and school levels. These projects are unique in their involvement of broad partnerships and development of comprehensive goals, solutions, and actions. Data to assess progress toward this goal are part of the reporting requirements for the systemic initiatives, which are reviewed by the EHR advisory committee to arrive at a qualitative assessment.

FY 2001 Performance Goal III-1b: Over 80 percent of schools participating in systemic initiative programs will (1) implement a standards-based curriculum in science and mathematics; (2) further professional development of the instructional workforce; and (3) improve student achievement on a selected battery of tests, after three years of NSF support.

FY 1999 Result: In 1999, 40 NSF-sponsored projects implemented mathematics and science standards-based curricula in over 81 percent of participating schools, and provided professional development for more than 156,000 teachers. All participating educational systems demonstrated some level of improvement in student achievement in mathematics and science on a battery of system-selected assessment instruments.

FY 2000 Result: This goal was achieved.

FY 2001 Performance Goal III-1c: Through systemic initiatives and related teacher enhancement programs, NSF will provide intensive professional development experiences for at least 65,000 pre-college teachers.

FY 1999 Result: In FY 1999, systemic initiatives and related teacher enhancement programs provided intensive professional development to more than 82,400 teachers, exceeding the goal of 65,000.

FY 2000 Result: This goal was achieved.

Means and Strategies for Successful Implementation:

Related to process:
- Support the most promising ideas through merit-based grants and cooperative agreements to individual researchers and groups, in partnership with colleges, universities, and other institutions – public, private, state, local, and federal – throughout the U.S.;
- Emphasize the NSF core strategies of integrating research and education, promoting partnerships, and developing intellectual capital;
- Encourage partnerships and cooperative research efforts – among disciplines, in different sectors, and across international boundaries;
- To develop a workforce that reflects America's diversity - expand participation of underrepresented groups in NSF activities by developing partnerships with professional societies, industry, academe, federal agencies, and other groups that focus on broadening participation; and by making presentations on the full breadth of NSF opportunities at national and regional meetings of minority-serving organizations, and at regularly scheduled campus meetings such as those involving EPSCoR and the LSAMP programs;
- To further the engagement of the NSF community in international activities – support attendance at international meetings, faculty/student exchange opportunities, and research utilizing international facilities and field/logistics centers;
- To enhance development of the instructional workforce – support approaches that integrate research and learning activities; support the use of educational and information technologies in classrooms of teachers participating in NSF-funded projects;
- To develop a more informed public – support increases in the linkages between formal programs and outreach/informal science and engineering activities such as museum and science center exhibits, public fora, mass media (press releases) or internet activities; and
- Provide grants of sufficient size and duration to improve efficiency and effectiveness of researchers and educators.

Related to programs:
- Provide financial support for activities specifically addressing the People Strategic Outcome. For FY 2001 this investment is about $888 million. Investments in programmatic activities related to (1) K-12 support, (2) undergraduate support, and (3) graduate and professional development support comprise the major components of the Foundation's investments in People. Although EHR provides a major focus for much of NSF's education and workforce investments, these efforts are integrated with complementary activities across the Foundation.
- Support programmatic themes for FY 2001 highlighted in the section labeled FY 2001 Areas of Emphasis (detailed below; also see the Summary Table of Performance Goals);

- Develop and support a balanced award portfolio that considers emerging and unmet opportunities and high risk, multidisciplinary and innovative projects .

FY 2001 Areas of Emphasis:

- *Enhancing the Instructional Workforce:*
  - > *Centers for Learning and Teaching (CLT)* is an integrative element of the Learning for the 21st Century Workforce Initiative. These centers offer a new approach to teacher education that responds to needs for increasing the ability of practicing teachers to deliver standards-based instruction; rebuilding and diversifying the national infrastructure for science, mathematics, and technology education; facilitating workforce induction/retention during initial years of service; and strengthening linkages between pre-/in-service teacher education. These large-scale projects will be closely linked to K-12 school districts and required to build on shared expertise of local education agencies, institutions of higher education, and the informal science community.
  - > The *NSF Graduate Teaching Fellows in K-12 Education* program places graduate and advanced undergraduate students in K-12 schools to serve as science and mathematics content resources for teachers. This program provides graduate students with exposure to the opportunities and challenges of K-12 teaching, while introducing K-12 students and teachers to active researchers. This is part of a comprehensive approach to workforce development that reaches from grade school through graduate school. This continues FY 1999 and 2000 efforts.
- *Broadening Participation:*
  - > An initiative for *Tribal Colleges* encourages Native Americans to pursue information technology and other science and technology fields of study, as well as increase the capacity of tribal colleges to offer relevant science and technology courses and enhance K-12 education in feeder school systems.
  - > The Partnerships for Innovation Program (PFI) focuses on connections between new knowledge created in the discovery process to learning and innovation. The goals of the program are: (1) to stimulate the transformation of knowledge created by the national research and education enterprise into innovations that create new wealth, build strong local, regional and national economies and improve the national well-being; (2) to broaden the participation of all types of academic institutions and all citizens in NSF activities to more fully meet the broad workforce needs of the national innovation enterprise; and (3) to create the enabling infrastructure necessary to foster and sustain innovation in the long term. As a first step towards these goals, beginning in FY 2000 NSF awarded 24 promising partnerships among academe, government and the private sector that will explore new approaches to support and sustain innovation.
- *Addressing Near-term Workforce Needs:*
  - > *The Advanced Technological Education (ATE)* program is the vehicle for addressing near-term workforce requirements. ATE provides opportunities for developing the workforce for technological positions that do not require full undergraduate programs of study. A related activity is the Scholarships for Service effort, which will enhance capabilities of the federal workforce in information security.

Sources of Performance Information: Reports on or containing demographic data on participants in NSF-funded activities and in the science and technological workforce; quality and nature of experiences in NSF-funded activities aimed at educating the next generation of the workforce; models and practices to strengthen teacher training and classroom instruction; and student achievement. Also, annual and final progress reports for awards, press releases, and scientific publications.

External Factors that Affect Performance:

- NSF provides very little of the overall investment for the development of the science and engineering workforce. Meeting workforce goals requires a gradual change in process and philosophy of educating the workforce. It also implies a commitment on the part of institutions and their faculties to provide a broad

range of high-quality educational opportunities and to enhance the diversity of the science and engineering workforce.

- NSF K-12 activities must be developmental and catalytic, given the small fraction of total resources in K-12 education represented by NSF's funding. Again, achieving goals for these activities implies a gradual change in the structure of education in mathematics and science. This also requires a commitment on the part of school districts, schools, and their faculty to modify their approaches in order to identify resources and enhance achievement.

B. IDEAS STRATEGIC OUTCOME

OUTCOME GOAL III-2: **Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."**

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

FY 2001 Performance Goal 2: NSF's performance is successful when, *in the aggregate*, results reported in the period demonstrate significant achievement for one or more of the following indicators:

- A robust and growing fundamental knowledge base that enhances progress in all science and engineering areas including the science of learning;
- Discoveries that advance the frontiers of science, engineering, and technology;
- Partnerships connecting discovery to innovation, learning, and societal advancement; and
- Research and education processes that are synergistic.

Baseline: This is a new goal. The baseline will be established in FY 2001.

Means and Strategies for Successful Implementation:

Related to Process:
- Support the most promising ideas through merit-based grants and cooperative agreements to individual researchers and groups, in partnership with colleges, universities, and other institutions – public, private, state, local, and federal – throughout the U.S.;
- Make awards focused on discoveries that also create or have potential for connections with use in service to society;
- Encourage partnerships and cooperative research efforts – among disciplines, in different sectors, and across international boundaries;
- Take informed risks in emerging research areas where consensus on appropriate directions (e.g., theory, methodology, or knowledge) is just beginning to form;
- Identify and support major cross-disciplinary initiatives in areas where U.S. and NSF leadership are important;

- Utilize the NSF core strategies of integrating research and education, promoting partnerships, and developing intellectual capital; and
- Provide grants of sufficient size and duration to improve efficiency and effectiveness;

Related to Programs:
- Provide financial support for programs specifically addressing NSF's strategic outcome related to Ideas. For FY 2001, this investment totals about $2,251 million, an increase of $289 million over FY 2000. Investments in research grants and centers are the principal components of NSF's investments in Ideas. The FY 2001 request devotes significant increases to core disciplinary research across the NSF.
- Support programmatic themes for FY 2001 highlighted in the section labeled FY 2001 Areas of Emphasis (detailed below; also see the Summary Table of Performance Goals). These themes focus on aspects of the entire NSF portfolio and on focused initiatives such as Information Technology Research (ITR); Biocomplexity in the Environment (BE); Nanoscale Science and Engineering; and the research portion of the 21st Century Workforce initiative; and
- Develop and support a balanced award portfolio that considers discipline and fields, interdisciplinary research areas, and emerging and "unmet opportunities.

FY 2001 Areas of Emphasis:

- *Appropriate balance of portfolio*: Directorate COVs and advisory committees will examine the directorate's FY 2001 portfolio of research activities for balance with respect to characteristics such as identification of emerging opportunities, openness in the system, integration of research and education, involvement of underrepresented groups, and balance among projects characterized as high-risk, multidisciplinary, and innovative. High-risk research is exploratory in nature. There is often a lack of experimental data or methodologies, little consensus on theory, information and/or approach, and there is a significant probability of failure associated with the research. If successful, such high-risk research could result in a significant advance in the scientific or technological field. The focus of this review will be to ensure that NSF is positioned well to attain the Ideas outcome goal. This area of emphasis was reviewed by COVs and advisory committees during FY 1999 and FY 2000. The COV assessment process found NSF successful in terms of quality and balance for multidisciplinary or innovative activities, but determined that the agency needs to support more high-risk activities.
- *Initiatives*
  - > *Biocomplexity in the Environment* (BE) became an area of focus in FY 1999, beginning with a special competition on the *Interrelationships between Microorganisms and Biological, Chemical, Geological, Physical, and Social Environments*. In FY 2000, NSF sponsored a $50 million initiative -- *Integrated Research to Understand and Model Complexity Among Biological, Physical, and Social Systems*. Preliminary results arising from awards made as a result of the first of these competitions may be available for assessment in FY 2001. Advisory Committees will also be able to examine the active portfolio of awards for their potential influence on progress in these exciting areas
  - > *Nanoscale Science and Engineering* (NSE) represents a new focused investment opportunity in FY 2001. An assessment of the resulting portfolio of investments will be part of the FY 2001 performance report.
  - > *Information Technology Research* (ITR) is one of a number of multidisciplinary areas of research identified as being of particular importance for its potential connections to use in service to society. In implementing focused research in the ITR area, NSF works in partnership with other agencies. NSF has been designated as lead agency for a multi-agency *Information Technology Research* initiative begun in FY 2000. NSF investments in FY 2001 will support basic knowledge generation in computer and information science for research and education activities in virtually every field of research. Funding will enhance fundamental research in software development methods and component technologies, as well as research aimed at understanding how humans, software, sensory data input, information system and

networks interact. Particular emphasis will be placed on developing a science base for software engineering and the understanding to develop more robust models. Increased basic research on the societal, ethical, and workforce implications of the information revolution will also be supported. All parts of NSF will address relevant issues in these areas. All COVs and directorate advisory committees will review progress in developing a strong portfolio of activity.

> Within NSF's FY 2001 budget request, a number of multidisciplinary areas of research are identified as being of particular importance for their potential connections to use in service to society. These fit within the Foundation's broad initiatives of ITR, BE, and Nanoscale Science and Engineering, but additionally they involve partnership with other agencies and/or other countries. COVs and directorate advisory committees will be asked to pay particular attention to these areas in their assessments, examining results of past investments, where results are available, and the contents of the current portfolio for quality of NSF research and infrastructure activities and balance among related areas of activity within NSF. These multidisciplinary areas of research include:

  – *Information Technology Research* – discussed above
  – *Global Change Research*, one component of NSF's environmental portfolio, has for years been an important area of focused research investment at NSF. The research is supported in conjunction with NSF's participation in the U.S. Global Change Research Program. COVs and advisory committees in BIO, GEO, OPP, and SBE will address performance in global change, including both past results and the current portfolio.
  – *Plant Genome Research* received a major funding increase in FY 1998. The BIO directorate has initiated a program of support for research and infrastructure development, consistent with the recommendations of the 1998 report of the National Science and Technology Council entitled *National Plant Genome Initiative*. In FY 2001, COVs and the BIO advisory committee will review progress in developing a strong portfolio in this area, including interactions with other agencies, other nations, and the private sector.
  – *Research on the Science of Learning* was given high priority in the report of the President's Committee of Advisors on Science and Technology on the Use of Technology to Strengthen K-12 Education in the United States (March 1997). Efforts will incorporate an NSF partnership with the Department of Education and the National Institutes of Health in FY 1999 and FY 2000, the Interagency Education Research Initiative (IERI). While all NSF directorates will participate in this effort, the EHR advisory committee will be asked to provide an assessment of the new investments for NSF as a whole.

• *Non-initiative Fundamental Research*: In addition, NSF will make increased investments in ongoing core research areas such as *Mathematical Research and Education*, *Functional Genomics,* and *Cognitive Neuroscience*. The COVs and advisory committees for BIO, CISE, ENG, GEO, MPS, OPP, and SBE will be asked to examine the set of awards relevant to their directorate for their potential influence on progress.

Source of Performance Data and Information: Reports on or containing information on quality of outputs and outcomes, importance and impact of discoveries, introduction of new ideas, interplay of disciplinary and interdisciplinary research, and balance of the portfolio. Also annual and final progress reports for awards, press releases, and scientific publications.

C. TOOLS STRATEGIC OUTCOME

OUTCOME GOAL III-3:   Providing "broadly accessible, state-of-the-art information-bases and shared research and education tools."

As the research issues we face increasingly involve phenomena at or beyond the limits of our measurement capabilities, many of these research areas can only be studied and solved through the use of new generations of powerful tools. NSF investments provide state-of-the-art tools for research and education, such as instrumentation and equipment, multi-user facilities, digital libraries, research resources, 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 includes funding for construction, upgrade, operations, and maintenance of facilities, and for personnel to assist scientists and engineers in conducting research at the facilities. All of these investments enable the Foundation to meet its mission of promoting the progress of science, while responding specifically to direction in the NSF Act of 1950 " to foster and support the development and use of computer and other scientific and engineering methods and technologies, primarily for research and education in the sciences and engineering..."

FY 2001 Performance Goal III-3: NSF's performance is successful when, *in the aggregate*, results reported in the period demonstrate significant achievement for one or more of the following indicators:

- Shared use platforms, facilities, instruments, and databases that enable discovery and enhance the productivity and effectiveness of the science and engineering workforce;
- Networking and connectivity that take full advantage of the Internet and make SMET information available to all citizens; and
- Information and policy analyses that contribute to the effective use of science and engineering resources.

Baseline: This is a new goal. The baseline will be established in FY 2001.

Means and Strategies for Successful Implementation:

Related to process:
- Support the most promising projects through merit-based grants and cooperative agreements to individual researchers and groups throughout the U.S.;
- Engage other federal agencies, national laboratories, and other nations as partners in developing infrastructure by capitalizing and leveraging the human and financial resources of each group;
- Operate a disciplined internal NSF capital planning process, with attention to innovative capabilities and infrastructure needs of the U.S. community served by NSF;
- Ensure that the breadth of community infrastructure needs is examined regularly through workshops, panels, advisory groups, or other mechanisms;
- Continue broad support to the information technology community and members of other core programs involved in innovative applications of cutting-edge IT tools for science and engineering;
- Utilize the NSF core strategies of integrating research and education, promoting partnerships, and developing intellectual capital; and
- Provide grants of sufficient size and duration to improve efficiency and effectiveness.

Related to programs
- Provide financial support for activities specifically addressing the Tools strategic outcome. For FY 2001 this investment totals about $1,061 million. Investments in research instrumentation and research facilities (capital and otherwise) are the principal components of this Tools portfolio.
- Support programmatic themes for FY 2001 highlighted in the section labeled FY 2001Areas of Emphasis (detailed below; also see the Summary Table of Performance Goals).
- Develop and support a balanced portfolio that considers disciplines and fields, interdisciplinary research areas, and emerging or "unmet opportunities"; and
- Provide appropriate human and financial resources for development, upgrade, maintenance, and oversight of facilities.

FY 2001 Areas of Emphasis:

- *Investments in Major Research Equipment*: This account provides funding for capital expenditures for the construction and acquisition of major research facilities that provide unique transformational capabilities at the cutting edge of science and engineering. Projects supported by this account are intended to expand the

boundaries of technology and offer significant new research opportunities, frequently in totally new directions. Continuing projects include South Pole Station Modernization (SPSM), Atacama Large Millimeter Array (ALMA) research and development, Network for Earthquake Engineering Simulation (NEES), and the Terascale Computing System. Support is increased to $121 million for FY 2001.

- *Continued investments in:*
    > *Terascale Computing System.* NSF has been designated the lead Federal agency for an initiative on Information Technology Research (ITR) – a six agency initiative including the DOE, DOD, NASA, NIH, and NOAA. NSF's FY 2001 investment includes $45 million for continued development of a *Terascale Computing System* to enable U.S. researchers to gain access to leading edge computational systems. This major construction project will be assessed using the facilities oversight investment process goals related to annual expenditure plans and schedules and total construction costs.

    > The *Major Research Instrumentation Program* (MRI) is designed to improve the condition of scientific and engineering equipment for research and research training in our nation's academic institutions. This program seeks to improve the quality and expand the scope of research and research training in science and engineering, and to foster the integration of research and education by providing instrumentation for research-intensive learning environments. In FY 2001, NSF will provide $75 million for this program to support the acquisition and development of research instrumentation for academic institutions. An external Committee of Visitors examined the extent and appropriateness of investments made in the MRI program in FY2000. The review covered a five-year period of investments.

    > The work of NSF's Division of Science Resources Studies (SRS) involves survey development, data collection, analysis, information compilation, dissemination, and customer service to meet the statistical demands of a diverse user community concerning the nation's science, engineering, and technology enterprise. In FY 2001, NSF will provide about $15.8 million for this program to support a continuing emphasis on improving the relevance and quality of its data. The SBE advisory committee will provide an assessment of these activities.

    > *New types of scientific databases and tools for using them.* All COV and directorate advisory committees will be asked to examine the extent and appropriateness of investment in this area. It is a critical component of activity under Information Technology Research, one of NSF's areas of emphasis in FY 2000 and FY 2001.

Source of Performance Data and Information: Reports that demonstrate development of new tools and technologies; multidisciplinary databases; new instrumentation; shared-use facilities; development/deposition of data, research materials and other relevant products of awards in public databases, museums, or other shared repositories. Also, annual and final progress reports for awards, press releases, and scientific publications.

IV. PERFORMANCE GOALS FOR MANAGEMENT

Excellence in managing the agency's processes is an NSF goal on par with our mission-oriented outcome goals. In its Strategic Plan, NSF articulated four critical factors in managing for excellence that provide the framework for annual performance goals:

- Operating a credible, efficient merit review system;
- Exemplary use of and broad access to new and emerging technologies for business application;
- A diverse, capable, motivated staff that operates with efficiency and integrity; and
- Implementation of mandated performance assessment and management reforms in line with agency needs.

Performance goals related to the merit review system, given their role in NSF investment processes, are addressed in Section V. The following performance goals for FY 2001 represent key indicators that NSF is managing its centrally funded and coordinated administrative activities efficiently and effectively in support of its mission. NSF continues to pursue automation initiatives that greatly enhance our core business processes. NSF has chosen to emphasize performance goals related to implementation of information technologies and human resources development in FY 2001. These performance goals are largely accomplished through the Administration and Management function. The FY 2001 Request for A&M totals $216 million.

A. NSF BUSINESS PRACTICES

A state-of-the-art communications and technology infrastructure has been essential to NSF's success in managing an increasing workload with approximately level resources. This investment also provides incentives for the recruitment and retention of high quality employees. Activities underway or under consideration include:

- continuing experimentation with new means to do business electronically;
- active leadership among federal agencies in doing business electronically;
- active leadership in government/university forums for addressing business practices;
- appropriate use of contractors to bring needed expertise to bear on systems development;
- testing in contained situations;
- training for staff;
- development of implementation plans involving all parts of NSF and issuance of Important Notices to institutions;
- movement from mainframe to client server operation; and
- movement to full implementation in cooperation with proposers, reviewers, and staff.

- **Performance Area: Electronic Proposal Submission**

  The research and education communities have worked with NSF staff to build FastLane, NSF's Web-based interface with grantee institutions. Each FastLane module has gone through a phase of expanding use. The most complex use of FastLane is for the submission of full technical proposals. NSF is the only federal research agency currently receiving proposals electronically on a production basis.

  FY 2001 Performance Goal IV-1: Ninety-five percent of full proposals will be received electronically through FastLane

Performance Indicator	FY 1997 Baseline	FY 1998	FY1999 Goal	FY 1999 Result	FY 2000 Goal	FY 2000 Result	FY 2001 Goal
Percent of full proposal submissions received electronically through FastLane	4.4%	17.5%	25%	44%	60%	81%	95%

Baseline: The FY 1999 performance goal was initially set at 10%. It was modified to 25% once data became available for FY 1998. Since the FY 1999 results (44%) greatly exceeded the goal (25%) the FY 2000 goal was revised from 35% to 60%. In FY 2000, approximately 81% of full proposal submissions were received through FastLane. For FY 2001, the goal is being raised to 95%, or full implementation. While electronic submission will be mandatory, NSF will allow exceptions to the FastLane requirement for those who experience difficulties or cannot submit electronically. Based on feedback from users of FastLane, it is expected that this number will not exceed 5%.

Means and Strategies for Success:

> Beginning in FY 2001, NSF will require proposal submission through FastLane. In September 2000, the Director issued Important Notice 126 to presidents of universities and colleges and heads of other grantee institutions reiterating the goal of full electronic submission of proposals through FastLane.
> The performance goal will be met by continuing an aggressive outreach strategy (activities which include workshops, meetings and regional conferences) with the research and education community to educate them on the use and advantages of FastLane. NSF is committed to increasing our outreach to those segments of our customer groups who are having, or might have difficulty with electronic submission. Also, we shall continue to enhance the capabilities of our external Helpdesk to assist our customers.

Data: The FastLane system automatically yields counts on the numbers of proposals submitted through the electronic system. Other proposal and award systems track the total number of submissions.

Comments:

> Peer reviewers will have the capability to review any proposal online. However, some reviewers may elect to request a paper copy. A print on demand feature will allow those reviewers to receive a paper copy.

- **Performance Area: Electronic Proposal Processing**

  Once proposals are submitted electronically and initial processing is complete, current NSF practice is to move to a paper process. Our goal is to move to make the entire proposal and award process an electronic, or paperless, process.

  FY 2001 Performance Goal IV-2: In FY 2001, NSF will conduct ten pilot paperless projects that manage the competitive review process in an electronic environment.

  Baseline: This is a new goal for FY 2001.

  Performance Indicator: Number of competitions where the review process is conducted in a totally electronic environment.

Means and Strategies for Success:

> NSF has experimented with paperless processes in selected competitions. By the end of FY 2000, NSF's goal was to have the technological capability of taking competitive proposals submitted electronically through the entire proposal and award/declination process without generating paper within NSF. This goal was not successful due to electronic signature issues. During FY 2000 NSF initiated projects designed to enable piloting full electronic submission/processing in FY 2001.
> NSF will demonstrate the technological capability by successfully managing ten pilot competitions electronically.

Comments:

> Some small, focused competitions have been managed largely through paperless processes.
> The results from 10 pilots should generate information to serve as a springboard for future, more comprehensive electronic processing initiatives.

External factors:

> Many reviewers are not comfortable with receiving proposals for review electronically. In order to have quality control on the review process, it may be important to generate hard copies for reviewers who want them.

• **Performance Area: Video-Conference/Long Distance Communications**

Video-conferencing is one of the state-of-the-art business practices that have great potential at NSF. Much of the work we do is done through collaborations with subject matter experts around the nation. Over the past few years as we have increased our capability to videoconference, we have become more enthusiastic about the potential of this technology to enhance communications and, in some cases, avoid additional travel.

FY 2001 Performance Goal IV-3: By the end of FY 2001, NSF will increase usage of a broad-range of video-conferencing/long distance communications technology by 100% over the FY 1999 level.

Performance Indicator: Number of videoconferences completed at NSF

Baseline: This is a new goal in FY 2001. The FY 1999 usage of about 50 videoconferences will be the baseline against which the FY 2001 goal will be addressed. The goal for FY 2001 is 100 videoconferences. FY 2000 was used as a year to increase our technical capability in this area and to continue to market the technology to staff and the community we serve.

Means and Strategies for Success:

> We plan to build on our experience of the past few years. In late FY 1999, NSF supplemented the portable videoconference stations with a state-of-the-art videoconference facility. In FY 2000, we opened a new executive VTC room, upgraded equipment and capabilities, and held various training classes to market the new technologies. We will continue to market and use both in order to achieve the stated goal.

Data: The Office of Information and Resource Management will develop a record keeping system for documenting usage. A log of video-teleconferencing (VTC) usage will be maintained, Sprint and other line charges will be recorded for each centrally conducted VTC session and Directorates and Offices will be asked to report VTC usage. This information will be combined into a simple comprehensive log that will be added to our quarterly monitoring and reporting system.

B. WORKFORCE/WORKPLACE

The NSF Strategic Plan notes that "a diverse, capable, motivated staff that operates with efficiency and integrity" is one of the critical factors for NSF success. NSF has a long history of being at the forefront in providing a work environment conducive to supporting and motivating our staff. This section addresses agency activities as they relate to NSF workforce/workplace issues.

- **Performance Area: NSF Staff — Diversity**

  In order to increase the diversity of the U.S. science and engineering workforce, it is particularly important that the program officers at NSF exemplify that diversity. Yet this is the segment of the staff at NSF that shows the highest levels of under-representation of women, those minority groups under-represented in the science and engineering careers, and persons with disabilities. Realistic goals for closing that gap vary from one area to another across research and education. The most important link in the recruitment chain may be finding and attracting appropriate candidates to NSF.

  FY 2001 Performance Goal IV-4: NSF will show an increase over 1997 in the total number of hires to S&E positions from underrepresented groups.

New Hires	FY 1997 Baseline	FY2000 Results
Number of Women	16	35
Members of Underrepresented Minority Groups	15	19

  Performance Indicator: Increase the composition of underrepresented groups in the workforce.

  Baseline: The FY 2001 goal is identical to the FY 2000 goal. Continued diversification of the staff will be achieved if the goal is reached.

  Means and Strategies for Success:

  > NSF will stimulate members of underrepresented groups to apply for NSF's science and engineering positions through increased outreach efforts including targeted advertising, attendance at job fairs, and site visits to minority institutions and organizations.
  > NSF will also create a registry for minorities interested in serving on advisory committees and panels, which are a major pipeline for recruiting our rotators and visiting scientists.

  Data: Trend data will be kept both on the actual number of hires to S&E positions and the aggregate numbers of underrepresented group members in the S&E workforce. The data will be compared to the base year of 1997. Over time, NSF expects to see a positive trend both in the number of new hires and in

the total number represented in the S&E workforce. Data will be maintained by the Division of Human Resources.

Comments:

> Results: Both the FY 1999 and FY 2000 goals were achieved.
> In FY 1999, NSF demonstrated efforts to attract applicants from groups that are underrepresented in the science and engineering staff compared to their representation among Ph.D. holders in their fields. In FY 1999, NSF hired a total of 61 scientists and engineers.
> Results: The FY 2000 goals were achieved. In FY 2000, of the new hires 35 were female and 19 were minority. In the baseline year of 1997, 16 females and 15 minorities were hired. A wide variety of strategies were used to increase the diversity of the applicant pool, including targeted advertising in minority serving magazines, institutions, and professional associations; and attendance at job fairs that attract underrepresented groups.

- **Performance Area: NSF Staff— Work Environment**

    In order to provide consistent and continuous focus on this critical factor, we are including a performance goal in the FY 2001 plan on the work environment. A survey will be conducted to uncover meaningful data on our work environment, and provide us with the needed data to set specific goals for FY 2002.

    FY 2001 Performance IV- 5: NSF will establish various baselines that will enable management to better assess the quality of worklife and work environment within the Foundation.

    Performance Indicator: Development of an employee survey.

    Baseline: This is a new goal for FY 2001. No previous results are available.

    Means and Strategies for Success:

    > NSF will develop, distribute and analyze results of an employee attitude survey. While the assessment will be conducted agency-wide, the analysis will be made at the Directorate/Office level to ensure action plans are developed at the appropriate level to address any identified areas of concern.

    Data: Employee surveys will be used to capture information on this goal. A number of work environment indicators and employee attitudes will be identified through this effort.

    Comments:

    > NSF's intent with this goal is to improve the workplace environment, enhance employee potential and promote higher performance.
    > Human Resources Division and the Office of Equal Opportunity will be involved in creating and conducting an employee survey that will be distributed to all employees within NSF.

V. PERFORMANCE GOALS FOR THE NSF INVESTMENT PROCESS

NSF's success in achieving its goals is dependent upon the award portfolio developed by NSF program staff. The following sections provide information on how the NSF investment process shapes the awards portfolio and supports the Foundation outcome goals. Investment goals focus on means and strategies for successful performance – especially on the proposal and award process, broadening participation, and facilities oversight. In FY 2001, NSF investments across all goals total almost $4.4 billion.

A. PROPOSAL AND AWARD PROCESSES

The goals included within this section focus on merit review and customer service. Success in achieving these goals is dependent upon factors such as high quality external review, sufficient staff resources and operating expenses, administrative requirements/oversight, and electronic information systems that support the processes.

MERIT REVIEW

NSF's merit review process is the keystone for award selection. NSF invests in the best ideas from the most capable people, determined by competitive merit review. NSF evaluates proposals for research and education projects using two criteria -- the intellectual merit of the proposed activity and the broader impacts of the proposed activity on society. The criteria now in place, established by the National Science Board, were revised in 1998 in order to simplify them and harmonize them with the strategic plan. Both support NSF's mission "To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense."

Evaluation of proposals and funding decisions made through the process of merit review include expert evaluation by selected peers. Each year, more than 200,000 merit reviews are conducted to help NSF program officers evaluate the proposals submitted for consideration. NSF's merit review process is critical to fostering the highest standards of excellence and accountability—standards for which NSF is known the world over.

Processing of NSF proposals starts with receipt of the proposals by the NSF Proposal Processing Unit. This unit assigns the proposals to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal and are without conflicts of interest. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons who should not review the proposal. These suggestions may serve as an additional source in the reviewer selection process at the Program Officer's discretion. Program Officers may obtain comments from assembled review panels or from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards and declines. When a decision has been made (whether an award or a declination), verbatim copies of reviews, excluding the names of the reviewers, and summaries of review panel deliberations, if any, are provided to the proposer.

NSF uses the advice of COVs and directorate advisory committees in monitoring this performance goal.

- **Performance Area: Use of Merit Review**

    FY 2001 Performance Goal V-1: At least 85% of basic and applied research funds will be allocated to projects which undergo merit review.

    FY 2001 will represent the first time data is collected using OMB's government-wide merit review definition. (NSF has established this target to be consistent with the OMB range of 70 percent to 90 percent. This performance goal applies to federal science, space, and technology agencies.)

    This performance goal was revised from that stated in FY 1999 and 2000 in order to be consistent with the government-wide definition of merit-reviewed scientific research as specified by OMB in FY 2000:

    > *"Merit-reviewed scientific research with competitive selection and external (peer) evaluation. Intramural and extramural research programs where funded activities are competitively awarded from a pool of qualified applicants following review by a set of external scientific or technical reviewers (often called peers) for merit. The review is conducted by appropriately qualified scientists, engineers, or other technically-qualified individuals who are apart from the people or groups making the award decisions, and serves to inform the program manager or other qualified individual who makes the award."*

Performance Indicator	FY 1997 Baseline	FY 1998 Result	FY 1999 Goal	FY 1999 Result	FY 2000 Goal	FY 2000 Result	FY 2001 Goal
Percent of basic and applied research funds allocated to projects reviewed by appropriate peers external to NSF and selected through a merit-based competitive process[13]	85%	86%	N/A	86%	80%[14] (estimate)	87%	85%

[13]Numbers based on new OMB definition of merit reviewed scientific research, which does not count FFRDCs and SGER grants as merit-reviewed, and is calculated as a percentage of NSF basic and applied research funds.

[14] The 80% estimated goal, recalculated from NSF's original goal of 90%, is based on the new OMB definition of merit reviewed scientific research.

Baseline: Merit review is the core of NSF's selection process. The1997 baseline was established based on internal data for that year. FY 1998 and FY 1999 results exceeded the established goals.

Performance Indicators: Percent of proposals, which undergo merit, review.

Means and Strategies for Success:

> NSF makes a few exceptions to its general requirement for external merit review. These include situations in which objective external reviewers may be difficult to find, when natural phenomena such as volcanic eruptions or earthquakes make an external review process for proposals to study them too lengthy, or when researchers propose such new ideas that knowledgeable external reviewers do not exist.

Data: Maintained in NSF's proposal and award systems.

Comments: Percent of proposals that undergo merit review.

> FY 2000 Results: Based on NSF's original goal , which included merit reviewed projects as a percentage all NSF funding, the Foundation exceeded the original goal of 90% for FY 1999 and FY 2000 by achieving results of 95% for both years (see section VII. Appendix).
> NSF has calculated a new baseline, goals, and results based on OMB's revised merit review definition issued in FY 2000. Using OMB's new definition, which measures merit reviewed scientific research as a percentage of research and development funding, NSF exceeded the estimated 80% goal, specifically reaching 87% for FY 2000. The new OMB merit review definition does not include funds for merit-reviewed scientific research with limited competitive selection (in other words, applicants that are limited to organizations that were created to largely serve Federal missions, such as Federally-Funded Research and Development Centers [FFRDCs]). It does not include merit-reviewed scientific research with competitive selection and internal (program) evaluation (for example, reviews conducted from within the agency program, without additional independent evaluation, such as NSF's small grants for exploratory research [SGERs]).

- **Performance Area: Implementation of Merit Review Criteria— Reviewers**

    FY 2001 Performance Goal V-2: NSF performance in implementation of the merit review criteria is successful when reviewers address the elements of both generic review criteria.

    Performance Indicators: Use of merit review criteria by reviewers.

Baseline: This is a revised goal for FY 2001. Reviewer data will be collected on FastLane to establish a baseline.

Means and Strategies for Success:

> NSF has modified program announcements to encourage proposers to provide information on all relevant aspects of the merit review criteria. NSF has recently re-issued guidance to the applicants and reviewers, stressing the importance of using both criteria in the preparation and evaluation of proposals submitted to NSF.
> For FY 2001 screens have been provided in FastLane so reviewers can address each merit-review criterion separately. The performance information will be collected from the FastLane database and reviewed by the Committees of Visitors and Advisory Committees.

Data: In FY 2001, all reviews are expected to be submitted to NSF electronically via FastLane, NSF's web-based interface with grantee institutions. The review submission module in FastLane is divided into separate sections for responses to each of the merit review criteria. This will allow NSF to obtain an accurate count of all reviews that address both criteria.

Comments:

> On September 20, 1999, NSF issued Important Notice # 125 to Presidents of universities and colleges, encouraging Principal Investigators to address the merit review criterion, "the broader impacts of the proposed activity", in their proposal and reviews. This criterion addresses the extent to which proposed activities will: advance discovery and understanding while promoting teaching, training, and learning and vice versa; broaden participation of underrepresented groups; enhance the infrastructure for research and education; enhance scientific and technological understanding; and benefit society.

- **Performance Area: Implementation of Merit Review Criteria— Program Officers**

  FY 2001 Performance Goal V-3: NSF performance in implementation of the merit review criteria is successful when program officers address the elements of both generic review criteria when making their award decisions.

  Performance Indicator: Development of a measurement system to determine extent of Program Officer attention to both merit review criteria and establishment of baseline against which to measure future performance.

  Baseline: This is a new goal. A baseline will be established in FY 2001 for comparison with future performance.

  Means and strategies for Success:

  > COVs and advisory committees for each NSF directorate will monitor this performance goal. The advisory committees along with their subcommittees will address questions on implementation of the merit review criteria, using their selected samples of reviews that they routinely examine in their judgment of the effectiveness and fairness of the review process.

Data: This performance goal is to develop a plan and system to ensure that Program Officers address both merit review criteria in proposals and to develop a baseline for their performance in this area. In FY 2002, NSF will implement that plan, which might include, for example, management certification that Program Officers have addressed both criteria.

CUSTOMER SERVICE

Customer service has a potential impact on the number and quality of proposals received and thus on NSF's ability to meet all outcome goals. In 1995, NSF adopted a set of customer service standards, primarily related to the proposal review process, treating grantees and potential grantees (*applicants*) as the primary *customers* for NSF's administrative processes. In a survey, applicants valued three standards most highly: (1) clear guidelines for proposal content and preparation, (2) a minimum of three months between program announcements and proposal deadlines, and (3) notification of proposal funding recommendation within six months of proposal submission. The survey measured baseline levels of customer satisfaction, with reference to FY 1995 experiences. The survey was repeated in FY 1999, with similar results.

For the FY 2001 performance plan, we have focused on the latter two of these standards, ones to which NSF staff have devoted special attention since the standards were adopted.

- **Performance Area: Customer Service – Time to Prepare Proposals**

  FY 2001 Performance Goal V-4: Ninety-five percent of program announcements will be available to relevant individuals and organizations at least three months prior to the proposal deadline or target date. The goal is identical to the goals set in FY 1999 and FY 2000.

Performance Indicator	FY 1998 Baseline	FY 1999 Goal	FY 1999 Result	FY 2000 Goal	FY 2000 Result	FY 2001 Goal
Percent of program announcements and solicitations available at least three months prior to proposal deadlines or target dates.	66%	95%	75%	95%	89%	95%

Baseline: The baseline was established using data collected by internal electronic systems in 1998. In that year, 66 percent of proposals were posted at least 90 days prior to proposal deadlines or target dates.

Means and Strategies for Success:

> To encourage new investigators and solicit quality proposals, the Foundation understands that scientists and engineers require sufficient time to prepare outstanding submissions. Based on responses to customer surveys, a preparation time of three months prior to a deadline was established. NSF strongly encourages all programs to make their program announcements and solicitations available at least 90 days prior to the deadline for submission.
> Of the announcements that did not meet the 3-month goal, the most common reason was delays in posting them on the web. NSF has focused its efforts in addressing potential bottlenecks in the announcement posting process. NSF plans to review and revise the timing of clearance procedures, in order to ensure that web posting of announcements will occur in a timely manner. Additionally, in FY2000, a web-based system for creating program announcements was put in place. The Program Announcement Template System (PATS) is expected to decrease the time required for an announcement to be posted on the NSF web site, which will aid the agency in achieving this goal. However, because this is the first year of implementation, not all announcements are being prepared using the PATS. We expect that there will be increased use of this system and additional progress toward meeting the goal next year.
> NSF is working to enhance the tracking system that measures the time it takes to prepare proposals in an effort to improve the accuracy of the data. NSF is developing the Program Information Management System (PIMS), which is a relational database designed to collect information and track the progress of publications such as program announcements and solicitations created in the PATS system.
> NSF staff work toward this performance goal by limiting the number of special competitions requiring individual program announcements and solicitations, planning for such competitions as far in advance as possible, and initiating clearance processes at least six months prior to the anticipated proposal deadlines.

Data: Data is maintained in NSF's On-line Document System. NSF maintains records of timing between announcement and deadline. Timing begins when the announcement is placed on the Web for public information.

Comments:

> Approximately 8 percent of program announcements and solicitations missed the 90-day time limit by fewer than 5 days.

- **Performance Area: Customer Service – Time to Decision**

    FY 2001 Performance Goal V-5: For 70 percent of proposals, be able to tell applicants whether their proposals have been declined or recommended for funding within six months of receipt.

    Processing proposals within six months of receipt is a challenging goal for NSF. NSF's long term goal continues to be processing 95 percent of proposals within six months.

Performance Indicator	FY 1997 Baseline	FY 1998 Result	FY 1999 Goal	FY 1999 Result	FY 2000 Goal	FY 2000 Result	FY 2001 Goal
Percent of proposals processed within six months of receipt	61%	59%	70%	58%	70%	54%	70%

    Baseline: The baseline was established using data collected by internal electronic systems. In 1997, NSF processed 61percent of proposals within six months of receipt.

    Means and Strategies for Success:

    > 2000 Results: NSF did not meet its goal of 70 percent. The Foundation is currently reviewing the situation to see what, if any, processing measures can be changed. There are a number of factors that may come into play in the decision-making process. For instance, some programs at NSF prefer to use mail review rather than panel review during the merit review process. Mail review tends to take longer to complete. Another concern is that programs tend to hold some highly rated proposals until the end of the fiscal year or even into the next fiscal year, in anticipation that more funds might become available.   A few programs reported temporary staffing shortages, which have now been corrected. In addition, the processing of international awards takes more time than standard awards.
    > Some directorates are considering not holding over proposals for potential funding in the next fiscal year.
    > Some divisions have added "performance on prompt handling of proposals" to their performance evaluation criteria for program managers.
    > NSF is committed to increasing its staff in FY 2001 to accommodate the anticipated increase in proposals associated with the budget increase and the major initiatives.
    > In FY 2001, NSF staff will work towards shortening the award process time by making more effective use of electronic mechanisms in conducting the review, working cooperatively to eliminate overloads and bottlenecks and carefully tracking the stage of processing and age of all proposals.

    Data: Maintained in NSF's proposal and award systems.

    Comments:

    > The date the proposal was received at NSF is the date used for purposed of evaluating performance toward this standard for all proposals, including those with stated deadline or target dates. A proposal has been processed and a decision made when it has attained division director concurrence.

- **Performance Area: Award Size and Duration**

  In FY 2001 NSF will continue efforts to address the Foundation-wide concerns about research grant sizes by increasing the average annualized award size and the duration of awards. This will enable scientists and engineers to devote a greater portion of their time to productive research. In real terms, NSF's average research grant size has decreased over the past two decades.[15] Adequate award size and duration are important both to getting high quality proposals and to ensuring that proposed work can be accomplished as planned.

  Given adequate funding, the goal is to increase the average annualized award size for research grants by approximately 8.25% per year, to reach $150,000 by FY 2005; and to increase award duration by .25 years per year, to reach 4 years by FY 2005.[16] Because this is a budget-dependent goal, the award size and/or duration targets may fluctuate.

  These performance goals are applicable only to competitive research grants (a subset of awards that focuses on awards to individual investigators and small groups).

  FY 2001 Performance Goal V-6a: NSF will increase the average annualized award size for research projects to $110,00.

Performance Indicator	FY 1998 Baseline	FY 1999 Result	FY 2000 Result	FY 2001 Goal
Average annualized award size for research projects	$90,000	$94,000	$105,800	$110,000

  FY 2001 Performance Goal V-6b: NSF will increase the average duration of awards for research projects to at least three years.

Performance Indicator	FY 1998 Baseline	FY 1999 Goal	FY 1999 Result	FY 2000 Result	FY 2001 Goal
Average duration of awards for research projects	2.7 years	2.8 years	2.8 years	2.8 years	3.0 years

  Baseline: Increasing award size is a new goal in FY 2001. The award duration goal builds on a FY 1999 goal (the duration goal was dropped in FY 2000 and reinstated in FY 2001). Both of the FY 2001 goals included above are based on actual data from previous years consistent with the strategic plan.

  Means and Strategies for Success:

  > NSF staff work toward these performance goals by carefully examining the amount of resources and time needed to complete the work proposed, using the guidance of reviewers as needed. They are also able to use electronic monitoring systems to keep track of average award size and duration and to modify their funding strategies as needed.
  > Targeted solicitations – increased award sizes for the "initiatives," and focused competitions and other programs.

  Data: Maintained in NSF's proposal and award systems.

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[15] "Real terms" means that the data has been adjusted for inflation.
[16] Based on estimates that projected an award size of $101,000 for FY 2000.

- **Performance Area: Maintaining Openness in the System**

  NSF believes that it is important that the proposal and award process be open to new people and new ideas, to help ensure that NSF is supporting research at the frontier of science and engineering. NSF is committed to maintaining openness in the system and will strive to increase the percentage of awards to new investigators.

  FY 2001 Performance Goal V-7: NSF will award 30% of its research grants to new investigators. Performance goal is identical to that in FY 1999 and FY 2000.

Performance Indicator	FY 1997 Baseline	FY 1998	FY 1999 Goal	FY 1999 Result	FY 2000 Goal	FY 2000 Result	FY 2001 Goal
Percent of competitive research grants going to new investigators	27%	27%	30%	27%	30%	28%	30%

  Baseline: In the early 1990's, NSF had percentages approximating 30 percent of all competitive research grants[17] going to new investigators. The percentage dropped over the mid-1990's and has risen slightly. NSF's FY 1999 and 2000 performance goals were to raise that percentage to 30%. The FY 2001 goal will continue to be 30%.

  Means and Strategies for Success:

  > This is a challenging goal for NSF. The Foundation will continue to seek creative and innovative proposals from new investigators. Program staff will attend scientific meetings, conferences, and conventions and will conduct site visits to promote awareness of the research opportunities at NSF and to encourage new investigators to submit proposals. NSF will examine trends, such as whether the pool of new investigators is smaller than in previous years or whether they are submitting fewer proposals, and if needed, use this information to modify targets in the future.

  Data: Maintained in NSF's proposal and award systems.

B. BROADENING PARTICIPATION

NSF is strongly committed to increasing the participation of science and engineering researchers, educators and students from groups currently underrepresented in the science and engineering enterprise in all NSF activities. Congress has enacted legislation giving NSF explicit responsibility for addressing issues of equal opportunity in science and engineering. This assignment of responsibility reflected the serious underrepresentation of women, minorities, and persons with disabilities in the science and engineering workforce, underrepresentation that persists to this day, although some progress has been made.

Recognizing that progress toward all outcome goals for research and education requires maximum diversity of intellectual thought, NSF is emphasizing attention to enhancing the participation of groups currently underrepresented in science and engineering in all its programs. In order to realize this increased participation,

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[17] The category of research grants is a subset of awards that focus on awards to individual investigators and small groups.

and so contribute to the development of a dynamic, diverse, human resource pool in science and engineering, over the next decade NSF seeks to:

– Increase the participation of scientists and engineers from underrepresented groups in NSF's merit review process;

– Increase the participation of scientists and engineers from underrepresented groups in NSF's workshops and conferences;

– Increase the number of proposals submitted by and awards made to scientists and engineers from underrepresented groups; and

– Increase the number of scientists and engineers from underrepresented groups appointed by NSF to its staff.

In FY 2001, NSF is setting performance goals to establish baselines for these various endeavors; to accomplish several targeted activities aimed at increasing the participation of members of underrepresented groups in NSF's merit review process; and to increase the number of scientists and engineers from underrepresented groups appointed by NSF to its staff (see NSF's management goal for NSF Staff Diversity).

- **Performance Area: Broadening Participation— Reviewer Pool**

    FY 2001 Performance Goal IV-8: NSF will begin to request voluntary demographic data electronically from all reviewers to determine participation levels of members of underrepresented groups in the NSF reviewer pool.

    Performance Indicators: Accomplishment of the aforementioned actions during FY 2001 indicates successful achievement of this performance goal.

    Means and Strategies for Success:

    > Initiate steps to redesign, as necessary, the current reviewer database to capture voluntarily provided demographic data about potential NSF merit reviewers and make this data available within NSF.
    > Begin to request voluntary demographic data from all reviewers electronically.
    > Collect potential reviewer data from targeted associations and institutions serving groups that are underrepresented in science and engineering, including women, underrepresented minorities, and individuals in underserved institutions.
    > Provide an opportunity on the NSF web site for would-be reviewers to identify themselves and voluntarily "register" to be reviewers.
    > Inform Program Officers of the availability of new reviewers and instruct them on how to access information about these reviewers.
    > Focus on recruiting new entrants to the reviewer pool and collecting voluntarily provided demographic data from current reviewers.
    > Encourage members of underrepresented groups in science and engineering fields to participate in the NSF merit review system as reviewers and widely disseminate information about opportunities to participate in the NSF merit review process as a reviewer or panel member.
    > Widely disseminate information to NSF Program Officers about members of underrepresented groups in science and engineering and who are available to serve as reviewers.
    > Encourage increased participation of members of underrepresented groups in NSF conferences and workshops.

Baseline: This is a new goal. FY 2001 will mark the first time we have focused attention on reviewer pool data. To establish the baselines for this goal, we will first gather the appropriate voluntary data from the reviewers, which will then be added to the reviewer pool database. A baseline for FY 2002 will be derived from this data.

Data: Information on reviewers will come from NSF's proposal and awards system and from collection activities developed as part of the implementation of these performance goals.

C.   FACILITIES OVERSIGHT

The goals that follow are for Federal science, space and technology agencies, which support construction projects and have responsibility for managing facilities (NSF, NASA, DOE). NSF reports in two categories for this performance area: *Construction and Upgrade of Facilities, and Operations and Management of Facilities*

NSF provides support for large multi-user facilities, which meet the need for access to state-of-the-art research platforms that are vital to the progress of research. This funding is essential to the development of world-class research capabilities. NSF provides funding for the construction and acquisition of major research facilities that provide unique capabilities at the cutting edge of science and engineering.

NSF has major responsibility for funding the operation of several multiple user facilities, which provide high cost equipment with unique capabilities to many individuals. NSF has provided construction funds for only a few facilities. Such facilities typically cannot be duplicated at more than one site. In addition, NSF puts a high premium on professional initial planning for construction and upgrade of facilities. Planning for unique, state-of-the-art facilities must take into account the exploratory nature of the facilities themselves. Such facilities test the limits of technological capability.

- *Every year, in the President's Budget Request, NSF sets out a cost plan and schedule for major construction and upgrade projects currently underway or planned for initiation in the Major Research Equipment account. NSF has established performance goals and measurements with respect to these plans and expects each construction and upgrade activity to meet these performance goals. NSF consults with other agencies to avoid duplication and to optimize capabilities available to American researchers, and cooperates with other agencies in construction of facilities where it will facilitate use across broad communities of researchers.*
- *NSF manages facilities in the Antarctic that are used by all federal agencies for selected projects.*
- *Many major facilities involve international cooperation.*

Facilities must operate efficiently and reliably and must offer appropriate opportunities if they are to be valuable to those they serve. NSF program officers work closely with facility directors to ensure that the facilities have appropriate resources to conduct operations and to provide maintenance that ensures reliable operations.

In order to report on the government-wide performance goals related to Facility Operations, and Construction and Upgrade, in FY 1999 NSF developed a new Performance Reporting System (as a module of the existing FastLane system), which was used to collect information on facility operations and construction from Facilities Managers external to NSF. As is the case with any new data collection effort, we expect the quality of the information provided to improve in subsequent years as managers gain experience with gathering and reporting the required data. In FY 1999, NSF developed a general facilities reporting template for use in collecting information on the construction, upgrade, and operations goals. This reporting system was linked to the new Project Reporting System (as a module of the existing FastLane system). The manager of each facility, located at the facility site, reports the data to NSF. FY 1999 was the first year that NSF collected data on these goals.

- **Performance Area: Construction and Upgrade of Facilities**

    NSF puts a high premium on initial planning for construction and upgrade of facilities that is thorough and professional. But any planning for unique, state-of-the-art facilities must take into account the exploratory nature of the facilities themselves. Such facilities stretch the limits of technological capability.

    Every year, in its Budget Justification to Congress, NSF sets out a cost plan and schedule for major construction and upgrade projects currently underway or planned for initiation in the Major Research Equipment account. NSF has established performance goals and measurements with respect to these plans and expects each construction and upgrade activity to meet these performance goals.

    FY 2001 Performance Goal IV-9a: For 90 percent of facilities, keep construction and upgrades within annual expenditure plan, not to exceed 110 percent of estimates.

Performance Indicator	FY 1999 Result	FY 2000 Result	FY 2001 Goal
Comparison with planned annual costs	Majority of projects within 110% of estimated expenditure plan	All projects were within 110% of estimates	90% of facilities within 110% of estimates

    In FY 2000, NSF achieved this goal. All projects were within annual expenditure plans, many were under budget.

    FY 2001 Performance Goal IV-9b: Ninety percent of facilities will meet all major annual schedule milestones by the end of the reporting period.

Performance Indicator	FY 1999 Result	FY 2000 Result	FY 2001 Goal
Comparison with planned annual schedule	Majority of projects were within 110% of estimates	Majority of projects were within 110% of estimates	90% of facilities meet all annual milestones by end of reporting period

    In FY 2000, NSF did not achieve this goal. In several cases where projects were not on schedule, it was beyond the project manager's control. For example, one project had difficulty acquiring necessary parts, while another dealt with non-performance of a sub-contractor.

FY 2001 Performance Goal 9c: For all construction and upgrade projects initiated after 1996, when current planning processes were put in place, keep total cost within 110 percent of estimates made at the initiation of construction.

Performance Indicator	FY 1999 Baseline	FY 2000 Result	FY 2001 Goal
Comparison with planned total cost	N/A No projects completed in FY 1999	N/A No projects completed in FY 2000	All projects completed after 1996 within 110% of estimates made at initiation of construction

In FY 2000, this goal was not applicable. No projects initiated after 1996 were completed in FY 2000.

- **Performance Area: Operations and Management of Facilities**

  Facilities must operate efficiently and reliably and must offer appropriate opportunities if they are to be valuable to those they serve. NSF program officers work closely with facilities' directors to ensure that facilities have appropriate resources to conduct operations and to provide maintenance that ensures reliable operations.

  FY 2001 Performance Goal 10: For 90 percent of facilities, keep operating time lost due to unscheduled downtime to less than 10 percent of the total scheduled operating time.

Performance Indicator	FY 1999 Result	FY 2000 Result	FY 2001 Goal
Comparison with scheduled operating time	Majority of facilities successful -- operating time lost less than 10% of total scheduled operating time	Majority of facilities successful – operating time lost less than 10% of total scheduled operating time	90% of facilities with less than 10% of total scheduled operating time lost

  In FY 2000, NSF did not achieve this goal. All but a few of the 26 facilities reporting on this goal kept unscheduled downtime to less than 10%.

Baseline: FY 2001 goals are based on government-wide goals established by OMB for science and technology agencies (NSF, NASA and the Department of Energy) that support construction projects and have responsibility for managing facilities. In discussions for several goals below, NSF has established "successful" performance at the 90% level. The government-wide function 250 is for all facilities.

The annual "within cost" goal for FY 2001 has been revised slightly so that when at least 90 percent of facilities meet the federal standard, the goal is considered achieved. This change was made because NSF places great importance on accurate planning for construction and upgrade of facilities, but we recognize that the unique, state-of-art projects being supported stretch the limits of technological capability. As a result there may be unforeseen expenditures. NSF expects that the vast majority of its projects will be within budget. However, it does not believe the agency should be considered unsuccessful overall in these areas if a small percentage of facilities are

unable to meet the goals. Therefore, to provide the flexibility necessary for NSF to report realistic and achievable goals, we are reestablishing the level deemed "successful" at 90% of the facilities. This change will be evaluated over time to determine if 90% is the appropriate level for these goals.

The annual "on schedule" goal has also been revised slightly so that NSF considers itself "successful" if ninety percent of the facilities meet all annual schedule milestones by the end of the reporting period. This change was made because NSF places great importance on accurate planning for construction and upgrade of facilities, but we recognize that the unique, state-of-art projects being supported stretch the limits of technological capability. As a result there may be unexpected construction delays. NSF expects that the vast majority of its projects will be on schedule. However, its does not believe the agency should be considered unsuccessful overall in these areas if a small percentage of facilities are unable to meet the goals. Therefore, to provide the flexibility necessary for NSF to report realistic and achievable goals, we are reestablishing the level deemed "successful" at 90% of the facilities. This change will be evaluated over time to determine if 90% is the appropriate level for these goals.

The "operating time" goal has also been revised from 100% to 90% because NSF recognizes that some facilities may have a failure rates greater than 10%, but that this is balanced overall by facilities that operate more reliably. NSF expects that the vast majority of facilities will keep operating time lost due to unscheduled downtime to less than 10% of the operating time. We do not believe the agency should be considered unsuccessful if a small percentage of the facilities are unable to meet this goal. Therefore, to provide the flexibility necessary for NSF to report realistic and achievable goals, we are reestablishing the level deemed "successful" at 90% of the facilities. This change will be evaluated over time to determine if 90% is the appropriate level for these goals

Data:

NSF collected data on these goals for the first time in FY 1999. As a result of knowledge gained during that process, the facilities reporting system was reviewed and updated to increase efficiency and improve the data reliability. Data for FY 2000 were not collected until the end of the fiscal year. The new system was available for testing by NSF staff in early September and was available for Principal Investigator data entry early in FY 2001.

In FY 1999, NSF developed a general facilities template for use in reporting on the construction, upgrade, and operations goals. This was linked to the new Project Reporting System (as a module of the existing FastLane system). Facilities Managers external to NSF reported the data.

NSF reviewed the FY 1999 data collection and reporting effort and made feasible modifications to the FY 2000 and 2001 systems where appropriate. This included allowing for reporting on construction/upgrade activities at facilities funded through the Research and Related Activities Account, refining the on-screen language to be more clear and to more accurately address the facilities goals, automating most of the output, and instituting a stage for collecting estimates. FY 2001 will be the first year for separate estimates collection.

Cross-cutting Activities with Other Agencies and Countries:

- NSF consults with other agencies to optimize capabilities available to American researchers with no inappropriate duplication and cooperates with other agencies in construction of facilities where it will facilitate use across broad communities of researchers.
- NSF manages facilities in the Antarctic that are used by all federal agencies for selected projects.
- Many major facilities involve international cooperation.

Means and Strategies for Success:

- Careful planning ensures that construction and operating plans are realistic and contain needed contingency funds.
- NSF program officers work closely with the project directors to ensure that the performance goals can be met.

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- Where potential problems are identified, the program officer will immediately inform the NSF-wide team assigned to that project so that all appropriate actions can be taken to keep construction projects within cost and schedule and to maintain operating schedules to the extent possible.
- External factors such as extremely adverse weather or failure of partners to act as planned can have a significant effect on construction projects and operating plans.

VI. VERIFICATION AND VALIDATION – COLLECTION, REPORTING, AND VALIDATION OF PERFORMANCE INFORMATION

A. DATA COLLECTION, VERIFICATION, AND VALIDATION

The data used in reporting NSF's goals are of two types. *Qualitative* output and outcome information, collected and reported using the alternative form allowed by the Act, are used to assess the Outcome Goals and the implementation of the new merit review criteria. *Quantitative* data collected through systems are utilized for the performance target levels of the Investment Process and Management Goals.

In FY 2000, NSF engaged an external third party, PricewaterhouseCoopers LLP (PwC), to verify and validate selected FY 2000 GPRA performance data as well as the process through which supporting data was compiled. In their final reports, PwC concluded that NSF was reporting its GPRA measures with "sufficient accuracy such that any errors, should they exist, would not be significant enough to change the reader's interpretation as to the Foundation's success in meeting the supporting performance goal...." Furthermore, PwC 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."

Compared with FY 1999, in FY 2000 NSF was much more rigorous in evaluating goal achievement. Options for grading were limited to either successful or not successful, and full justifications were required for successful grades to be counted for those goals that used qualitative measures. For the Outcome Goals, PwC verified and validated the goal achievement data tables.

RELATED TO GOALS FOR STRATEGIC OUTCOMES:

Most of the data that underlie achievement assessments of the alternative form performance standards come from outside the agency, through two major grantee reporting systems: the Project Reporting System which includes annual and final project reports for all awards, and the Impact Data Base and project monitoring system, designed by the Directorate for Education and Human Resources. Through these systems, performance information/data such as the following will be available to program staff, third party evaluators, and advisory committees:

- **Information on People** :
  student participants; demographics of participants; descriptions of student involvement; education and outreach activities under grants; demographics of science and engineering students and workforce; numbers and quality of educational models, products and practices; number and quality of teachers trained; and student outcomes including enrollments in mathematics and science courses, retention, achievement, and science and mathematics degrees received.

- **Information on Ideas**:
  results, published and disseminated; journal publications, books, software, audio or video products; contributions within and across disciplines; organizations of participants and collaborators (including collaborations with industry); contributions to other disciplines, infrastructure, and beyond science and

engineering; use beyond the research group of specific products, instruments, and equipment resulting from NSF awards; and role of NSF-sponsored activities in stimulating innovation and policy development.

- **Information on Tools**: new tools and technologies, multidisciplinary databases; software, newly-developed instrumentation, and other inventions; data, samples, specimens, germ lines, and related products of awards placed in shared repositories; facilities construction and upgrade costs and schedules; and operating efficiency of shared-use facilities.

NSF's electronic Project Reporting System permits organized reporting of aggregate information. We anticipate that the reliability of the information in the system will improve over time, as investigators and institutions become comfortable with its use. FY 1999 was the first year of its full implementation. Electronic submission of project reports was required in FY 2000.

To encourage cooperation, NSF has worked with the university community to minimize the added reporting and assessment burden so as to encourage cooperation. This is important to having a viable performance plan for NSF. More direct efforts to verify and validate information in the Project Reporting System would add significantly to the cost and to the burden on the grantee community.

RELATED TO INVESTMENT PROCESS GOALS:

Most data supporting performance goals under the heading *Proposal and Award Processes* are collected and maintained in NSF's proposal and award systems. These systems are subject to regular checks for accuracy and reliability. One exception is the performance goal on time to prepare proposals. Data for this goal are maintained in NSF's On-line Document System. Another exception is the performance goal on use of merit review criteria by reviewers. Expert external judgment is used to assess performance. Advisory Committees will be provided with summary information developed from random samples of review records as they make their assessments. Background information to validate the accuracy of the summaries will be available upon request.

Data supporting the performance goals under the heading *Facilities Oversight* are currently reported to NSF electronically through the Facilities Reporting System, which is linked to the Project Reporting System. NSF verifies the accuracy and completeness of the information through constant interaction between NSF staff and the management of the facilities.

The performance goals in the categories of *Broadening Participation* will be supported by data from NSF's proposal and award systems and from collection activities in FY 2001 to help establish baseline levels.

RELATED TO GOALS FOR MANAGEMENT

All of these performance goals are collected and maintained in internal NSF management systems.

The Division of Information Systems (DIS; within the Office of Information and Resource Management) maintains an extensive database on the use of FastLane. They will continue to maintain statistics on submission of full proposals through FastLane. The Division of Human Resources Management (HRM/IRM) maintains information related to staff recruitment and staff training, under the guidance of the Chief Information Officer.

B. DATA SOURCES AND LIMITATIONS

The sources of data used in the performance report are organized according to each goal relevant to Strategic Outcomes, Investment Process, and Management.

NSF data systems include central databases such as the electronic Project Reporting System, the Enterprise Information System, the FastLane system, the Proposal system, the Awards system, the Reviewer System, the Integrated Personnel System, the Finance System, Online Document System, and the Performance Reporting System; distributed sources such as scientific publications, press releases, independent assessments including Committee of Visitor (COV) and Advisory Committee (AC) reports, program and division annual reports, directorate annual reports, and internally maintained local databases. In a few cases, NSF makes use of externally maintained contractor databases.

RELATED TO PERFORMANCE DATA FOR STRATEGIC OUTCOMES

The performance results for Strategic Outcome Goals are tabulated from reports collected at all areas of NSF, as prepared by committees of external experts (COVs and ACs). Results for each goal are aggregated across the agency level and compared with expected performance according to how the goal is stated.

STRATEGIC OUTCOMES	DATA SOURCES	DATA LIMITATIONS
Ideas **People** **Tools**	External reports from awardees; independent assessments and third-party evaluations, including COV reports and AC reports using alternative form; program reports; press releases; scientific publications; internal and external information systems and external studies; and independently maintained databases.	Non-quantitative information requires judgment of experts; basis for judgment not always evident; substance and timing of outcomes from research and education activities are unpredictable; some local databases not under central quality control; long-term data needed to assess impact of outcomes; potential for self-reporting bias; process to collect and aggregate data needs improvement.
K-12 Systemic Activities: Over 80% of schools participating in a systemic initiative program will implement a standards-based curriculum in science and mathematics; further professional development of the instructional workforce; and improve student achievement on a selected battery of tests, after three years of NSF support.	Internal and external information systems and external studies; independent assessments and evaluations, including COV and Advisory Committee reports.	Additional research and analysis are required to further our understanding of the impact of K-12 educational interventions. Also, strategies are needed to facilitate more effective data reporting and documentation. In response there is interaction with districts to facilitate more effective data reporting and use. Third party evaluations and research studies are being conducted to enhance assessment and interpretation of quantitative results and to address issues of attribution. Collection of academic achievement information is limited to those schools that utilize the same assessments systems over a three-year period.

RELATED TO PERFORMANCE DATA FOR INVESTMENT PROCESS GOALS

Internal databases are maintained to collect, verify, and validate data pertaining to the investment goals. These goals are relevant to the means and strategies used by NSF to support the outcome goals and the processes by which NSF shapes its portfolio of awards.

GOAL	DATA SOURCE	DATA LIMITATIONS
Use of Merit Review	Internal data systems	None
Implementation of Merit Review Criteria	Reviews from external sources; program officer review analysis; program annual reports; COV reports; and AC reports using alternative form	Information is subject to review for reliability and accuracy. Implementation more successful for some programs than others; adequate data not always available.
Customer Service- Time to prepare proposals	Internal data systems	None
Customer Service- Time to decision	Internal data systems	None
Award size	Internal data systems	None
Award duration	Internal data systems	None
Maintaining Openness in the System	Internal data systems	Possible to incorrectly identify a PI as "new"- needs to be monitored
Broadening Participation- Increasing underrepresented groups in reviewer pool	Internal systems	Data is based on voluntary self-reporting
Construction and upgrade: within 110% of annual expenditure plan estimates	Internal data systems containing information collected from external sources	The reporting system was revised and implemented in FY 2000; facilities managers still gaining experience in collecting and reporting this information
Construction and upgrade: schedule within 110% of estimates	Internal data systems containing information collected from external sources	The reporting system was revised and implemented in FY 2000; facilities managers still gaining experience in collecting and reporting this information
Construction and upgrade: total cost within 110% of estimates	Internal data systems containing information collected from external sources	The reporting system was revised and implemented in FY 2000; no construction and upgrade projects were completed in FY 2000.
Operations: keep operating time lost to less than 10% of total scheduled operating time	Internal data systems containing information collected from external sources	The reporting system was revised and implemented in FY 2000; facilities managers still gaining experience in collecting and reporting this information

RELATED TO PERFORMANCE DATA FOR MANAGEMENT GOALS

Central data systems as well as internal databases are maintained to collect, verify, and validate data pertaining to the management goals. These goals are relevant to use of new and emerging technologies, training of NSF staff, and implementation of management reforms to improve service to NSF's customers.

GOAL	DATA SOURCE	DATA LIMITATIONS
Electronic proposal submission	Internal data systems	None
Electronic Proposal processing	Internal data bases	None
Video-conference/long distance communications	Internal tracking system to be developed	None
Staff diversity	Internal data bases	Measure may not be accurate because applicants are not required to provide the information according to law
Work Environment	Employee attitude surveys	None

C. NSF DATA QUALITY PROJECTS

During FY 1999, NSF staff implemented a Data Quality Project for the quantitative Investment Process and Management goals. The objectives of the project were to:
- Evaluate the quality of the data in the central databases.
- Ensure the paper documents and the NSF central databases are synchronized.
- Identify inconsistencies so that methods for correcting the cause of the inconsistencies can be developed.
- Ascertain the causes of the data quality problems and develop systematic methods for correction.
- Develop a comprehensive data dictionary.
- Promulgate data quality policies and procedures NSF-wide.

In FY 2000, NSF engaged an external third party, PricewaterhouseCoopers LLP (PwC), to verify and validate selected FY 2000 GPRA performance data as well as the process through which supporting data was compiled. They documented the processes through which NSF collects, processes, maintains, and reports selected performance data. They noted relevant controls and discussed if the controls were being used. They also mapped NSF procedures against GAO criteria for supporting processes to be considered valid and verifiable. For the outcome goals, PwC verified and validated the goal achievement data tables.

In their final reports, PwC concluded that NSF was reporting its GPRA measures with "sufficient accuracy such that any errors, should they exist, would not be significant enough to change the reader's interpretation as to the Foundation's success in meeting the supporting performance goal...." Furthermore, PwC 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."

NSF will continue to further refine data collection methods and systems to address areas in need of improvement as time and funds allow.
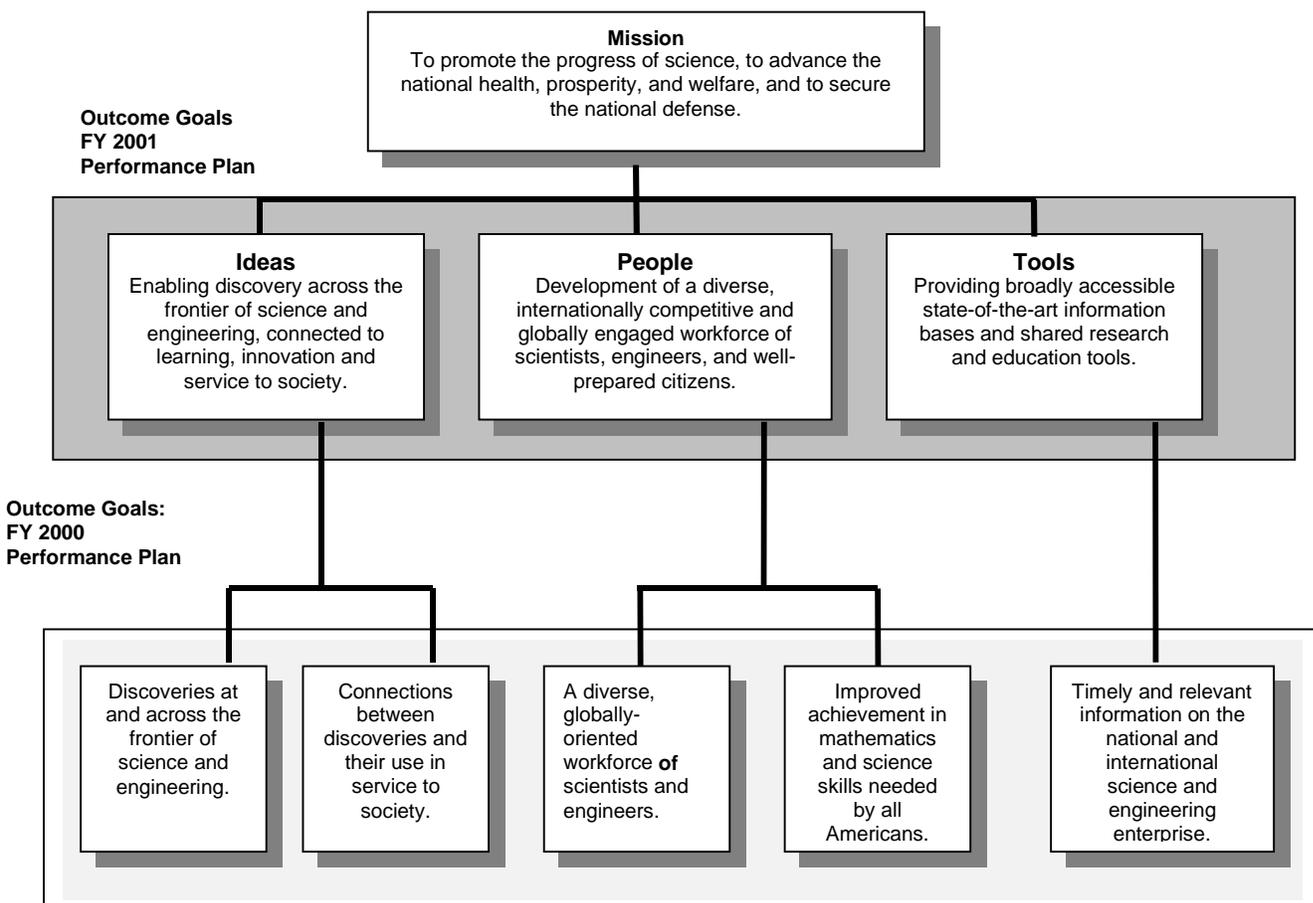
VII. APPENDIX: MODIFICATIONS TO NSF GOALS

The modifications to NSF goals described below are organized into two sets:
- One set describes changes from the revised final FY 2000 goals to the revised final FY 2001 goals; and
- A second set describes changes from the original FY 2001 NSF Performance Plan dated February 7, 2000 to the revised final FY 2001 goals.

All final modifications to NSF goals are included in this Revised Final FY 2001 Performance Plan.

A. Modifications to NSF Goals from FY 2000 – FY 2001

The FY 2001 Revised Final Performance Plan (Spring 2001) is based on NSF's updated GPRA Strategic Plan FY 2001 – 2006, finalized in September 2000, and upon newly developed strategic outcomes included therein. The chart below clarifies the structural linkage between the new goals contained in that plan and those utilized in earlier NSF GPRA documents.

Mission
To promote the progress of science, to advance the national health, prosperity, and welfare, and to secure the national defense.

Outcome Goals FY 2001 Performance Plan

Ideas
Enabling discovery across the frontier of science and engineering, connected to learning, innovation and service to society.

People
Development of a diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens.

Tools
Providing broadly accessible state-of-the-art information bases and shared research and education tools.

Outcome Goals: FY 2000 Performance Plan

Discoveries at and across the frontier of science and engineering.

Connections between discoveries and their use in service to society.

A diverse, globally-oriented workforce **of** scientists and engineers.

Improved achievement in mathematics and science skills needed by all Americans.

Timely and relevant information on the national and international science and engineering enterprise.

The following goals, which were presented in the FY 2000 Performance Plan, have been modified or removed from the final FY 2001 Performance Plan. The significance and rationale for changes or exclusion from the final FY 2001 Performance Plan are discussed below.

ANNUAL PERFORMANCE GOALS FOR NSF'S STRATEGIC OUTCOMES

- FY 2000 Outcome Goal: A diverse, globally oriented workforce of scientists and engineers.

  This goal is incorporated under the FY 2001 Strategic Outcome: People-A diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens.

- FY 2000 Outcome Goal: Improved achievement in mathematics and science skills needed by all Americans.

  This goal is incorporated under the FY 2001 Strategic Outcome: People - A diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens.

- FY 2000 Outcome Goal: Discoveries at and across the frontier of science and engineering.

  This goal is incorporated under the FY 2001 Strategic Outcome: Ideas - Discovery across the frontier of science and engineering, connected to learning, innovation and service to society.

- FY 2000 Outcome Goal: Connections between discoveries and their use in service to society.

  This goal is incorporated under the FY 2001 Strategic Outcome: Ideas- Discovery across the frontier of science and engineering, connected to learning, innovation and service to society.

- FY 2000 Outcome Goal: Timely and relevant information on the national and international science and engineering enterprise.

  This goal addresses the concerns of Science Resources Studies (SRS) customers regarding the accuracy and the ability to obtain needed information on science and engineering personnel and resources. The goal was adjusted to determine what data are needed to better reflect the 21st century science and technology enterprise – to develop, assess, and begin implementation of design options for recasting SRS science and engineering resources data collections. This goal is incorporated under the FY 2001 Strategic Outcome: Tools - Broadly accessible state-of-the-art information-bases and shared research and education tools.

ANNUAL PERFORMANCE GOALS FOR MANAGEMENT

- FY 2000 Performance Goal: By the end of FY 2000, all staff will receive an orientation to FastLane, and at least 80% of program and program support staff will receive practice in using its key modules.

  NSF offers a comprehensive training program and strongly encourages all employees to keep current with technology improvements as well as government regulations. This goal will not be continued in FY 2001.

- FY 2000 Performance Goal: NSF will complete all activities needed to address the Year 2000 problem for its information systems according to plan, on schedule and within budget.

  OMB guidelines and milestones for assessment, renovation, validation and implementation were followed and achieved. External validation of NSF's systems compliance with Y2K guidance was accomplished. This goal is no longer relevant.

- FY 2000 Performance Goal: During FY 2000, at least 85% of all project reports will be submitted through the new electronic Project Reporting System.

This system is utilized and the goal will not be continued in FY 2001.

- FY 2000 Performance Goal: By the end of FY 2000, NSF will have the technological capability to take competitive proposals submitted electronically through the entire proposal and award/declination process without generating paper within NSF.

  This goal has been modified to focus on the review process. NSF will conduct 10 pilot paperless projects that manage the competitive review process in an electronic environment.

ANNUAL PERFORMANCE GOALS FOR NSF'S INVESTMENT PROCESS

- FY 2000 Performance Goal: At least 90% of NSF funds will be allocated to projects reviewed by appropriate peers external to NSF and selected through a merit-based competitive process.

  This performance goal was revised from that stated in FY 1999 and early 2000 in order to be consistent with the government-wide definition of merit-reviewed scientific research as specified by OMB in FY 2000:

  NSF exceeded the original goal of 90% for FY 1999 and FY 2000 by achieving results of 95% for both years. Nevertheless, NSF has calculated a new baseline, goals, and results based on OMB's revised merit review definition issued in FY 2000.

- FY 2000 Performance Goal: NSF's performance in implementation of the new merit review criteria is successful when reviewers address the elements of both generic review criteria appropriate to the proposal at hand and when program officers take the information provided into account in their decisions on awards, as judged by external independent experts.

  This goal was separated into its component parts and directed toward reviewers and program officers to better measure the performance of each.

- FY 2000 Performance Goal: Identify possible reasons for customer dissatisfaction with NSF's merit review system and with NSF's complaint system.

  The information is being utilized in staff training and in developing goals. This goal as currently stated will not be continued in FY 2001.

- FY 2000 Performance Goal: Identify best practices and training necessary for NSF staff to conduct merit review and answer questions about the review criteria and process. Identify best practices and training necessary for NSF staff to answer questions from the community and to deal with complaints in a forthright manner.

  Customer service continues to be of the highest priority for NSF. NSF continues to address these concerns, particularly those involving the merit review process and handling of customer complaints and will concentrate on improving its Merit Review Process (see FY 2001 performance goals V-4 and V-5.) This goal will not be continued in FY 2001.

- FY 2000 Performance Goal: Improve NSF's overall American Customer Satisfaction Index (ACSI) compared to the FY 1999 index of 57 (on a scale of 0 to 100.)

Customer service continues to be a high priority for NSF. The results of these surveys were used to identify issues of importance to respondents, which enables NSF to design meaningful goals. This goal will not be continued in FY 2001.

- FY 2000 Performance Goal: Develop a plan and system to request that Principal Investigators address the integration of research and education in their proposals, and develop a system to verify that PI's have done so.

  The goal above is incorporated into the Implementation of Merit Review Criteria Goals for FY 2001 (see FY 2001 performance goals V-2 and V-3). Each program announcement, NSF's Guide to Programs and the Grant Proposal Guide explain the review criteria (see Implementation of Merit Review Criteria.)

  The plan was developed and is being utilized. Issuance of Important Notice #125 reminded PIs of the importance of addressing this topic. This goal will not be continued in FY 2001.

- FY 2000 Performance Goal: Develop and implement a system/mechanism to request and track reviewer comments tied to merit review criterion #2, "what are the broader impacts of the proposed activity?".

  The system was developed and is being utilized. The goal above is incorporated into the Implementation of Merit Review Criteria Goals for FY 2001 (see FY 2001 performance goals V-2 and V-3). Each program announcement, NSF's Guide to Programs and the Grant Proposal Guide explain the review criteria (see Implementation of Merit Review Criteria.) This goal will not be continued in FY 2001.

- FY 2000 Performance Goal: In FY 2000, NSF will identify mechanisms to increase the number of women and underrepresented minorities in the proposal applicant pool, and will identify mechanisms to retain that pool.

  This goal is incorporated under the FY 2001 Strategic Outcome: People—A diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens, and also under the Implementation of Merit Review Criteria Goals (reviewer and Program Officer goals) for FY 2001.

  This goal will not be continued as stated. In FY 2001, NSF has focused its "broadening participation" performance area initially on diversification of the reviewer pool.

B. Modifications to NSF Goals within FY 2001

This section compares goals contained in the FY 2001 GPRA Performance Plan submitted on February 7, 2000 with those developed for this FY 2001 Revised Final GPRA Performance Plan.

ANNUAL PERFORMANCE GOALS FOR NSF'S STRATEGIC OUTCOMES

- The statement of successful performance for NSF's Strategic Outcomes related to People, Ideas, and Tools has changed:

  "NSF is successful when results reported in the period demonstrate significant progress in achieving .... (FY 2001 Performance Plan dated February 7, 2001)
  " NSF is successful when, in the aggregate, results reported in the period demonstrate significant achievement in one or more of the following indicators (FY 2001 Performance Plan dated Spring 2001)

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These changes are based on results of FY 2000 activities and on feedback from auditors. This change will be monitored over time for appropriateness.

- The phrasing and wording of indicators for the "People" Strategic Outcome are slightly modified. The changes incorporate the substance of previously developed indicators.

These changes were made to clarify the wording for COVs (Committees of Visitors) - NSF committees of external experts, advisory committees, and others involved in assessment of NSF GPRA goals.

- FY 2001 (Original) Performance Goal: Determine what data are needed to better reflect the 21st century S&T enterprise. Develop, assess and begin implementation of design options for recasting SRS S&E resources data collections.

- FY 2001 (Original) Performance Goal: Determine the aspects of each SRS survey most needing improvement, based upon the standard set of data quality measures for reporting SRS products. Improve the quality of at least one half of the core SRS surveys.

The two goals above address issues related to the data needed to better reflect the 21st century science and technology enterprise – to develop, assess, and begin implementation of design options for recasting SRS science and engineering resources data collections. The goal as stated above will not be continued in FY 2001. These goals are incorporated under the FY 2001 Strategic Outcome: Tools – Providing "broadly accessible state-of-the-art information bases and shared research and education tools."

ANNUAL PERFORMANCE GOALS FOR NSF MANAGEMENT

- FY 2001 (Original) Performance Goal: During FY 2001, at least 95% of eligible project reports will be submitted through the electronic Project Reporting System.

This system is utilized and the goal will not be continued in FY 2001.

- FY 2001 (Original) Performance Goal: In FY 2001, NSF will strive to provide NSF staff with a physical environment that is safe and well equipped with current technology tools, and a work culture that promotes high performance, life-long learning, and recognition of high achievement.

This goal as stated will not be retained for FY 2001. The focus has been changed to development of baselines that will enable management to better assess the quality of worklife and work environment.

ANNUAL PERFORMANCE GOALS FOR NSF'S INVESTMENT PROCESS

- FY 2001 (Original) Performance Goal: NSF performance in implementation of the new merit review criteria is successful when reviewers address elements of both generic review criteria appropriate to the proposal at hand and when program officers take the information provided into account in their award decisions.

This goal is separated into its component parts and directed to both reviewers and program officers to better measure the performance of each (see FY 2001 performance goals V-2 and V-3). The goal as stated above will not be continued in FY 2001.

- FY 2001 (Original) Performance Goal: NSF performance is successful when reviewers of research grant proposals address elements of both generic review criteria, and explicitly address the integration of research and education.

  Both parts of this goal are incorporated into implementation of Merit Review Criteria Goals for FY 2001 (see the FY 2001 performance goals V-2 and V-3.) Each program announcement, NSF's Guide to Programs and the Grant Proposal Guide explain the review criteria.

- FY 2001 (Original) Performance Goal: In a pilot effort, at least 50% of research grant proposals will explicitly address integration of research and education.

  The goal above was incorporated into the Implementation of Merit Review Criteria Goals for this FY 2001 (see FY 2001 performance goals V-2 and V-3). Each program announcement, NSF's Guide to Programs and the Grant Proposal Guide explain the review criteria (see Implementation of Merit Review Criteria.) This goal will not be continued in FY 2001.

- FY 2001 (Original) Performance Goal: NSF's overall customer satisfaction rating on applicant surveys (American Customer Satisfaction Survey – ACSI) will show continued improvement over FY 2000 applicant survey results.

  Customer service continues to be a high priority for NSF. Results of these surveys, such as the importance applicants place on "time to decision" and "time to prepare proposals", were used to identify issues of importance, which enabled NSF to design meaningful goals. This goal will not be continued in FY 2001.

- FY 2001 (Original) Performance Goal: NSF will begin to implement mechanisms/approaches developed in FY 2000 for increasing the number of women and underrepresented minorities in the proposal applicant pool.

- FY 2001 (Original) Performance Goal: NSF will begin to implement the approaches for retaining women and underrepresented minorities in the proposal applicant pool.

  These two goals was incorporated under the FY 2001 Strategic Outcome: People—A diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens, and also under the Implementation of Merit Review Criteria Goals for FY 2001.

  Neither of the goals above is continued as stated. NSF has focused its "broadening participation" performance area – at least initially - on diversification of the reviewer pool.

- FY 2001 (Original) Performance Goal: Maintain FY 2000 goal: keep construction and upgrades within annual schedule, total time required for major components of the projects not to exceed 110% of estimates.

  For FY 2001, NSF has modified its definition of successful for the "on schedule" goal to "Ninety percent of the facilities will meet all major annual schedule milestones by the end of the reporting period". This change provides the flexibility to report realistic and achievable goals.

- FY 2001 (Original) Performance Goal: Maintain FY 2000 goal: keep operating time lost due to unscheduled downtime to less than 10% of the total operating scheduled operating time.

- FY 2001 (Original) Performance Goal: Maintain the 2000 goal: keep construction and upgrades within annual expenditure plan, not to exceed 110% of estimates.

For FY 2001 for the two goals above, NSF has modified its definition of successful at the 90% level.. The "within cost" and "operating time" goals now state "For 90% of the facilities, ...". These changes provide the flexibility to report realistic and achievable goals.