APPENDICES

APPENDIX I. - TABLE OF EXTERNAL EVALUATIONS

The Table below provides information on program assessments and evaluations other than Committee of Visitor and Advisory Committee assessments - with one exception – the CAREER program. The CAREER program is an agency-wide activity, and the assessment was contracted to an external private vendor.

The table lists other types of evaluations, not used in GPRA performance assessment, that were completed in FY 2001. These reports, studies, and evaluations are frequently used in setting new priorities in a field or in documenting progress in a particular area. The reader is encouraged to review the reports for additional information on findings and recommendations that are beyond the scope of this report.

Reports (other than COV and AC reports) produced by NSF are available online at http://www.nsf.gov/pubs/start.htm using the NSF's online document system and the publication number indicated.

Information on obtaining reports produced by the National Research Council or National Academy of Sciences can be found online by searching www.nap.edu or from the National Academy Press, 2101 Constitution Avenue, N.W., Lockbox 285, Washington, D.C. 20055 (1.800.642.6242).

Evaluations Completed in FY 2001	
BIO	
Evolution of Development and Tree of Life Workshop Report	**Findings:** Representatives from both the Evolution of Developmental Mechanisms (EvoDevo) and Tree of Life (ToL) communities agreed that research progress in these areas was constrained by the same major needs and that the elimination of these constraints would lead to remarkably fruitful and exciting interactions between evolutionary developmental biology and evolutionary systematics. Communities long separated technically and conceptually have now converged on a common set of evolutionary questions. The participants felt that after decades of separation they must exploit the powerful synergism presented by this convergence. **Recommendations:** 1) Hold a competition to create about 100 arrayed bacterial artificial chromosome (BAC) and cDNA libraries of representative organisms on the Tree of Life ("First 100"). 2) Provide grants for functional analysis tool development production of BAC or sequenced libraries of additional organisms that address fundamental evolution of development questions. 3) Provide support for sequencing about 24 major developmental gene families in the First 100 organisms. 4) Encourage collaboration among phylogeneticists and evolution of development researchers to develop a robust informatics infrastructure. **Availability:** NSF (http://www.nsf.gov/pubs/2001/bio012/)

Research Needs in Phyloinformatics" and "Developing the Technology and Infrastructure Needed for Assembly of the Tree of Life	**Findings:** A major new coordinated research effort is necessary. The integration of expertise and of data from a variety of sources will be essential for resolving the most vexing phylogenetic problems, and coordinated research groups will be the most efficient means to achieve this objective. Specifically, the workshop participants envision the funding of Tree of Life "networks" and "hubs," and of a "phyloinformatics" facility focused on synthesis and outreach. **Recommendations:** The NSF should establish, as soon as possible, a new program focused on "Assembling the Tree of Life" (ATOL). The concrete benefits to science and society stemming from ATOL, and the feasibility of accomplishing its major mission, justifies the development of a major new initiative and the investment necessary to build and maintain such a program. Specifically, the ATOL program should support the development of the following new structures: - Tree of Life Networks. TOLNets are the essential mechanisms for coordinating individual investigators from diverse fields of knowledge who are working on reconstructing the phylogeny of Life - Tree of Life Hubs. TOLHubs, with a concentration of expertise and specialized facilities, would serve the ATOL effort as focal points for obtaining and synthesizing phylogenetic data. They would facilitate interactions among TOLNets and function as ATOL training centers. - Phyloinformatics and Coordination Infrastructure (PICI). Centralization of the informatics program would avoid duplication of effort and facilitate integration among databases. Intellectual synergy would be promoted by co-locating research scientists, visiting scholars, and support staff in one place. Investment in such a center would establish a global resource and encourage cooperation with ongoing biodiversity and bioinformatics initiatives. Throughout the development of this program it will be critical to support training relevant to all aspects of ATOL, and the development of new methods for gathering, analyzing, and synthesizing phylogenetic data. Furthermore, every effort must be made to foster cross-disciplinary efforts, international collaboration, and linkage to other relevant programs. **Availability:** http://www.research.amnh.org/biodiversity

The Microbe Project: A Report from the Interagency Working Group on Microbial Genomics.	**Findings:** There are major areas of research as yet untouched that would increase our understanding of the broader microbial world, its diversity, and its potential applications. A coordinated interagency and international effort is needed to seize the opportunities offered by genome-enabled microbial science. In recognition of this need, the Microbe Project Interagency Working Group was convened in August 2000, and charged with developing a coordinated interagency action plan or microbial genomics activities. The Microbe Project has three broad goals: to build needed infrastructure, promote research and develop human resources and an informed public. **Recommendations:** - Microbial genome sequencing should be expanded to include scientifically important but as yet understudied microbes. - Individual agencies should continue, or as necessary, increase support for research on technique and tool development. - The Federal government should initiate a deliberate planning effort to address the issue of providing sustained support for and access to microbial genomic resources. - Develop standardized bioinformatics tools for the analysis of microbial genomes. - Database issues (including standardized annotation, interoperability and long term support) must be resolved through an interagency effort with planning activities to begin immediately. - Each agency, as its mission directs, should encourage and support genome–enabled microbial research objectives, as described in this report. - Individual and interagency activities initiated as part of the Microbe Project should contain elements that encourage training and /or educational activities, and include efforts to enhance the diversity of participants in all aspects of each activity. - Interagency coordination of the development and distribution of training materials should be encouraged. - Continue coordination cross agencies of all Microbe Project activities, in part through the development of an interagency Microbe Project web site. Availability**:** www.ostp.gov/html/microbial/start.htm

CISE	
White Paper on an NSF ANIR Middleware Initiative	**Scope:** Program Analysis. **Findings:** This group was commissioned to make recommendations for an NSF middleware program. Recommended that NSF support middleware research and a complementary middleware infrastructure program. **Availability:** Division Director, ANIR/NSF.
Report of Review Committee of NSF's High Performance International Internet Services (HPIIS) Project	**Scope:** Assessed the value to the research community of 3 HPIIS awards (Transpac – Asia-Pacific; Euro-Link; and Mirnet – Russia) that connect US researchers to researchers in other countries. Determine continuing need for HPIIS program. **Findings:** Transpac and Euro-Link are well run and effective. Mirnet is making an excellent start. The report recommended a classification of usage types and metrics for usage. Continued support and recognition of needs at application level (as illustrated by the ITR GryPhyN project) were recommended. **Availability:** Division Director, ANIR/NSF.

Appendix I. – Table of External Evaluations

Report of the National Workshop on Internet Voting: Issues and Research Agenda	**Scope:** Studied the feasibility of online voting at the request of the White House (memorandum, December 17, 1999). **Findings:** Poll Site Internet voting offers benefits and could be fielded within the next several election cycles. Remote voting and Internet voting registration pose significant integrity issues. It is appropriate for the NSF to address technical and social science research in this area. **Availability:** Internet Policy Institute (http://www.internetpolicy.org/).
Making IT Better: Expanding Information Technology Research to Meet Society's Needs	**Scope:** Identifies research areas that need increased effort for the Nation to enjoy full benefits of the Information Technology (IT) systems. **Findings:** Report recommends that NSF and DARPA establish programs for research on large scale IT systems; boosted funding for basic IT research commensurate with growth of research challenges; increased support for interdisciplinary research on social applications of IT. **Availability:** Computer Science and Telecommunications Board, National Research Council National Academy Press. (http://www.nap.edu/)
The Internet's Coming of Age	**Scope:** A study of the Internet and key challenges that shape its maturation. **Findings:** Recommended continued support for research on scaling challenges; partnerships for research to be conducted in realistic operational settings, and research on the economics of interconnection. **Availability**: Computer Science and Telecommunications Board, National Research Council, National Academy Press. www.nap.edu
Report to the President, Digital Libraries: Universal Access to Human Knowledge	**Scope:** Examined state of research on digital libraries (DL). **Findings:** Recommendations to NSF and other agencies. Expand research in DL including organizing content, scalability of systems, archival storage, intellectual property, privacy and security, and human use. Create several large-scale DL testbeds. Make Federal content persistently available on the Internet. Play a leadership role in policy for intellectual property rights. **Availability:** President's Information Technology Advisory Committee, Panel on Digital Libraries National Coordinating Office, Arlington VA. (www.ccic.gov)
Report to the President, Transforming Health Care Through Information Technology	**Scope:** Examined the use of IT in the health care sector. **Findings:** Recommendations were made in several areas focused on NIH and DHHS. Relevant to NSF were recommendations to work with NIH, DARPA and DOE to design and deploy a scalable computing and information infrastructure supporting biomedical research. Several IT research areas were identified. **Availability:** President's Information Technology Advisory Committee, Panel on Transforming Health Care National Coordinating Office, Arlington VA. (www.ccic.gov)

Report to the President, Developing Open Source Software to Advance High End Computing	**Scope:** Computing based on growing vulnerability in the development of software for high end computing. Group assessed the open source model to address this need. **Findings:** The Federal government should encourage open source software with efforts on technical assessment, management plans, policy studies, etc. These recommendations are particularly pertinent to NSF's PACI and Terascale Facilities. **Availability:** President's Information Technology Advisory Committee, Panel on Open Source Software for High End Computing National Coordinating Office, Arlington VA. (www.ccic.gov)

EHR	
The Graduate Research Fellowships (GRF) Program	**Scope:** To assess the impact of Fellowships on successful applicants. *The Graduate Research Fellowships (GRF) Program*-Abt/WestEd (REC9912174). **Findings:** Findings indicated an overall positive effect of the fellowships. Fellows complete the Ph.D. at a higher rate than non-Fellows, and the percentage of female Fellows completing the Ph.D. has become essentially the same as for men. Findings from the evaluation that relate to policy considerations include: • Highly qualified students are funded and the award is highly prestigious. • Fellows consider the major advantages of the fellowship to be its prestige and the flexibility it allows in choosing a research area, structuring a graduate program, and selecting the educational institution and mentor. • About two thirds of the NSF fellows complete their degrees within nine years, with comparable completion rates for female and male fellows. Minority Graduate Fellowship recipients take longer, but the gap is narrowing. Recipients of the add-on Women in Engineering awards tend to complete their doctorates at a faster but lower rate than their male GRF counterparts in engineering. • A large fraction of NSF fellows earn their baccalaureates from a small number of prestigious institutions (40% from 18 institutions in 2001). This year's applicants, on the other hand, came from 699 domestic and 69 foreign institutions. • NSF fellows tend to enroll and complete doctorates in a small number of highly ranked institutions, more so in some disciplines than others. Minority-serving institutions (MSIs) were the baccalaureate origins of a large fraction of applicants and awardees for the (discontinued in 1998) Minority Graduate Fellowship Program. The elimination of the separate minority competition has resulted in a dramatic decrease in applications, awards, and success rates of applicants from MSIs. **Availability:** Available from EHR Directorate, NSF

Academic Excellence for Urban Students - Their Accomplishments in Science and Mathematics	**Scope:** An evaluative study of 22 of the USI districts funded between 1994-1999. **Findings:** NSF's investments in urban education have led to dramatic improvements in student achievement in science and mathematics in most of these funded sites. ESR's urban program has been a catalyst for large-scale systemic change directed towards improving the science and mathematics achievement of all students. Greatest gains were in districts that had participated in the USI program for the longest period of time. USI students made gains in science and mathematics achievement, while reducing achievement gaps among racial/ethnic groups. Students substantially improved their enrollment rates in advanced science and mathematics courses. Underrepresented minority students made even greater gains than their peers during the same period, resulting in reduced enrollment disparities. Implementation of a standards-based curriculum and instruction, aligned assessment practices, and appropriate professional development are key to an increase in student achievement. The convergence of resources, a strong leadership structure, and effective partners were also critical to the improvement in student performance. The study concluded that the infrastructure developed by these districts would likely sustain the achievement gains. The study also concluded that it takes 7-10 years to bring about substantial improvement in systemic reform that may lead to the gains cited in the report (Kim, 2001). **Availability:** The executive summary and full report can be downloaded at www.systemic.com/usi and www.siurbanstudy.org/newspublication
Institution-wide Reform Initiative (IR)	**Scope:** The evaluators examined the differences between institutions receiving awards and institutions that had received high ratings in the IR competition, but were declined. **Findings:** The purpose of this three-year initiative was to encourage broader reform in undergraduate institutions by providing further support for reform-related activities already underway. The study showed that IR support had a substantial effect on students, faculty, and curriculum, with 58,000 students and nearly 1700 faculty participating, and more than 1200 courses developed or revised. Results indicate that the IR awards brought about change in some institutions, particularly 2-year colleges, but differences were small when participants were compared to a similarly motivated set of institutions. **Availability:** Available from EHR Directorate, NSF

Undergraduate Faculty Enhancement (UFE) Program	**Scope:** To determine the effectiveness of faculty training on classroom practices. Undergraduate Faculty Enhancement (UFE) Program-SRI (9412964). **Findings:** The UFE Program provided opportunities for the education of undergraduate faculty through workshops and other activities. Evaluators examined the impact of these. They found that the UFE program had led to 5,000 new courses, 7,300 major course revisions, and 8,600 moderate course revisions. Approximately 1,200 programs of study were developed or redesigned. In addition at least 2,700 other faculty had developed a new course or lab as a result of contact with colleagues who were colleagues who were UFE participants. The evaluators also estimated that, by 1999, more that 1,850,000 students (one in 22 students nationally) had completed courses that were developed or had major revisions as a result of UFE. "Faculty reported that students in their revised or modified courses performed better along a number of dimensions than comparable students in traditional courses. Faculty also cited improvements in students' abilities to solve problems, think critically, communicate, collaborate, use technology, and understand the scientific method." **Availability:** SRI. Available from EHR Directorate, NSF

ENG	
Environmentally Benign Manufacturing	**Scope:** The report includes global benchmarking of the current technologies, systems, and policies in manufacturing, with suggested recommendations for future research needs. Use of metals and polymers in the automotive and the electronics sectors were the primary topical areas. **Findings:** The study found that better tools, data, metrics, and technologies were needed on specific materials and industrial sectors. It called for development of high-performance business practices such as supply chain management, goals alignment, and assessment tracking. **Availability:** World Technology Evaluation Center (WTEC) of the International Technology Research Institute at Loyola College of Maryland. http://itri.loyola.edu/ebm/ebm.pdf
Outcomes and Impacts of the State/Industry-University Cooperative Research Centers (S/IUCRC) Program	**Scope:** Focused on research cooperation between industries and universities. **Findings:** Found that the program has been a modest success as measured against its goals and objectives and compared with the outcomes and impacts of the I/UCRC program that served as its model. **Availability:** Available from NSF (NSF 01-110)

Trends in Industrial Support of University-Based Cooperative Research	**Scope:** Focused on research cooperation between industries and universities **Findings:** The ongoing study found that Engineering Research Centers (ERCs) working to extend an established area of interest in industry are attractive to large, research-intensive firms that have a long-term interest in the results of the center's work. In contrast, centers working in areas that are out in front of existing product lines or corporate interests are much more likely be of interest to small firms and firms that do little or no research and have few or no financial resources to support center work. **Availability:** Available from Engineering Directorate, NSF
Impact of Interaction with Engineering Research Centers on Industry: Repeat Study	**Scope:** Examines the outcomes and impacts of ERC membership on firms that are members of mature second-generation ERCs (centers in the classes of 1994–96) and identifies changes in firms' interactions with ERCs due to changes in the program and in industry compared with first-generation ERCs (classes of 1985–90).

GEO	
Ocean Sciences at the New Millennium.	**Scope:** The Decadal Committee was charged to consider existing reports, additional sources of information, and community input in developing a report summarizing the directions for ocean science over the next decade. **Findings:** Numerous findings were made relating to the scientific opportunities in ocean sciences in the coming decade. The committee recommended: the development of a multi-agency fleet replacement plan; a vigorous effort in technology development, implementation and support in all areas of ocean science; improvement of databases and ready access to these databases by the scientific community; continued emphasis on the development of models that link different parts of the ocean system; and a vigorous exploration of a new class of controlled perturbation experiments. **Availability:** National Academy of Sciences www.nas.edu
Initial Science Plan (ISP) for the Integrated Ocean Drilling Program	**Scope:** To examine the scientific significance, technical feasibility, and potential societal benefits of the ISP. **Findings:** The Committee reaffirmed that the scientific significance, technical feasibility, and potential societal benefits of the ISP make it of exceptional importance and timeliness. The Committee concluded that the benefits of the program described in the ISP far outweigh the costs and the technical uncertainties. The Committee gave its unreserved support to the priorities of the program as described in the ISP. A number of specific recommendations on scientific and technological objectives, facilities, organizational and implementation options, and resource requirements were included. **Availability:** National Academy of Sciences, www.nas.edu

Basic Research Opportunities in Earth Science	**Scope:** To undertake a major study of research in the Earth Sciences. **Findings:** The Board found that the Division of Earth Sciences (EAR) has done an excellent job in maintaining the balance among core programs supporting investigator-driven disciplinary research, problem-focused programs of multidisciplinary research, and equipment-oriented programs for new instrumentation and facilities. The committee offers recommendations that address the evolving science requirements in all three of these programmatic areas and primarily pertain to new mechanisms that will allow EAR to exploit research opportunities identified by the committee. The Board also strongly endorsed the four observational components of the *EarthScope* Initiative. **Availability:** National Research Council/National Academy Press, 2000, www.nas.edu

MPS	
Physics in a New Era	**Scope:** The report surveys the field of physics broadly, identifies priorities, and formulates recommendations. The overview assesses the state of physics in four broad categories – quantum manipulation and new materials, complex systems, structure and evolution of the universe, and fundamental laws and symmetries – emphasizing the unity of the field and the strong commonality that links the different areas, while highlighting new and emerging ones. **Findings:** Six high-priority opportunities identified, nine recommendations are made: support of physics by the federal government; physics education; role of basic physics research in national security; increasingly important role of partnerships among universities, industry, and national labs; the stewardship of federal science agencies; and the rapidly changing role of information technology in physics research and education. **Availability:** National Research Council, http://www.nap.edu/catalog/10118.html
An Assessment of the Department of Energy's Office of Fusion Energy Sciences Program.	**Scope:** An assessment of the scientific quality of the Department of Energy (DOE) Office o Fusion Energy Sciences Program. **Findings:** Although this report was generated at the request of the DOE's Office of Science, NSF is often referred to within the document. In particular, the report recommends that NSF play a greater role in extending the reach of fusion science and in sponsoring general plasma science. **Availability:** National Research Council, http://books.nap.edu/catalog/9986.html

Committee on Organization and Management of Research in Astronomy and Astrophysics	**Scope:** To assess the organizational effectiveness of Federal support of astronomical sciences and, specifically, the pros and cons of transferring NSF's astronomy responsibilities to NASA. **Findings:** NSF's astronomy and astrophysics responsibilities should not be transferred to NASA. The Federal government should develop a single integrated strategy for astronomy and astrophysics research that includes supporting facilities both on the ground and in space. An interagency planning board for astronomy and astrophysics should be formed that would receive input from the community through a joint advisory committee of outside experts. Additional recommendations address ways to improve the present overall management structure and strengthen NSF's ability to support astronomy. **Availability:** National Research Council (http://www.nas.edu/) with the prepublication copy available at http://books.nap.edu/html/integrated_program/comraa.pdf
Proceedings of the Workshop on the Present Status and Future Developments of Solid State Chemistry and Materials	**Scope:** Define research opportunities in the field of solid-state chemistry and materials; identify the most important multidisciplinary areas for involvement by the solid-state chemistry and materials community; determine novel roles for the Solid State Chemistry and Materials community that will advance educational and training opportunities for future scientists, engineers, and technicians; develop new approaches that allow for the more effective and efficient conduct of research and educational activities. **Findings:** Numerous recommendations are listed for various sub-fields in this discipline. **Availability:** NSF web site http://www.nsf.gov/mps/dmr/ssc.pdf
US-Africa Materials Workshop	**Scope:** The workshop explored research opportunities directed towards expanding materials research and education for the purpose of contributing to the development of new technologies as well as promoting collaboration among U.S. and African universities and industries. **Findings:** Need to establish one or more organizations to ensure the continuation of conversations that began at the workshop. Technical recommendations from a number of working groups are included in the report. **Availability:** http://iumrs.org/docs/africa.pdf
National Science Foundation Force Transduction in Biology Workshop	**Scope:** The goal of this workshop was to explore recent advances in research on force transduction in biology at all length scales, and to seek possible overlap or synergies between these different areas. An additional goal was to explore the potential interdisciplinary interactions that will lead to significant advances in this area. Also, the workshop was to identify important new directions for research and to make recommendations about potential funding opportunities. **Findings:** Perhaps the most important conclusion of the workshop was that research in force transduction in biology has important problems that span many length scales and many disciplines. However, the interdisciplinary nature of the research, the quantitative nature of the important problems and the key relationship between the materials properties and the important issues all make this an area that the NSF can play a significant role in fostering progress. **Availability:** http://hurkle.deas.harvard.edu/nsf/workshop.html

SBE	
The Societal Implications of Nanoscience and Nanotechnology	**Focus:** The aim was to: (1) survey current studies on the societal implications of nanotechnology (educational, technological, economic, medical, environmental, ethical, legal, etc.); (2) identify investigative and assessment methods for future studies of societal implications; (3) propose a vision for accomplishing nanotechnology's promise while minimizing undesirable consequences. **Availability:** The report has been published both on the web and in book form (http://itri.loyola.edu/nano/NSET.Societal.Implications/).

APPENDIX II. – SCHEDULE OF PROGRAM EVALUATIONS

The following table provides information on the scheduling of meetings for Committees of Visitors (COVs) for our programs. The table lists the fiscal year of the most recent COV meeting for the program and the fiscal year for the next COV review of the program. We have highlighted the COV meetings that were held in FY 2001 in bold font.

Committee of Visitors Meetings
By Directorate

(COV meetings held during FY 2001 are highlighted in bold font)

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
BIOLOGICAL SCIENCES		
Biological Infrastructure		
Instrument Related Activities	2000	2002
Research Resources	2000	2003
Training	2000	
Plant Genome	**2001**	
Environmental Biology		
Ecological Studies	1999	2002
Long Term Research	**2001**	
Systematic and Population Biology	2000	2004
Integrative Biology and Neuroscience	**2001**	2005
Neuroscience	1999	2003
Developmental Mechanisms	2000	2004
Physiology and Ethnology	1997	2002
Molecular and Cellular Biosciences		2002
Biomolecular Structure and Function	2000	
Biomolecular Processes	2000	
Cell Biology	**2001**	
Genetics	1999	

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
COMPUTER AND INFORMATION SCIENCE AND ENGINEERING		
Advanced Computational Infrastructure and Research		
Advanced Computational Research	**2001**	2004
PACI	1999	2002
Computer-Communications Research		
Communications	2000	2003
Computer Systems Architecture	2000	2003
Design Automation	2000	2003
Hybrid and Embedded Systems (new in '02)	N/A	2003
Numeric, Symbolic and Geometric Computation	2000	2003
Operating Systems and Compilers	2000	2003
Signal Processing Systems	2000	2003
Software Engineering and Languages	2000	2003
Theory of Computing	2000	2003
Trusted Computing (new in '02)	N/A	2003
Information and Intelligent Systems		
Computation and Social Systems	1999	2002
Human Computer Interaction	1999	2002
Knowledge and Cognitive Systems	1999	2002
Robotics and Human Augmentation	1999	2002
Information and Data Management	1999	2002
Advanced Networking Infrastructure and Research		
Networking Research	2000	2003
Special Projects in Networking Research	2000	2003
Advanced Networking Infrastructure	2000	2003
Information Technology Research (ITR) (new in '00)	N/A	2003
Experimental and Integrative Activities	**2001**	
-Instrumentation Infrastructure Cluster		
Research Infrastructure	**2001**	2004
Research Resources (new in '02)	N/A	2004
-Multidisciplinary Research Cluster		
Biological Information Technology and Systems (new in '02)	N/A	2004
Quantum and Biologically Inspired Computing (new in '02)	N/A	2004
Digital Government	**2001**	2004
Next Generation Software	**2001**	2004
-Education Workforce Cluster		
Information Technology Workforce (new in '02)	N/A	2004
Minority Institutions Infrastructure	**2001**	2004
CISE Educational Innovation	**2001**	2004
****CISE Postdoctoral Research Associates**	**2001**	

-EIA Special Projects Cluster		
Special Projects (new in '02)	N/A	2004
****NSF-CONACyT Collaborative Research**	**2001**	
****NSF-CNPq Collaborative Research**	**2001**	
**EIA monitored, managed/reviewed by Division in Partnership with Engineering		

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
EDUCATION AND HUMAN RESOURCES		
Educational Systemic Reform		
Statewide Systemic Initiatives	**2001**	2004
Urban Systemic Initiatives	**2001**	2004
Rural Systemic Initiatives	**2001**	2004
Office of Innovation Partnerships		
Innovation Partnership Activities (new in '01)	N/A	2004
EPSCoR	2000	2003
Elementary, Secondary and Informal Education		
Informal Science Education	**2001**	2004
Teacher Enhancement	2000	2003
Instructional Materials Development	1997	2002
Centers for Learning and Teaching (new in '01)	N/A	2004
Undergraduate Education		
Teacher Preparation	2000	2003
Advanced Technological Education	2000	2003
NSF Computer, Science, Engineering and Mathematics Scholarships (new in '01)	N/A	2002
Distinguished Teaching Scholars (new in '02)	N/A	2004
Scholarship for Service (new in '01)	N/A	2004
National SMETE Digital Library (new in '01)	N/A	2002
Course, Curriculum, and Laboratory Improvement	2000	2003
Undergraduate Assessment (new in '02)	N/A	2004
Graduate Education		
Graduate Research Fellowships	1999	2003
NATO Postdoctorate Fellowships	**2001**	2005
IGERT (new in '97)		2002
GK-12 Fellows (new in '99)	N/A	2002
Human Resource Development		
The Louis Stokes Alliances for Minority Participation	**2001**	2004
Centers for Research Excellence In Science and Technology (CREST)	**2001**	2004
Programs for Gender Equity (PGE)	2000	2003
Programs for Persons with Disabilities (PPD)	2000	2003
Alliances for Graduate Education and the Professoriate (AGEP)	**2001**	2004
Tribal Colleges Program (TCP) (new in '01)	N/A	2004
Historically Black Colleges and Universities (HBCU)	**2001**	2004

Research, Evaluation & Communications		
REPP/ROLE (new in '96)		2002
Evaluation	2000	2003
Education Research Initiative (ERI) (new in '01)	N/A	2002
Other		
H-IB VISA K-12		2004
Math and Science Partnership (MSP) (new in '02)	N/A	2005

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
ENGINEERING		
Bioengineering and Environmental Systems		2002
Biochemical Engineering	1999	2002
Biotechnology	1999	2002
Biomedical Engineering	1999	2002
Research to Aid the Disabled	1999	2002
Environmental Engineering	1999	2002
Environmental Technology	1999	2002
Civil and Mechanical Systems	**2001**	2004
Dynamic System Modeling, Sensing and Control	**2001**	2004
Geotechnical and GeoHazard Systems	**2001**	2004
Infrastructure and Information Systems	**2001**	2004
Solid Mechanics and Materials Engineering	**2001**	2004
Structural Systems and Engineering	**2001**	2004
Network for Earthquake Engineering Simulation	**2001**	2004
Chemical and Transport Systems		2003
Chemical Reaction Processes	2000	2003
Interfacial, Transport and Separation Processes	2000	2003
Fluid and Particle Processes	2000	2003
Thermal Systems	2000	2003
Design, Manufacture and Industrial Innovation		
-Engineering Decision Systems Programs (new in '02)	N/A	2003
Engineering Design	2000	2003
Manufacturing Enterprise Systems (new in '02)	N/A	2003
Service Enterprise Systems (new in '02)	N/A	2003
Operations Research	2000	2003
-Manufacturing Processes and Equipment Systems	2000	2003
Materials Processing and Manufacturing	2000	2003
Manufacturing Machines and Equipment	2000	2003
Nanomanufacturing (new in '02)	N/A	2003
-Industrial Innovation Programs Cluster		

Small Business Innovation Research (SBIR)	**2001**	2004
Innovation and Organizational Change	2000	
Grant Opportunities for Academic Liaison with Industry	2000	2003
Small Business Technology Transfer	**2001**	2004
Electrical and Communications Systems		
Electronics, Photonics and Device Technologies	2000	2002
Control, Networks, and Computational Intelligence	2000	2002
Integrative Systems (new in '02)	N/A	2002
Engineering, Education and Centers	**2001**	2004
Engineering Education	**2001**	2004
Engineering Research Centers	**2001**	2004
Earthquake Engineering Research Centers	**2001**	2004
Human Resource Development	**2001**	2004
State/Industry/University Cooperative Research Centers	**2001**	2004
Industry/Univ. Cooperative Research Centers	**2001**	2004

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
GEOSCIENCES		
Atmospheric Sciences		
-Lower Atmospheric Research Cluster		
Atmospheric Chemistry	**2001**	2004
Climate Dynamics	**2001**	2004
Meoscale Dynamic Meteorology	**2001**	2004
Large-scale Dynamic Meteorology	**2001**	2004
Physical Meteorology	**2001**	2004
Paleoclimate	**2001**	2004
-Upper Atmospheric Research Cluster		
Magnetospheric Physics	1999	2002
Aeronomy	1999	2002
Upper Atmospheric Research Facilities	1999	2002
Solar Terrestrial Research	1999	2002
-Centers and Facilities Cluster		
Lower Atmospheric Observing Facilities	2000	2003
UNIDATA	2000	2003
NCAR/UCAR	2000	2003
Earth Sciences		
Instrumentation and Facilities	1997	2004
-Research Support Cluster	1998	
Tectonics	1998	2002
Geology and Paleontology	1998	2002
Hydrological Sciences	1998	2002
Petrology and Geochemistry	1998	2002
Geophysics	1998	2002
Continental Dynamics	1998	2002

Ocean Sciences		
-Integrative Programs Cluster	1997	2002
Oceanographic Technical Services	1994	2002
Ship Operations	1994	2002
Oceanographic Instrumentation	1994	2002
Ship Acquisitions and Upgrades (new in '02)	N/A	2002
Shipboard Scientific Support Equipment (new in '02)	N/A	2002
Oceanographic Tech and Interdisciplinary Coordination	1998	2002
-Marine Geosciences Cluster		
Marine Geology and Geophysics	1998	2003
Ocean Drilling	1994	2003
-Ocean Cluster		
Chemical Oceanography	1998	2003
Physical Oceanography	1998	2003
Biological Oceanography	1998	2003

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
MATHEMATICAL AND PHYSICAL SCIENCES		
Astronomical Sciences	1999	2002
Planetary Astronomy	1999	2002
Stellar Astronomy and Astrophysics	1999	2002
Galactic Astronomy	1999	2002
Education, Human Resources and Special Programs	1999	2002
Advanced Technologies and Instrumentation	1999	2002
Electromagnetic Spectrum Management	1999	2002
Extragalactic Astronomy and Cosmology	1999	2002
-Facilities Cluster		
Gemini 8-Meter Telescopes	1999	2002
National Radio Astronomy Observatory (NRAO)	1999	2002
National Optical Astronomy Observatories (NOAO)	1999	2002
National Astronomy and Ionosphere Center (NAIC)	1999	2002
Chemistry	**2001**	2004
Office of Special Projects	**2001**	2004
Chemistry Research Instrumentation and Facilities (CRIF)	**2001**	2004
Organic Chemical Dynamics	**2001**	2004
Organic Synthesis	**2001**	2004
Chemistry of Materials	**2001**	2004
Theoretical and Computational Chemistry	**2001**	2004
Experimental Physical Chemistry	**2001**	2004
Inorganic, Bioinorganic and Organometallic Chemistry	**2001**	2004
Analytical and Surface Chemistry	**2001**	2004

Materials Research	1999	2002
-Base Science Cluster		
Condensed Matter Physics	1999	2002
Solid-State Chemistry	1999	2002
Polymers	1999	2002
-Advanced Materials and Processing Cluster		
Metals	1999	2002
Ceramics	1999	2002
Electronic Materials	1999	2002
-Materials Research and Technology Enabling Cluster		
Materials Theory	1999	2002
Instrumentation for Materials Research	1999	2002
National Facilities	1999	2002
Materials Research Science and Engineering Centers	1999	2002
Mathematical Sciences	**2001**	2004
Applied Mathematics	**2001**	2004
Topology and Foundations	**2001**	2004
Computational Mathematics	**2001**	2004
Infrastructure	**2001**	2004
Geometric Analysis	**2001**	2004
Analysis	**2001**	2004
Algebra, Number Theory, and Combinatories	**2001**	2004
Statistics and Probability	**2001**	2004
Physics	2000	
Atomic, Molecular, Optical and Plasma Physics	2000	2003
Elementary Particle Physics	2000	2003
Theoretical Physics	2000	2003
Particle and Nuclear Astrophysics (new in ’00)	N/A	2003
Nuclear Physics	2000	2003
Education and Interdisciplinary Research (new in ’00)	N/A	2003
Gravitational Physics	2000	2003

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES		
Office of International Science and Engineering (INT)	1999	2002
Science Resource Statistics (SRS) (new in ‘99)		2004
-NSF-wide Programs Cluster		
CAREER	**2001**	
ADVANCE (new in ‘01)		
Behavioral and Cognitive Sciences (BCS)		2004
Archeology and Archaeometry	1999	2004
Child Learning and Development	1997	2004

Cultural Anthropology	1999	2004
Linguistics	1999	2004
Human Cognition and Perception	1999	2004
Social Psychology	1999	2004
Physical Anthropology	1999	2004
Geography and Regional Sciences	1999	2004
Social and Economic Sciences (SES)		2003
Decision, Risk, and Management Sciences	2000	2003
Political Science	2000	2003
Law and Social Science	2000	2003
Innovation and Organizational Change	2000	2003
Methodology, Measurement and Statistics	2000	2003
Science and Technology Studies	2000	2003
Societal Dimensions of Engineering, Science, and Technology	2000	2003
Economics	2000	2003
Sociology	2000	2003

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
OFFICE OF POLAR PROGRAMS		
Polar Research Support	**2001**	2004
Antarctic Sciences		2003
Antarctic Aeronomy and Astrophysics	2000	2003
Antarctic Biology and Medicine	2000	2003
Antarctic Geology and Geophysics	2000	2003
Antarctic Glaciology	2000	2003
Antarctic Ocean and Climate Systems	2000	2003
Arctic Sciences		2003
Arctic Research Opportunities	2000	2003
Arctic Research and Policy	2000	2003
Arctic System Sciences	2000	2003
Arctic Natural Sciences	2000	2003
Arctic Social Sciences	2000	2003

DIRECTORATE *Division* Program	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
OFFICE OF INTEGRATIVE ACTIVITIES		
Major Research Instrumentation (MRI)	2000*	
Science and Technology Centers (STC)	1996*	2007
*External evaluations		

APPENDIX III. – TABLE OF ACRONYMS

AC	Advisory Committee
ACR	Advanced Computational Research
ACSI	American Customer Satisfaction Index
ADP	Automated Data Processing
AGEP	Alliances for Graduate Education and the Professoriate
AKRSI	Alaska Rural Systemic Initiative
ALMA	Atacama Large Millimeter Array
AMANDA	Antarctic Muon and Neutrino Detection Array
AMRC	Antarctic Meteorological Research Center
AMS	American Mathematical Society
AO	Arctic Oscillation
ARSI	Appalachia Rural Systemic Initiative
AST	Astronomical Sciences Division
ATE	Advanced Technological Education
ATLAS	A Toroidal LHC Apparatus
BAC	Bacterial Artificial Chromosome
BBC	British Broadcasting Corporation
BCS	Division of Behavioral and Cognitive Sciences
BE	Biocomplexity in the Environment
BIO	Directorate for Biological Sciences
CAREER	Faculty Early Career Development Program
CASES	Cooperative Atmosphere-Surface Exchange Study
CAVE	Cave Automatic Virtual Environment
CDA	Cross-Directorate Activities Program
CDRC	Child Development Research Collaborative
CERN	European Organization for Nuclear Research
CHE	Chemistry Division
CHESS	Cornell High Energy Synchrotron Source
CHRNS	Center for High Resolution Neutron Scattering
CIRE	Collaboratives to Integrate Research and Education
CIS	Center for Integrated Studies
CISE	Directorate for Computer and Information Science and Engineering
CLAWPACK	Conservation Law Package
CLT	Centers for Learning and Teaching
CMS	Compact Muon Spectrometer
CNRS/INRA	Centre National de Recherche Scientifique/Institut National de la Recherche Agronomique
CompTIA	Computing Technology Industry Association
COV	Committee of Visitors
CPMSA	Comprehensive Partnerships for Mathematics and Science Achievement
CPO	Division of Contracts, Policy and Oversight
CREST	Centers for Research Excellence In Science and Technology
CRI	Children's Research Initiative
CRIF	Chemistry Research Instrumentation and Facilities
DARPA	Defense Advanced Research Projects Agency
DDI	Data Documentation Initiative
DGA	Division of Grants and Agreements
DHHS	Department of Health and Human Services
DL	Digital Libraries
DMR	Division of Materials Research
DMS	Division of Mathematical Sciences
DNA	Deoxyribonucleic Acid
DOD	Department of Defense
DOE	Department of Energy
DRSI	Delta Rural Systemic Initiative
DYCOMS	Dynamics and Chemistry of Marine Stratocumulus
EAR	Division of Earth Sciences
EHR	Directorate for Education and Human Resources
EIA	Division of Experimental and Integrative Activities
EIS	Enterprise Information System
ENG	Directorate for Engineering
EPSCoR	Experimental Program to Stimulate Competitive Research
ERC	Engineering Research Center
ERI	Education Research Initiative
ESR	Educational System Reform
EST	Expressed Sequence Tag
FAA	Federal Aviation Administration
FACA	Federal Advisory Committee Act

FAS	Financial Accounting System
FEMA	Federal Emergency Management Agency
FT-ICR	Fourier-Transform-Ion Cyclotron Resonance
GABA	Gamma Aminobutyric Acid
GAO	General Accounting Office
GEO	Directorate for Geosciences
GK-12	Graduate Teaching Fellows in K-12 Education
GPA	Grade Point Average
GPRA	Government Performance and Results Act
GPS	Global Positioning System
GRF	Graduate Research Fellowship
GSN	Global Seismographic Network
GSS	General Social Survey
GW	Ground water
HBCU	Historically Black Colleges and Universities
HDGC	Human Dimensions of Global Change
HPIIS	High Performance International Internet Services
HPNC	High Performance Network Connections
HRM	Division of Human Resources Management
IBN	Division of Integrative Biology and Neuroscience
ICPSR	Inter-University Consortium for Political and Social Research
IGERT	Integrative Graduate Education and Research Traineeship
INT	Office of International Science and Engineering
IP	Internet Protocol
IPA	Intergovernmental Personnel Act (appointee)
IPCC	Intergovernmental Panel on Climate Change
IRIS	Incorporated Research Institutions for Seismology
IRIS	Industrial Research & Development Information System
ISE	Informal Science Education
IT	Information Technology
ITR	Information Technology Research
ITS	Information Technology Security
IUCRC	Industry University Cooperative Research Center
KeLP	Kernel Lattice Parallelism (KeLP)
KHEP	K-12 Higher Education Partnerships
LAPACK	Linear Algebra Package
LASER	Leadership and Assistance for Science Education Reform Center
LHC	Large Hadron Collider
LIGO	Laser Interferometer Gravitational-wave Observatory
LSAMP	Louis Stokes Alliances for Minority Participation
MEMS	Microelectromechanical Systems
MPS	Directorate for Mathematical and Physical Sciences
MRE	Major Research Equipment (account)
MRI	Major Research Instrumentation (program)
MRSEC	Materials Research Science and Engineering Center
MS	Master of Science or Mass Spectrometry
MSP	Math and Science Partnerships
NAIC	National Astronomy and Ionosphere Center
NAPA	National Academy of Public Administration
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NCAR	National Center for Atmospheric Research
NCTM	National Council of Teachers of Mathematics
NEES	Network for Earthquake Engineering Simulation
NHGIS	National Historical Geographic Information System
NHMFL	National High Magnetic Field Laboratory
NIH	National Institutes of Health
NNI	National Nanotechnology Initiative
NNUN	National Nanofabrication Users Network
NOAA	National Oceanic and Atmospheric Administration
NOAO	National Optical Astronomy Observatory
NRAO	National Radio Astronomy Observatory
NRC	National Research Council
NRL	Naval Research Laboratory
NSB	National Science Board

NSE	Nanoscale Science and Engineering
NSEC	Nanoscale Science and Engineering Centers
NVO	National Virtual Observatory
ODS	Online Document System
OEOP	Office of Equal Opportunity Programs
OIG	Office of Inspector General
OIRM	Office of Information and Resource Management
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OPP	Office of Polar Programs
ORISE	Oak Ridge Institute for Science and Education
OTS	Organization for Tropical Studies
OWC	Oklahoma Weather Center
PACI	Partnerships for Advanced Computational Infrastructure
PARS	Proposal, PI and Reviewer System
PDF	Program Document Format
PFI	Partnerships for Innovation
PGE	Programs for Gender Equity
PHY	Division of Physics
PI	Principal Investigator
PICI	Phyloinformatics and Coordination Infrastructure
PIMS	Program Information Management System
PMA	President's Management Agenda
PMET	Physical Meteorology
PPD	Programs for Persons with Disabilities
PSID	Panel Study of Income Dynamics
PwC LLP	PricewaterhouseCoopers LLP
REPP	Research in Education Policy and Practice
RET	Research Experiences for Teachers
REU	Research Experiences for Undergraduates
ROLE	Research on Learning and Education
RSI	Rural Systemic Initiative
SAR	Synthetic Aperture Radar
SBE	Directorate for Social, Behavioral and Economic Sciences
SBIR	Small Business Innovation Research
ScaLAPACK	Scalable Linear Algebra Package
SES	Division of Social and Economic Sciences
SFFAS	Statement of Federal Financial Accounting Standard
SGER	Small Grant for Exploratory Research
SMET	Science, Mathematics, Engineering and Technology
SMETE	Science, Mathematics, Engineering and Technology Education
SOARS	Significant Opportunities in Atmospheric Research and Science
SPSM	South Pole Station Modernization
SRC	Synchrotron Radiation Center
SRI	SRI International
SRS	Division of Science Resources Statistics
SSI	Statewide Systemic Initiative
STC	Science and Technology Center
STEM	Science, Technology, Engineering and Mathematics
TCS	Terascale Computing System
TEA	Teachers Experiencing Antarctica and the Arctic
UCAN	Utah, Colorado, Arizona, New Mexico
UCAR	University Corporation for Atmospheric Research
UFE	Undergraduate Faculty Enhancement
UML	Unified Modeling Language
UPR	University of Puerto Rico
URM	Underrepresented Minorities
USGS	United States Geological Survey
USI	Urban Systemic Initiative
USP	Urban Systemic Program
VORTEX	Verification of Origins of Rotation in Tornadoes Experiment
VR	Virtual Reality
WAIS	West Antarctic Ice Sheet
WDCP	World Data Center for Paleoclimatology
WTC	World Trade Center
WTEC	World Technology Evaluation Center

APPENDIX IV. PwC EXECUTIVE SUMMARY

EXCERPT FROM THE PRICEWATERHOUSECOOPERS LLP REPORT *"NATIONAL SCIENCE FOUNDATION FY 2001 GPRA PERFORMANCE MEASUREMENT VALIDATION AND VERIFICATION FINAL REPORT JANUARY 2002"*

1 Executive Summary

The National Science Foundation ("NSF" or "the Foundation"), as a Federal agency, is subject to the performance reporting requirements of the Government Performance and Results Act (GPRA). Accordingly, NSF developed a series of performance measures to help the agency meet its mission, goals, and objectives. The Foundation asked PricewaterhouseCoopers (PwC) to assess whether the methods that NSF uses to compile and report selected FY 2001 performance measures are verifiable and produce valid results. This is the second consecutive year that PwC has performed this function.

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

The General Accounting Office (GAO) has directed federal agencies to provide confidence that the policies and procedures that underlie GPRA performance reporting are complete, accurate and consistent. To address GAO's mandate and past concerns, NSF asked us to conduct an independent verification and validation review of eighteen FY 2001 quantitative and qualitative goals contained in the FY 2001 NSF GPRA Performance Plan. GAO defines verification as a means to check or test performance data in order to reduce the risk of using data that contains significant errors. GAO defines validation as a way to test data to ensure that no error creates significant bias. Significant error, including bias, would affect conclusions about the extent to which NSF has achieved its performance goals. These definitions and the GAO-specified criteria were the guiding principles of our assessment.

Thirteen of the goals we assessed are undergoing review for the first time, while the remaining six are being reviewed a second time. As part of our review of the processes and results for these selected performance goals, we:

- Assessed the accuracy of NSF's performance measures
- Described the reliability of the processes NSF uses to collect, process, maintain, and report data
- Reviewed system controls to confirm that quality input results in quality output
- Identified changes to processes and data for those goals undergoing review for the second time

This assessment is not an audit and, as such, was not conducted in accordance with generally accepted government auditing standards. Rather, we followed GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/GCD-10.1.20) to guide our review. Our assessment was intended neither to determine whether NSF's goals are appropriate nor to conclude whether these goals are the appropriate way to gauge agency success. Based on GAO guidance, we assessed whether NSF's processes to collect, process, maintain, and report data for its goals meet the following criteria:

- Does the process provide for periodic review of collection, maintenance, and processing procedures to ensure they are consistently applied and continue to be adequate?
- Does the process provide for periodic sampling and review of data to ensure their completeness, accuracy, and consistency?

- Does the process rely on independent audits or other established procedures for verifying and validating financial information when performance measures require the use of financial information?
- Does NSF address problems, in verification and validation procedures, known to GAO or the agency?
- Does the agency recognize the potential impacts of data limitations should they exist?

For goals undergoing review for the first time, we documented the processes NSF follows to collect, process, maintain, and report performance data. We also identified relevant controls and commented on their effectiveness.

1.1 Results

From our review, we determined that NSF has reported on ten of the quantitative goals and all five of the qualitative goals in a manner such that any errors, should they exist, would not be significant enough to change the reader's interpretation of the Foundation's success in meeting the supporting performance goal. For these goals, NSF relies on sound business processes, system and application controls, and manual checks of system queries to report performance. We believe that these processes are valid and verifiable. For the four goals related to facilities management, we identified significant data limitations, which impaired our ability to verify the processes. However, we believe that NSF's reported outcomes are consistent with the data they collected. We summarize our results in the following table:

FY 2001 Performance Goal	Are processes verifiable and are results valid?		
Quantitative goals reviewed for the first time in FY 2001	**Yes**	**Partially**	**No**
IV-2: In FY 2001, NSF will conduct ten pilot paperless projects that manage the competitive review process in an electronic environment.	✔		
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.	✔		
V-1: At least 85% of basic and applied research funds will be allocated to projects, which undergo merit review.	✔		
V-6a: NSF will increase the average annualized award size for research grants to $110,000.	✔		
V-6b: NSF will increase the average duration of awards of research grants to at least three years.	✔		
V-9a: For 90 percent of facilities, keep construction and upgrades within annual expenditure plan, not to exceed 110 percent of estimates.		✔	
V-9b: Ninety percent of facilities will meet all major annual schedule milestones by the end of the reporting period.		✔	
V-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.		✔	
V-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.		✔	
III-1b: Over 80% of schools participating in systematic 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.	✔		
III-1c: Through systematic initiatives and related teacher enhancement programs, NSF will provide intensive professional development experiences for at least 65,000 pre-college teachers.	✔		
Update Reviews (Goals initially reviewed in FY 2000)			
IV-1: Ninety-five percent of full proposals will be received electronically through FastLane.	✔		

FY 2001 Performance Goal	Are processes verifiable and are results valid?		
Quantitative goals reviewed for the first time in FY 2001	**Yes**	**Partially**	**No**
IV-4: NSF will show an increase over 1997 in the total number of hires to S&E positions from underrepresented groups.	✔		
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.	✔		
Qualitative Goals			
III-1: Development of "a diverse, internationally competitive and globally-engaged workforce of scientists, engineers, and well-prepared citizens."	✔		
III-2: Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."	✔		
III-3: Providing "broadly accessible, state-of-the-art and shared research and education tools."	✔		
V-2: NSF performance in implementation of the merit review criteria is successful when reviewers address the elements of both generic review criteria.	✔		
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.	✔		

Our conclusions that the qualitative goals are valid and verifiable are based on our ability to confirm the ratings and interpretations contained in the Advisory Committee (AC) and Committee of Visitors (COV) reports. At the date of this report, we have been unable to review the final language that NSF will use in presenting the Foundation-wide results due to varying external reporting due dates for performance measurement information. However, we expect that the results that will be reported in upcoming months will coincide with the comments and conclusions reported in the AC and COV reports.

In addition, we concluded that there was insufficient information in many of the COV reports on which to base an unequivocal determination of success in achieving certain indicators. We recommend that NSF balance their final performance report language reflecting the neutrality of these reports and the inability to support the AC and COV report text with clearly identifiable examples and awards.

Recommendations

For each goal under review, we provide recommendations for how NSF can strengthen the processes it uses to collect, process, maintain, and report GPRA information. Details for our recommendations can be found in the report. We highlight our overarching recommendations below:

- **For goals that compare actual performance to estimates, ensure that estimates are unchangeable.** For the goals related to facilities management, NSF designed the data collection system to allow principal investigators (PIs) to change the estimates, which are used to calculate the results. NSF allows these changes to account for management problems beyond the facilities control. However, the ability to change estimates and the fact that the system does not track these changes hinders the ability to compare actual costs, milestones and completion dates to original estimates. By making estimates unchangeable, NSF could create true project-specific baselines for these goals, which will provide NSF an accurate picture of project performance, compared to estimates. Should NSF choose to continue to allow estimates to be changed, we recommend that the system be enhanced to track estimate changes, as a management and monitoring tool for NSF and Program Officers (POs).

- **Simplify the GPRA reporting process for facilities goals.** NSF should consider allowing POs, rather than PIs, to report on the progress of facilities projects. By allowing POs to report on project

performance, NSF can simplify the reporting process, improve internal accountability, and lessen the reporting burden on PIs. POs could use annual project reports, schedule. or other reports already developed by the PI, to report progress on facilities projects for GPRA. This would eliminate the need for PIs to provide duplicative information and create budgets and schedules based on the federal fiscal year yet have little value for program management.

- **Clarify language for goals to better reflect NSF's objectives and thresholds for success.** For some of the goals we reviewed, we believe that NSF can revise the language to be more specific and indicative of what NSF is trying to achieve. For example, NSF could clarify the language for goal III-1b to indicate that the goal only measures schools participating for three years or more in the systemic initiative program. Also, for construction and upgrade goals, NSF could revise the language to mention that it only measures construction and upgrade projects that have a total cost of at least $5 million or funded out of the Major Research and Equipment Account. Clarifying the language of these goals will help NSF staff and external reviewers understand NSF's objectives and facilitate the process to collect, process, maintain, and report data.

- **Further refine reporting templates and instructions for the qualitative measures.** NSF has made great strides to develop and improve the templates that are provided to the committees. However, we believe that this improvement can continue to evolve. A well-designed template will save committees valuable time, provide more verifiable support, reduce ambiguity, and provide more comprehensive evaluations. Committees could be encouraged to provide more than one example, if desired. A sample template for the "People" goals at a Division level is provided below.

- (Sample not included in this excerpt).

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