PERFORMANCE INFORMATION

This chapter provides supporting information on the performance goals that underpin NSF's FY 2009 Request and incorporates the agency's Government Performance and Results Act (GPRA) performance results for FY 2007. This integration of programmatic performance results with the agency's budget request enables the Foundation to demonstrate its leadership in incorporating the outcomes of its investments in discovery, innovation, and education in planning future directions to meet the opportunities and challenges in today's dynamic environment.

NSF's leadership in advancing the frontiers of science and engineering research and education is monitored through internal and external performance assessments. The results of this performance assessment process provide our stakeholders, including the American taxpayer, with vital information about the return on NSF's investments.

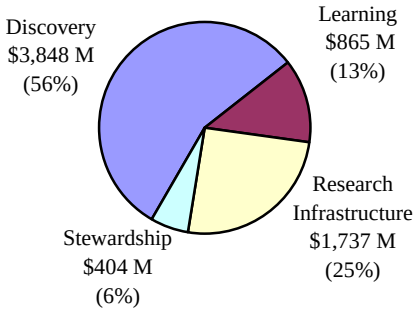
This chapter includes a discussion of the R&D Investment Criteria, NSF's strategic framework, NSF's performance assessment process, NSF's data verification and validation review, and the results of NSF's FY 2007 performance goals and their implications for FY 2008 and FY 2009. The following table summarizes the FY 2009 funding requirements for NSF's strategic outcome goals.

National Science Foundation
By Strategic Outcome Goal
(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate Amount	Change over FY 2008 Estimate Percent
Discovery	$3,200.60	$3,263.83	$3,847.98	$584.15	17.9%
Learning	785.00	808.82	864.98	56.16	6.9%
Research Infrastructure	1,578.70	1,633.30	1,736.85	103.55	6.3%
Stewardship	320.07	359.05	404.29	45.24	12.6%
Total, NSF	$5,884.37	$6,065.00	$6,854.10	$789.10	13.0%

Totals may not add due to rounding.

NSF's FY 2009 Request by Strategic Goal



R&D INVESTMENT CRITERIA

For NSF and other federal agencies with significant R&D portfolios, assessment activities are required to draw upon the R&D Investment Criteria established by the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP). These three criteria – Relevance, Quality, and Performance – are reflected in each of the directorate and office narratives throughout this budget request.

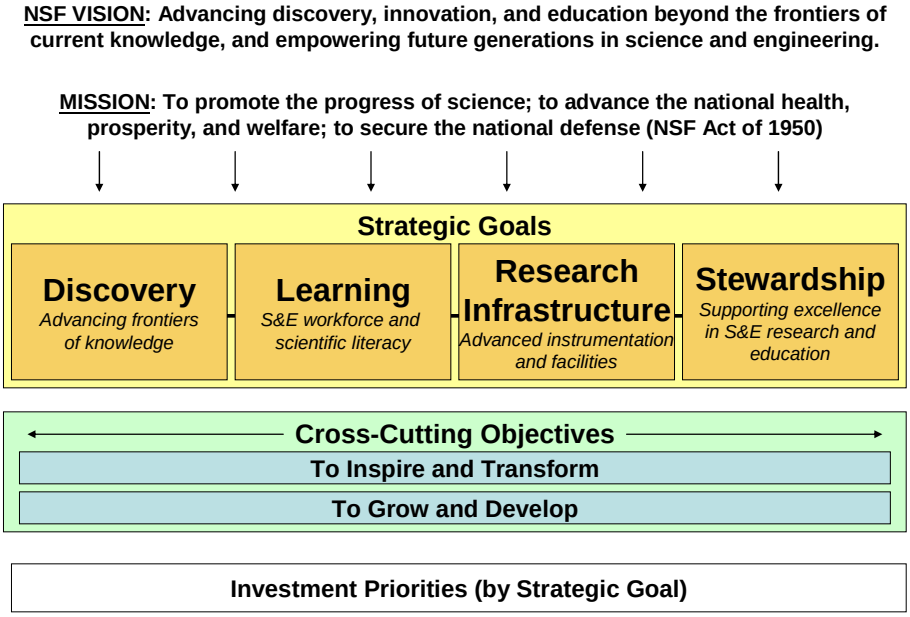
R& D Investment Criteria

- Relevance: R&D programs must be able to articulate why this investment is important, relevant, and appropriate.
- Quality: R&D programs must justify how funds will be allocated to ensure quality R&D.
- Performance: R&D programs must be able to monitor and document how well the investment is performing.

A detailed discussion of NSF's application of the R&D Criteria may be found in the Overview.

STRATEGIC FRAMEWORK

The NSF Strategic Plan for FY 2006 – 2011 (www.nsf.gov/pubs/2006/nsf0648/nsf0648.jsp) provides the framework for the agency's activities and performance goals, shown in the following chart.



To accomplish the NSF mission, "to promote the progress of science and engineering; to advance the national health, prosperity, and welfare; to secure the national defense" (NSF Act of 1950), NSF invests in the best ideas generated by scientists, engineers, and educators working at the frontiers of knowledge,

and across all fields of research and education. The NSF Strategic Plan for FY 2006–FY 2011 established four long-term strategic outcome goals.

- *Discovery* – Foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit, and establishing the nation as a global leader in fundamental and transformational science and engineering.

- *Learning* – Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.

- *Research Infrastructure* – Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure, and experimental tools.

- *Stewardship* -- Support excellence in science and engineering research and education through a capable and responsive organization.

The four interrelated outcome goals establish an integrated strategy to deliver new knowledge at the frontiers, meet vital national needs, and work to achieve the NSF vision. The first three goals – *Discovery*, *Learning*, and *Research Infrastructure* – focus on the Foundation's long-term investments in science and engineering research and education and align directly with the three strategic priorities established by the *National Science Board 2020 Vision for the National Science Foundation*. The fourth goal – *Stewardship* – is an internally-focused goal that emphasizes effective and efficient management practices. NSF also monitors 20 annual performance goals that were developed in conjunction with NSF's annual Program Assessment Rating Tool (PART) reviews.

NSF'S PERFORMANCE ASSESSMENT PROCESS

GPRA requires federal agencies to develop a strategic plan, establish annual performance goals, and report annually on the progress made toward achieving these goals. GPRA and PART pose a challenge to agencies like NSF involved in long-term science and education research. It is often not possible to link outcomes to annual investments because results in basic research and education can be unpredictable. Serendipitous results can be the most interesting and most important. Science and engineering research projects can generate discoveries in an unrelated area, and it can take years to recognize discoveries and their impact.

Assessing the impact of advances in science and engineering is inherently retrospective and is best performed using the qualitative judgment of experts. The use of external experts to review results and outcomes is a longstanding practice in the academic research and education community. NSF's use of such panels, such as the Committees of Visitors (COVs) and Advisory Committees, pre-dates GPRA and has been recognized as a valid quality assessment practice by the General Accountability Office (GAO) and others.

NSF has used external expert review for its programs for more than 20 years. Experts conduct independent assessments of the quality and integrity of our programs. On broader issues, NSF often uses external third parties such as the National Academies for outside review. The Foundation also convenes external panels of experts for special studies. A schedule of NSF's COV program evaluations and a list of the external evaluations completed in FY 2007 may be found on NSF's performance website: www.nsf.gov/about/performance/.

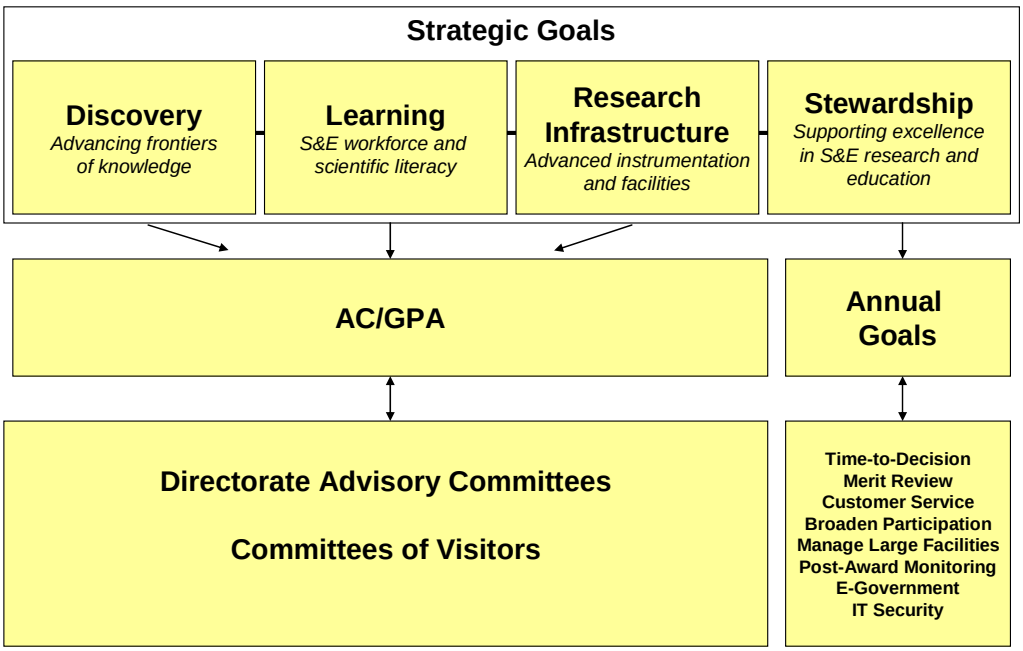
The value of expert review was affirmed in the 2001 report from the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. According to the report, "Because we do not know how to measure knowledge while it is being generated and when its practical use cannot be predicted, the best we can do is ask experts in the field – a process called *expert review* – to evaluate research regularly while it is in progress. These experts, supplemented by quantitative methods, can determine whether the knowledge being generated is of high quality, whether it is directed to subjects of potential importance of the mission of the sponsoring agency, and whether it is at the forefront of existing knowledge – and therefore likely to advance the understanding of the field." (See: National Academy of Sciences, Committee on Science, Engineering, and Public Policy, *Implementing the Government Performance and Results Act for Research: A Status Report*, Washington, D.C., National Academy Press, 2001.)

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

The AC/GPA met on June 14-15, 2007, to review more than 1,100 outstanding accomplishments – or "highlights" – compiled by NSF program officers. In addition, the AC/GPA had access to all award abstracts, investigator project reports, and COV reports to give a full picture of the NSF portfolio. Moreover, the process of assessment by NSF's external advisory committee is itself assessed by an independent, external management consulting firm. A more detailed discussion of the verification and validation of GPRA and PART data appears later in this chapter.

NSF's Performance Assessment Framework is depicted in the following chart.

NSF Performance Assessment Framework



Advisory Committee for GPRA Performance Assessment (AC/GPA): The AC/GPA was established in June 2002 to provide advice and recommendations to the NSF Director regarding NSF's performance under GPRA. NSF is the only federal agency that invites an external advisory committee to perform an analysis of its entire portfolio as part of the agency GPRA assessment process. The Committee, which is composed of about 20 scientists, engineers, and educators, reviews NSF's investments in research and education to determine NSF's annual progress towards meeting its strategic outcome goals of Discovery, Learning, and Research Infrastructure. The AC/GPA's assessment of whether NSF has demonstrated significant achievement is based on the collective experience and expertise of the Committee following the review of more than 1,100 outstanding accomplishments ("highlights") written by NSF program officers. The AC/GPA submits a report annually to the Director that evaluates NSF performance under each strategic goal. NSF's annual independent verification and validation report includes a review of the AC/GPA assessment process.

In FY 2007, the AC/GPA recommended several steps to improve the Committee's process for reviewing and selecting program highlights and other material in preparation for determining significant achievement under the three strategic outcome goals. Those recommendations called for establishing evaluation criteria and making process improvements in the collecting and writing of program "highlights." In response to those recommendations, NSF has established specific evaluation criteria under each of the three goals that the Committee will use in 2008. To address the recommendation on process improvements, NSF has designed a framework in which the "highlights" will be categorized in order to assure broad program coverage. NSF will provide all relevant performance information to the AC/GPA members in order to provide the other types of data and information requested by the Committee in its FY 2007 recommendations.

Advisory Committees: Each directorate and office has an Advisory Committee that meets twice a year to provide guidance on priorities, address program effectiveness, and review COV reports and management's response to COV recommendations. Advisory Committees are chartered and hence subject to Federal Advisory Committee Act rules. Each division or crosscutting program has a COV that meets once every three years to review and assess program priorities, program management, and award accomplishments or outcomes. COV recommendations must be addressed by the appropriate division director, and appropriate actions must be taken to comply.

Committees of Visitors (COVs): NSF's Committees of Visitors provide program assessments that are used both in program management and in annual GPRA reporting. Each COV typically consists of up to 20 external experts who review one or more programs over a two to three day period. A program may be defined as one or more divisions within a directorate or office, or a crosscutting program. The external experts are selected to ensure independence, programmatic coverage, and geographic balance, and they represent academia, industry, government, and the public sector. Approximately one-third of NSF activities are assessed each year. In evaluating the results of NSF investments, COVs are asked to comment on program activities as they relate to NSF's strategic outcome goals, justify their findings, and provide supporting examples or statements. COVs are subcommittees of NSF directorate advisory committees. Each COV prepares a report and the division or program that is being reviewed must prepare a response. COV reports, along with the NSF responses to their recommendations, are submitted to the parent advisory committee and to the Director of NSF. All COV reports and NSF responses are public documents posted on NSF's website at: www.nsf.gov/od/oia/activities/cov/covs.jsp.

Project-level Assessment During Merit Review

While Advisory Committees and Committees of Visitors assess NSF programs at the portfolio level, assessment at the project or award level is conducted in two different ways. First, when submitting a proposal, applicants provide information on the results of previous NSF support. Such information is available to external experts who review the proposals based on NSF's merit review criteria. Program officers also review this information and take it into account when making recommendations on awards or declines. Second, awardees are required to submit annual progress reports during the course of their awards. Such information is required before funds are released each year for continuing grants.

The merit review process involves several steps. When a proposal arrives at NSF, a program officer or team of program officers reviews the proposal and assigns it to at least three experts from outside NSF. Reviews are generally conducted by mail, in a review panel, or by combination of mail and review panel. Mail reviewers and panelists use two general criteria: intellectual merit and broader impacts. Following merit review, the program officer makes a recommendation to award or decline the proposal, taking into account external reviews, panel discussion, and other factors such as portfolio balance and the availability of funding. The division director reviews and approves the recommendation. If an award is recommended, grants officers perform an administrative review. Large awards are also subject to further review at a higher level, by the Director's Review Board and the National Science Board.

PART Assessments

In 2002, OMB developed the Program Assessment Rating Tool (PART) as a systematic methodology for assessing the performance of program activities across the federal government. A PART evaluation focuses on program purpose and design, strategic planning, program management, and program results and accountability. Each year, about 20 percent of an agency's programs undergo PART review. To date, all of NSF's programs have undergone PART review. Of the more than 1,000 PART programs that have been evaluated across federal agencies, 18 percent have received the highest rating of "Effective". NSF PART evaluations conducted to date have all received an "Effective" rating. PART results are available at www.whitehouse.gov/omb/expectmore/index.html.

Types and Sources of Performance Data and Information

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

- Information on *Discovery:* Published and disseminated results, including 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 *Learning:* Student, teacher, and faculty participants in NSF activities; demographics of participants; descriptions of student involvement; education and outreach activities under grants; demographics of science and engineering students and workforce; numbers and quality of educational models, products and practices used/developed; number and quality of teachers trained; and student

outcomes including enrollments in mathematics and science courses, retention, achievement, and science and mathematics degrees received.

- Information on *Research Infrastructure:* Published and disseminated results; 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 major multi-user facilities.

Most of the data supporting the annual quantitative performance goals may be found in NSF's central systems. These central systems include the Enterprise Information System; FastLane, with its Project Reporting System and its Facilities Performance Reporting System; the Program Information Management System (PIMS); the Proposal and Reviewer System; the Awards System; the Electronic Jacket; and the Financial Accounting System. These systems are subject to regular checks for accuracy and reliability.

Data/Information Limitations

With respect to the strategic outcome goals, the AC/GPA has access to recent Committee of Visitor reports and program assessments conducted by external programmatic expert panels, principal investigator project reports, and award abstracts. Because it is impractical for an external committee to review the contributions to the performance goals by each of the more than 20,000 active awards, NSF program officers provided the Committee with more than 1,100 summaries of notable results in FY 2007. Collections obtained from expert sampling of these outcomes, or program highlights, from awards, together with COV reports and project reports, form the primary basis for the AC/GPA determination of whether NSF demonstrated significant achievement in the strategic outcome goals of *Discovery, Learning,* and *Research Infrastructure*. The approach to highlights collection is a type of non-probabilistic sampling, commonly referred to as "judgmental" or "purposeful" sampling, which is best designed to identify notable examples and outcomes resulting from NSF's investments. It is the aggregate of collections of notable examples and outcomes that can, on their own, demonstrate significant agency-wide achievement of the strategic goals. Nevertheless, the combination of COV reports, project reports, award abstracts, and notable accomplishments covers the entire NSF portfolio.

Data Verification and Validation

As in prior years, NSF engaged an independent, external consultant to conduct a validation and verification (V&V) review of its annual performance information and data. IBM Global Business Services (IBM) completed a V&V review of the performance data and information reported for all the FY 2007 goals except three *Stewardship* goals: Post-Award Monitoring, E-Government, and IT Security. These three goals were examined as part of NSF's FY 2007 Internal Controls review and it was determined that a second review by IBM would be redundant. For the strategic outcome goals, IBM reviewed the processes NSF used to obtain external assessment of its goals.

IBM's V&V review is based on guidelines issued by GAO that require federal agencies to provide confidence that the policies and procedures underlying performance reporting are complete, accurate, and consistent. (See *GAO Guide to Assessing Agency Annual Performance Plans*, GAO/GGD-10.1.20.) IBM assessed the validity of the data and reported results as well as verified the reliability of the methods used to collect, process, maintain, and report data. IBM also reviewed NSF's information systems based on GAO standards for application controls.

FY 2007 SUMMARY PERFORMANCE RESULTS

The tables below summarize the results of the Foundation's GPRA goals from FY 2003 through FY 2007. In FY 2007, NSF achieved 100 percent of its strategic outcome goals and 70 percent of its annual PART performance goals. In FY 2007, the Stewardship Goal contained eight performance areas, each of which had specific qualitative milestones and/or quantitative measures. Detailed information for each goal follows.

FY 2003 – FY 2007 Strategic Outcome Goal Results

Strategic Outcome Goal	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**	**FY 2007**
Discovery	G	G	G	G	G
Learning	G	G	G	G	G
Research Infrastructure	G	G	G	G	G
Stewardship[1]	G	G	G	G	G

Green (G) indicates successful achievement

[1] *The Stewardship strategic outcome goal is an expansion of NSF's prior year Organizational Excellence goal. For FY 2007, eight targets and milestones were developed for the Stewardship goal (see pages 16-17).*

FY 2003 – FY 2007 Annual PART Performance Goals
Number and Percent of Goals Achieved

	FY 2003	**FY 2004**	**FY 2005**	**FY 2006**	**FY 2007**
Annual Performance Goals	10 of 16 (63%)	23 of 26 (88%)	14 of 17 (82%)	15 of 22 (68%)	14 of 20 (70%)

STRATEGIC OUTCOME GOAL 1: DISCOVERY

Foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit, and establishing the Nation as a global leader in fundamental and transformational science and engineering.

FY 2003–FY 2007 Performance Results				
FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
G	G	G	G	G
Green (G) indicates successful achievement				

Investments in ***Discovery*** support cutting-edge research that yield new and important discoveries and promote the development of new knowledge and techniques within and across traditional boundaries. These investments enable NSF 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.

Method of Assessment: NSF convenes an external expert group, the Advisory Committee for GPRA Performance Assessment (AC/GPA) to evaluate the outcomes reported under this goal.

FY 2007 Result: NSF achieved this goal.

Implications for FY 2008 and FY 2009: This goal is a continuation of NSF's previous goal of *Ideas*, originally established in FY 2001. The AC/GPA determined that NSF was successful in achieving the *Ideas* Goal in Fiscal Years 2003 through 2006, and its successor, the *Discovery* goal, in FY 2007. This goal will be continued in FY 2008 and FY 2009. NSF will use the external advisory committee to determine achievement of this goal.

Resources Required for FY 2009: Successful achievement of this goal is dependent on NSF receiving the resources outlined below.

Support of Discovery Goal by Appropriation

(Dollars in Millions)

	R&RA	EHR	MREFC	AOAM	OIG	Total
Discovery	$3,670.27	$177.71	-	-	-	$3,847.98

Means and Strategies for Success: NSF's ongoing portfolio of investments and continuing priorities are outlined in this budget submission. In addition, the following long-term investment priorities associated with the strategic goal of *Discovery*, have been identified for increased emphasis or additional funding during the period of the Strategic Plan, FY 2006-2011:

- Promote transformational, multidisciplinary research.
- Investigate the human and social dimensions of new knowledge and technology.

- Further U.S. economic competitiveness through basic research that can lead to new, valuable, and marketable technologies.
- Foster research that improves our ability for sustainable living on Earth.
- Advance fundamental research in computational science and engineering, and in fundamental, applied, and interdisciplinary mathematics and statistics.

Additional Information:

Program Assessment Rating Tool (PART) Evaluations: Two PART evaluations were conducted between FY 2003 and FY 2006 on programs under *Discovery/Ideas*: the Fundamental Science and Engineering Program and the Science and Engineering Centers Program. Both were rated "Effective."

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

*The Committee concluded that there has been **significant achievement** in the Discovery outcome goal. The Committee found that the National Science Foundation has fulfilled its strategic goal of Discovery and is doing so with research that encompasses ever-more complex systems of technological and societal relevance.*

Many exciting discoveries were described and the project outcomes provided clear examples of goal achievement. Most of the highlights were found to be exemplars of the NSF research investment and did capture uniformly interesting scientific research. The highlights consistently underscored the success the NSF has achieved in freeing their grantees from "one-flavor" research and encouraging them in their proposals to explore scientific problems that cross multiple scientific disciplines. Many of the projects have significant broader impacts components, including opportunities for underrepresented groups in science and engineering, and pre-college and college students. (Page 11, www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf07207.)

STRATEGIC OUTCOME GOAL 2: LEARNING

Cultivate a world-class, broadly inclusive science and engineering workforce,
and expand the scientific literacy of all citizens.

FY 2003–FY 2007 Performance Results				
FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
G	G	G	G	G
Green (G) indicates successful achievement				

Leadership in today's knowledge economy requires world-class scientists and engineers and a national workforce that is scientifically, technically, and mathematically strong. Investments in ***Learning*** aim to improve the quality and reach of science, engineering, and mathematics education and enhance student achievement. Each year, NSF supports an estimated 240,000 people – teachers, students, and researchers at every educational level and across all disciplines in science and engineering. Embedded in all NSF programs are efforts to build a more inclusive, knowledgeable, and globally-engaged workforce that fully reflects the strength of the Nation's diverse population. Because science and engineering increasingly address global questions of significant societal importance, today's research requires globally-engaged investigators working collaboratively across agencies and international organizations to apply the results of research to long-standing global challenges.

Method of Assessment: NSF convenes an external expert group, the Advisory Committee for GPRA Performance Assessment (AC/GPA) to evaluate the outcomes reported under this goal.

FY 2007 Result: NSF achieved this goal.

Implications for FY 2008 and FY 2009: This goal is a continuation of NSF's previous goal of *People*, originally established in FY 2001. The AC/GPA determined that NSF was successful in achieving the *People* Goal in fiscal years 2003 through 2006, and its successor, the *Learning* goal, in FY 2007. This goal will be continued in FY 2008 and FY 2009. NSF will use the external advisory committee to determine achievement of this goal.

Resources Required for FY 2009: Successful achievement of this goal is dependent on NSF receiving the resources outlined below.

Support of Learning Goal by Appropriation

(Dollars in Millions)

	R&RA	EHR	MREFC	AOAM	OIG	Total
Learning	$280.10	$584.88	-	-	-	$864.98

Means and Strategies for Success: NSF's ongoing portfolio of investments and continuing priorities are outlined in this budget submission. In addition, the following long-term investment priorities, associated with NSF's Strategic Outcome Goal of *Learning*, have been identified for increased emphasis or additional funding during 2006-2011.

- Build strong foundations and foster innovation to improve K-12 teaching, learning, and evaluation in science and mathematics.
- Advance the fundamental knowledge base on learning, spanning a broad spectrum from humans to animals and machines.
- Develop methods to effectively bridge critical junctures in STEM education pathways.
- Prepare a diverse, globally-engaged STEM workforce.
- Integrate research with education, and build capacity.
- Engage and inform the public in science and engineering through informal education.

Additional Information:

Program Assessment Rating Tool (PART) Evaluations: Four PART evaluations were conducted based between FY 2003 and FY 2006 on programs under *Learning/People*: Support for Individual Researchers; Small Research Collaborations; Support for Research Institutions; and Capability Enhancement of Researchers, Institutions, and Small Businesses. All were rated "Effective."

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

*The Committee concluded that there has been **significant achievement** in the Learning strategic outcome goal.*

The spectrum of funded projects analyzed by the Committee shows that the portfolio of the NSF provides meaningful opportunities for educators, students, and the general public to engage in the many facets of science and technology. Several projects address broadening access to science and engineering education and target the challenges faced by groups historically underrepresented in STEM challenges. Also included are descriptions of excellent efforts to address the needs of students with limited mobility, hearing impairment, or sight impairment. In some instances projects are designed to result in better understanding of how all people learn, while addressing the specific challenges faced by a target population. To that end, not only are traditional classroom strategies being revisited, with much needed effort being expended in teacher training, but students are also being exposed to research activities as early as possible in the curriculum. Finally, public resources such as museums are being leveraged in new ways to enhance learning while drawing the attention of and engaging the general public.

The Committee finds that the highlights provide compelling - but not always complete - evidence that projects funded advance a variety of approaches to the cultivation of a science and engineering workforce that can compete in a global environment. Many projects are also expanding the scientific literacy of all citizens. (Page 12, www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf07207.)

STRATEGIC OUTCOME GOAL 3: RESEARCH INFRASTRUCTURE

Build the Nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure, and experimental tools.

FY 2003–FY 2007 Performance Results				
FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
G	G	G	G	G
Green (G) indicates successful achievement				

NSF investments in ***Research Infrastructure*** provide state-of-the-art tools for research and education, such as multi-user research facilities, distributed instrumentation networks and arrays, accelerators, telescopes, research vessels, aircraft, and earthquake simulators. In addition, investments in internet-based and distributed user facilities are increasing as a result of rapid advances in computer, information, and communication technologies. NSF support for large multi-user facilities helps create state-of-the-art, world-class research platforms vital to new discoveries and the progress of research. NSF support may include construction, upgrades, operations, maintenance, and personnel needed to assist scientists and engineers in the conduct of research at such facilities. NSF consults with other agencies and international partners to avoid duplication and optimize capabilities for U.S. researchers.

Method of Assessment: NSF convenes an external expert group, the Advisory Committee for GPRA Performance Assessment (AC/GPA) to evaluate the outcomes reported under this goal.

FY 2007 Result: NSF achieved this goal.

Implications for FY 2008 and FY 2009: This goal is a continuation of NSF's previous goal of *Tools*, originally established in FY 2001. The AC/GPA determined that NSF was successful in achieving the *Tools g*oal in fiscal years 2003 through 2006, and its successor, the *Research Infrastructure* goal, in FY 2007. This goal will be continued in FY 2008 and FY 2009. NSF will use the external advisory committee to determine achievement of this goal

Resources Required for FY 2009: Successful achievement of this goal is dependent on NSF receiving the resources outlined below.

Support of Research Infrastructure Goal by Appropriation

(Dollars in Millions)

	R&RA	EHR	MREFC	AOAM	OIG	Total
Research Infrastructure	$1,573.35	$15.99	$147.51	-	-	$1,736.85

Means and Strategies for Success: NSF's ongoing portfolio of investments and continuing priorities are outlined in this budget submission. In addition, the following long-term investment priorities, associated with the strategic goal of Research Infrastructure, have been identified for increased emphasis or additional funding during the period of the Strategic Plan, FY 2006-2011:

- Fill the gaps in our ability to provide enabling research.
- Identify and support the next generation of large research facilities.
- Develop a comprehensive, integrated cyberinfrastructure to drive discovery in all fields of science and engineering.
- Strengthen the Nation's collaborative advantage by developing unique networks and innovative partnerships.

Additional Information:

Program Assessment Rating Tool (PART) Evaluations: Four PART evaluations were conducted based between FY 2003 and FY 2006 on programs under Research Infrastructure/Tools: Construction and Operations of Research Facilities; Polar Research Tools, Facilities, and Logistics; Federally Funded Research and Development Centers; and Investment in Research Infrastructure and Instrumentation. All were rated "effective."

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

*The Committee concluded that there has been **significant achievement** for the Research Infrastructure outcome goal.*

As the issues researchers face increasingly involve phenomena at or beyond the limits of our measurement capabilities, their study requires the use of new generations of powerful research infrastructure. NSF investments provide state-of-the-art infrastructure for research and education, such as distributed instrumentation networks and arrays, multi-user facilities, digital libraries, accelerators, telescopes, research vessels, aircraft, and earthquake simulators. In addition, funding devoted to the Research Infrastructure strategic outcome goal provides resources needed to support large surveys and databases as well as computational and computing infrastructures for all fields of science, engineering, and education.

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

Many of the Research Infrastructure projects would not have been possible had it not been for the previously funded and enabling research infrastructure or cyberinfrastructure, upon which they depended.

There is no doubt that access to cyberinfrastructure of the highest level will allow for complex simulations and visualizations to take place. The infrastructure and the simulations they produce may not be transformative, but may be a means to an end. However, some of these simulations are allowing scientists to use computations as a new method of investigation - acquiring insights that would be impossible using experiments or theory alone. For example, using cyberinfrastructure for early diagnosis of brain disorders that transform treatment and care for millions, simulating turbulent flow in narrowed human arteries could lead to new treatments, and simulating the formation of the universe could lead to new fundamental insights. (Page 15, www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf07207)

STRATEGIC OUTCOME GOAL 4: STEWARDSHIP

Support excellence in science and engineering research and education
through a capable and responsive organization.

The ***Stewardship*** strategic outcome goal is fundamental to NSF's leadership in achieving success through its investments in science, engineering, and education research. With the implementation of the new Strategic Plan at the beginning of FY 2007, the Foundation set priorities for program and management staff. As a result, the Foundation established eight annual *Stewardship* performance areas for FY 2007 aimed to support the agency's focus on promoting continuous performance improvement.

Method of Assessment: Program or administrative units throughout the Foundation assumed leadership for achieving specific targets/milestones under Stewardship.

FY 2007 Result: FY 2007 results are shown on pp. 16-17. NSF's performance under Stewardship is successful when, in the aggregate, results reported demonstrate significant achievement in the majority of the performance areas.

Implications for FY 2008 and FY 2009: This goal is an update of NSF's prior years' *Organizational Excellence* goal. The AC/GPA determined that NSF was successful in achieving the *Organizational Excellence g*oal in fiscal years 2003 through FY 2006. For FY 2007, the *Organizational Excellence* goal was updated as the *Stewardship* goal, which is comprised of eight performance areas with targets and milestones that determine achievement. This goal will be continued in FY 2008 and FY 2009 with updated targets and milestones.

Resources Required for FY 2009: Successful achievement of this goal is dependent on NSF receiving the resources outlined below.

Support of Stewardship Goal by Appropriation

(Dollars in Millions)

	R&RA	EHR	MREFC	AOAM	NSB	OIG	Total
Stewardship	$70.27	$11.83	-	$305.06	$4.03	$13.10	$404.29

Means and Strategies for Success: The Foundation developed annual targets/milestones for *Stewardship* based on several of the long-term investment priorities in the Strategic Plan: improving the quality of the merit review process, improving customer service, broadening participation from underrepresented groups and diverse institutions, improving the management of large facilities, and improving the efficiency and effectiveness of administrative and management procedures. The FY 2007 results led to additions and revisions of the *Stewardship* targets and milestones for FY 2008 and beyond.

FY 2007 Stewardship Goal Results

1. Time-to-Decision	For 70 percent of proposals, inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date or of receipt date, whichever is later.	FY 2007 
2. Merit Review	Improve the transparency of decisions and the quality of the merit review process. NSF's performance is successful when results reported in FY 2007 indicate that a majority of the following milestones were achieved: • Develop methods or metrics to assess the transparency and quality of the merit review process. • Provide a written context statement to the Principal Investigator (PI) that describes the process by which the proposal was reviewed and the context of the decision (such as the number of proposals and awards, information about budget availability, and considerations in portfolio balancing). FY 2007 Target: 95 percent. FY 2007 Result: 95 percent • Develop a website to identify and disseminate effective merit review practices. • Ensure that the Program Management Seminar includes case studies on how to implement an effective merit review process. • Include a section on training and mentoring of program officers in the annual Merit Review Report to the National Science Board.	New in FY 2007 
3. Customer Service	Improve customer service to the science, engineering, and education communities. NSF's performance is successful when results reported in FY 2007 indicate the following milestones were achieved: • Conduct a survey of investigators on the proposal submission and review processes, targeting those who have submitted proposals to NSF. Gather data on such factors as (1) drivers that increase proposal submissions, (2) PI perceptions regarding success rates, (3) impacts on the PI and reviewer community of increasing proposal submission rates, and (4) trends in customer satisfaction. • Analyze the survey results for directions in improving customer service in order to implement selected recommendations in FY 2008.	New in FY 2007 

4. Broaden Participation	Expand efforts to increase participation by underrepresented groups and diverse institutions throughout the United States in all NSF activities and programs. NSF's performance is successful when results reported in FY 2007 indicate the following milestones were achieved: • Develop a plan to increase participation in NSF programs by underrepresented groups, which includes defining existing baseline data. • Develop a plan to broaden the pool of reviewers for NSF proposals.	New in FY 2007 
5. Management of Large Facilities	Ensure the efficient and effective management of the construction and operation of large facilities. NSF's performance is successful when results reported in FY 2007 indicate the following milestones were achieved: • For construction projects funded by the Major Research Equipment and Facilities Construction appropriation, keep negative cost and schedule variance to less than 10 percent. *[Note: The Scientific Ocean Drilling Vessel (SODV) did not achieve its construction schedule; NSF program staff will continue to work with the project managers to monitor the SODV construction schedule.]* • For facilities in the operational phase, keep operating time lost to less than 10 percent for 90 percent of those facilities.	Revised in FY 2007 
6. Post-Award Monitoring	Fully implement NSF's program of post-award financial and administrative monitoring, in order to test the risk-based identification model against the mitigation strategy of increasing methods of oversight. NSF's performance is successful when results reported in FY 2007 indicate the following milestones were achieved: • Apply the risk assessment results in order to develop the FY 2007 monitoring plan (on-site visits, desk reviews, and Financial Cash Transaction Report (FCTR) sampling efforts). • Complete 95 percent of projected FY 2007 on-site monitoring visits by the end of FY 2007. • Complete 95 percent of projected FY 2007 desk reviews by the end of FY 2007. • Complete 95 percent of projected FY 2007 FCTR transaction testing by the end of FY 2007.	New in FY 2007 

7. E-Government	Establish an E-Government Implementation Plan. NSF's performance is successful when results reported in FY 2007 indicate the following milestones were achieved: • Achieve 90 percent of major E-Government Plan implementation milestones. • Post 100 percent of discretionary grants applications on Grants.gov as specified in NSF Ramp-Up Plan.	New in FY 2007 ●
8. Information Technology (IT) Security	Conduct a successful Federal Information Security Management Act IT Program Review. NSF's performance is successful when results reported in FY 2007 indicate a majority of the following milestones were achieved: • Ensure major applications and general support systems certification and accreditations are current and up to date. • Ensure that 96 percent or more of IT systems are installed in accordance with security configurations. • Ensure that 90 percent or more of applicable systems have Privacy Impact Assessments.	New in FY 2007 ●

● Indicates successful achievement.
▮ Indicates partial achievement.

ANNUAL PART PERFORMANCE MEASURES

In addition to reporting the results of the eight performance areas under the Stewardship strategic outcome goal, the Foundation is reporting the results of 20 PART performance goals that were established during the PART assessments of ten Foundation programs during the period FY 2003 through FY 2006. Those PART assessments and performance goals were based on an alignment of programs under the NSF Strategic Plan for FY 2003–2008. With the adoption of a new Strategic Plan for FY 2006–2011, the Foundation has incorporated some of the PART performance goals into the Stewardship goal (such as time-to-decision and management of large facilities), which are important Foundation-wide management issues.

FY 2007 Results: Detailed results of the PART performance goals for FY 2007 are published on NSF's Performance Website: www.nsf.gov/about/performance/. The following table summarizes the results of the PART performance goals in three major categories: Time-to-Decision, Broadening Participation, and Management of Large Facilities. Time-to-Decision is reported in four separate PART program categories (Research Grants, Education Grants, the Major Research Instrumentation Program, and NSF Science and Engineering Centers). Broadening Participation includes efforts to increase the participation in NSF activities and programs of underrepresented groups, diverse institutions, and small businesses, and increase the number of graduate students in three flagship programs: the Graduate Research Fellowship Program (GRF), the Integrative Graduate Education and Research Traineeship (IGERT) Program, and the Graduate Teaching Fellows in K-12 Education (GK-12) Program. Management of Large Facilities includes the construction and operations of NSF-supported major multi-user research facilities, including the Federally Funded Research and Development Centers (FFRDCs) and the construction and logistical support for Polar facilities. Also included under Facilities are goals relating to the number of users of the TeraGrid, which is an open scientific discovery infrastructure at 11 partner sites around the United States that forms an integrated, persistent computational resource; the number of users of National Center for Atmospheric Research (NCAR) datasets; and the percent of observing time awarded through competitive merit review at the National Optical Astronomy Observatory (NOAO).

NSF was successful in achieving performance targets for 14 of the 20 annual PART goals for a success ratio of 70 percent. The unmet targets were in the Broadening Participation and Management of Large Facilities performance areas. Explanations for the unmet targets are included in the following table. In the Broadening Participation area, NSF is actively developing a plan to increase participation among underrepresented individuals and diverse institutions throughout the United States in all NSF activities and programs. In the Management of Large Facilities area, only one of the five facilities under construction did not meet the schedule goal. NSF continues to work with all facilities project managers to ensure that cost and schedule targets will be met and that the facilities operate at efficient levels. It may be said that in all the cases of unmet targets, the performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program or activity performance.

Implications for FY 2008 and FY 2009: NSF continues to place great value on its ability to make recommendations on the funding of proposals and conveying those recommendations to principal investigators in a timely manner. The overall, Foundation-wide goal of making those recommendations within six months for 70 percent of all proposals submitted to the Foundation will be continued. Although NSF will continue to monitor the time-to-decision for the PART program areas, the Foundation will not report those results in its FY 2008 and FY 2009 performance report. Likewise, in the Broadening Participation area, NSF has established several new performance measures that were recommended by a Foundation-wide staff working group and, consequently, will no longer report the results of the eight

PART performance goals in that area. In the area of Management of Large Facilities, NSF will report on the facilities construction and operations goals under Stewardship.

On the following pages are a list of the FY 2007 Annual PART Performance Goals, with indications of whether the goal was achieved or not, and a summary table of the goals organized into the three categories described above.

Summary Results of FY 2007 Annual PART Performance Goals

TIME -TO-DECISION	
1. Research Grants: Time to Decision	●
2. Education Grants: Time to Decision	●
3. Major Research Instrumentation (MRI) Program: Time to Decision	●
4. Science and Engineering Centers: Time to Decision for Pre-Proposals	●
BROADENING PARTICIPATION	
5. Research Grants: Percentage of Proposals from Outside the Top 100 Institutions	●
6. Education Grants: Percentage of Proposals from Outside the Top 100 Institutions	■
7. Major Research Instrumentation (MRI) Program: Percentage of Proposals from Outside the Top 100 Institutions	●
8. CAREER Program: Number of Applicants from Minority-Serving Institutions	●
9. Graduate Research Fellowship Program: Number of Applicants from Underrepresented Groups	●
10. SBIR/STTR Programs: Percentage of Phase I Awards to New PIs	■
11. Science and Engineering Centers: Percentage of Non-Academic Partner Institutions	■
12. GRF, IGERT, GK-12 Programs: Number of Graduate Students Funded	■
MANAGEMENT OF LARGE FACILITIES	
13. MREFC Facilities: Construction Cost and Schedule	■
14. Major Multi-User Research Facilities: Operations	●
15. FFRDC Operational Facilities	■
16. National Optical Astronomy Observatory (NOAO): Observing Time	●
17. National Center for Atmospheric Research (NCAR): Number of Users of Datasets	●
18. TeraGrid Users	●
19. Polar Programs: Support for Research in the Antarctic	●
20. Polar Programs: Construction Cost and Schedule	●

● Goal Achieved
■ Goal Not Achieved

Detailed Results of FY2007 Annual PART Performance Goals

Time-to-Decision	For 70 percent of proposals submitted Foundation-wide, inform applicants within six months of receipt whether their proposals have been declined or recommended for funding.	●
	1. Research Grants	●
	2. Education Grants	●
	3. Major Research Instrumentation Program	●
	4. S&E Centers Programs For 85 percent of pre-proposals submitted, inform applicants about funding decisions within six months of proposal receipt or deadline, or target date, whichever is later, while maintaining a credible and efficient merit review system.	●
Broadening Participation	Increase the percentage of proposals from academic institutions not in the top 100 of NSF funding recipients.	●
	5. Research Grants	●
	6. Education Grants *Explanation for Unmet Goal*: The performance goal was set at an approximate target level, and the deviation from that level is slight. There was no effect on overall program performance.	■
	7. Major Research Instrumentation Program	●
	8. CAREER Program Increase the number of applicants for Faculty Early Career Development (CAREER) awards from investigators at Minority Serving Institutions.	●

	9. Graduate Research Fellowships Program Increase the number of applicants to the Graduate Research Fellowship Program from groups that are underrepresented in the science and engineering workforce.	●
	10. SBIR/STTR Programs Maintain a high percentage of awards to new principal investigators (companies) in Phase I of the Small Business Innovation Research (SBIR) and Small Business Technology Research (STTR) Programs. *Explanation for Unmet Goal*: Although the performance goal was set at an approximate target level and the deviation from that level is slight, NSF will continue its outreach efforts, especially among small businesses owned and operated by women and members of underrepresented groups.	■
	11. Science and Engineering Centers Program For all NSF Centers, maintain a high percentage of partner institutions that are non-academic institutions (includes industry, state, local, and other Federal agencies). *Explanation for Unmet Goal*: The performance goal was set at an approximate target level, and the deviation from that level is slight.	■
	12. GRF, IGERT, GK-12 Programs Increase the number of graduate students funded through fellowships or traineeships in the Graduate Research Fellowship (GRF) Program, the Integrative Graduate Education and Research Traineeships Program (IGERT), and the Graduate Teaching Fellows in K-12 Education (GK-12) Program. *Explanation for Unmet Goal*: Funding decreased, resulting in fewer numbers of fellowships and traineeships being awarded.	■

Management of Large Facilities		
	13. MREFC Facilities For all facilities in the Major Research Equipment and Facilities Construction (MREFC) account, keep negative cost and schedule variances to less than 10 percent. *Explanation for Unmet Goal*: One project, the Scientific Ocean Drilling Vessel (SODV), did not achieve the schedule goal. SODV schedule variance is principally due to delays associated with the main shipyard contract, the cumulative effect of which has resulted in behind schedule performance of the required outfitting, steel structure repairs, and piping, electrical, and HVAC systems installation.	
	14. Major Multi-User Research Facilities For 90 percent of NSF facilities in the operational phase, keep operating time lost due to unscheduled downtime to less than ten percent.	
	15. FFRDC Operational Facilities For 90 percent of NSF's Federally Funded Research and Development Centers (FFRDCs), keep operating time lost to less than ten percent. *Explanation for Unmet Goal*: One of the four FFRDCs, the National Astronomy and Ionosphere Center (NAIC) did not achieve the goal for two reasons: (1) the NAIC Arecibo telescope is undergoing major maintenance, and (2) as a result of the recommendations of the NSF Astronomy Division Senior Review, NAIC operations funding was reduced by 24 percent, leading to a commensurate reduction in observing hours available for scientific research programs.	
	16. NOAO Observing Time At least 95 percent of the operating time at the National Optical Astronomy Observatory (NOAO) should be allocated through the NOAO allocation committee.	
	17. NCAR Dataset Users Increase the number of unique users of datasets at the National Center for Atmospheric Research (NCAR).	

	18. TeraGrid Users Increase the number of unique users of the TeraGrid from among the science, engineering, and education community.	●
	19. Polar Programs: Support for Research in the Antarctic Provide the necessary research support for researchers in the Antarctic at least 90 percent of the time they are scheduled to perform research.	●
	20. Polar Programs: Construction Cost and Schedule Keep the percent of cost and schedule variances for major Polar projects, as monitored by Earned Value Management, to seven percent or less.	●

● Goal achieved.
▮ Goal not achieved.