PERFORMANCE INFORMATION

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NSF PERFORMANCE ASSESSMENT FRAMEWORK

As was noted in the NSF FY 2011 Budget Request, NSF is reviewing its performance assessment framework, in keeping with the Administration's commitment to establishing an evaluation infrastructure that complements and integrates efforts to strengthen performance measurement and management. This overall effort has been a specific focus of the recent update of the NSF Strategic Plan, which places special emphasis on testing and refining new approaches to assessment and evaluation. The FY 2011 GPRA Performance Plan – presented later in this chapter – is the first such plan based upon the new Strategic Plan.

A number of related efforts are also underway. These include:

- Continued progress toward NSF's STEM Workforce Priority Goal.
- Sustained NSF support for the multi-agency data infrastructure for monitoring and analyzing investments in science and engineering research and education (see STAR METRICS below).
- The establishment of an NSF-wide capability for assessment and evaluation planning for an expanded NSF-wide assessment and evaluation capacity.
- Systematic efforts to improve evaluation and monitoring activities in STEM education and workforce programs.

This chapter presents key aspects of NSF's performance assessment framework, including the FY 2010 GPRA Performance Report, the FY 2011 GPRA Performance Plan, and an update on the STEM Workforce Priority Goal. Additional performance information related to the development of metrics for STEM education program is available at www.nsf.gov/about/budget/fy2012/toc.jsp. This opening section also includes a summary of the new Strategic Plan and brief updates on key related efforts.

NSF's FY 2011-FY 2016 Strategic Plan

As noted above, NSF has recently developed an update of its Strategic Plan.[1] This plan – *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016* fundamentally reframes the Foundation's strategic goals. The goals—Transform the Frontiers, Innovate for Society, and Perform as a Model Organization—lay out a path towards both longer-term outcomes and the more immediate impacts NSF's investments can generate. To bridge the gap between NSF's new strategic goals and measurable, performance-relevant outputs, the plan establishes a set of performance goals for each strategic goal.

Strategic Goal	Performance Goal
Transform the Frontiers (T) emphasizes the seamless integration of research and education as well as the close coupling of research infrastructure and discovery.	T-1: Make investments that lead to emerging new fields of science and engineering and shifts in existing fields. T-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers. T-3: Focus international partnerships on transforming the frontiers. T-4: Enhance research infrastructure and promote data access to enable transformation at the frontiers.

[1] This plan was completed before the enactment of the GPRA Modernization Act of 2010. NSF therefore expects to have an updated plan in FY 2013 to address the requirements in the new legislation.

Innovate for Society (I) points to the tight linkage between NSF programs and societal needs, and it highlights the role that new knowledge and creativity play in economic prosperity and society's general welfare.	I-1: Make investments that lead to results and resources that are useful to society. I-2: Build the capacity of the nation's citizenry for addressing societal challenges through science and engineering. I-3: Catalyze the development of innovative learning systems.
Perform as a Model Organization (M) emphasizes the importance to NSF of attaining excellence and inclusion in all operational aspects.	M-1: Achieve management excellence through leadership, accountability, and personal responsibility. M-2: Infuse learning as an essential element of the NSF culture with emphasis on professional development and personal growth. M-3: Encourage and sustain a culture of creativity and innovation across the agency to ensure efficiency and effectiveness in achieving high levels of customer service.

In this chapter NSF presents its first annual GPRA Performance Plan based upon the new Strategic Plan. This Performance Plan is characterized by its application of experimental approaches towards performance assessment. Some measures have been used in previous years at NSF, but baselines are also being taken and new measures are being explored. This approach is strongly informed by a principal recommendation from the FY 2009 report of the Advisory Committee for GPRA Performance Assessment: "Consider an assessment framework that uses multiple measures and methods, applied over various time scales." NSF delays finalization of its Performance Plan for FY 2012 due to the early stages of implementation of the new Strategic Plan.

Interagency Initiatives and NSF Performance Goals

STAR METRICS (Science and Technology for America's Reinvestment: Measuring the Effect of Research on Innovation, Competitiveness and Science)

NSF participates in the STAR METRICS activity. This multi-agency venture may eventually help the federal government document the impact of its investments in research and development to a degree not previously possible. In FY 2012, NSF funding will meet commitments to the interagency partnership. NSF is aiming to integrate elements of STAR METRICS into management information systems as well as assessment and evaluation activities. In the long run, NSF envisions that the STAR METRICS capability could be applied to the assessment of performance goals that relate to documenting the impact of research investments (such as T-1 and I-1, for example).

Priority Goal: Science, Technology, Engineering, and Mathematics (STEM) Workforce

NSF's Priority Goal is to "Improve the education and training of an innovative Science, Technology, Engineering, and Mathematics (STEM) workforce through evidence-based approaches that include collection and analysis of performance data, program evaluation, and other research." By the end of 2011, at least six major NSF STEM workforce development programs at the graduate, postdoctoral, or early career level will have evaluation and assessment systems in place. In FY 2012, the set of workforce

programs will grow to include undergraduate programs. This activity is included under Performance Goal T-2, "Prepare and engage a diverse STEM workforce motivated to participate at the frontiers."

Activities in support of the Priority Goal are generating strategic design, improvement, and planning for the evaluation and monitoring of the agency's STEM workforce development portfolio. A coordinated approach is in place that involves:

- Convening program representatives from across the agency to establish composite baseline information about workforce development programs, their goals, and their approaches;
- Collaborating across the agency in sharing metrics and implementing and refining performance management systems that may have common core elements; and
- Accumulating data and evidence and using for program improvement and redesign.

NSF framework for making progress on the Priority Goal uses a continuum model. Programs progress along the continuum with the support of the collaborations and collective expertise being built in the Priority Goal processes. The first stages of this continuum are to assist programs in: establishing workforce development assumptions and needs; creating and sharing explicit program logic models and theories of action; and refining program measurement outcomes and metrics. Building on this base, in the later stages of the continuum, programs establish and improve program performance management systems, and then accumulate and use data for program improvement.

Efforts in this initiative are leading to new collaborations and informal working groups across NSF addressing such issues as postdoctoral programs, longitudinal tracking of fellowship recipients, discussion of NSF's overall investment portfolio in graduate and early career scientists, and innovation in evaluation of STEM education programs. This will all serve as important foundational activity as plans for the centralized NSF-wide evaluation capacity are developed.

Fostering NSF-wide Perspectives on Assessment and Evaluation

NSF directorates and offices develop and implement assessment and evaluation capacities tailored to their particular programmatic needs, and NSF is starting to broaden and deepen its capacity to perform similar functions and analyses of activities around and across the agency.

- NSF activities in the area of STEM education and learning are in a multi-year process of developing performance metrics. The FY 2011 Budget Request published an initial set of metrics in an online supplement (www.nsf.gov/about.budget/fy2011). Metrics development continued in FY 2010 and an updated and expanded inventory can be found on NSF's website as a supplement to this chapter (www.nsf.gov/about/budget/fy2012). Collecting these data agency-wide is already enabling NSF staff to identify opportunities for program harmonization and to begin conversations about practices and approaches.
- In FY 2012, NSF will continue to develop a centralized NSF-wide assessment and evaluation capacity. In FY 2010 and FY 2011, NSF explored the issues around scope, organizational placement, necessary resources, and initial activities of an expanded capacity.
- In FY 2012, NSF will explore ways to more clearly distinguish between process and outcome evaluation through modifications to the agency's Committee of Visitors activity.

FY 2011 ANNUAL PERFORMANCE PLAN

NSF's new Strategic Plan establishes three Strategic Goals for NSF, and progress toward each goal will be monitored against the set of Performance Goals established in the draft plan. For more information, see page 3 of this chapter.

Performance Monitoring Framework

A number of Performance Goals in the new Strategic Plan continue and build on ongoing NSF activities. Some Performance Goals, however, represent priorities of the Foundation that have not previously been addressed in a performance context. For Performance Goals with no precedents in earlier years, the focus of FY 2011 activities is on initiating a longer-term process that will establish baselines and test different indicators of progress. This will position NSF to pursue a more comprehensive approach to monitoring and assessment in FY 2012 and beyond.

Transform the Frontiers

Transform the Frontiers emphasizes the seamless integration of research and education as well as the close coupling of research infrastructure and discovery.

NSF creates opportunities to expand and shape the frontiers of human knowledge. The Foundation embraces our unique role in supporting the fundamental, interdisciplinary, high-risk, and potentially transformative research and education that are central to the discovery of emergent properties and structures in physical, living, human, and engineered systems. NSF enables research at the frontiers by providing state-of-the-art infrastructure, by educating and preparing a diverse, world-class STEM workforce, and by partnering with others nationally and internationally. By transforming the frontiers, NSF can best promote the progress of science, engineering, and education. This research agenda encourages high-risk/high-reward activities and pursues potentially transformative ideas, in keeping with recent mandates from the science and engineering community[1], the National Science Board[2], Congress[3], and the Administration[4].

Performance Goal T-1: Make investments that lead to emerging new fields of science and engineering and shifts in existing fields.

- FY 2011 Goal Statement: Produce an analysis of NSF's FY 2010 investments in activities undertaken to foster potentially transformative research.
- Lead Organization: Office of the Director.
- Goal Target: One analysis.
- Target Explanation: This Goal builds upon NSF's FY 2010 performance goal, which is described in the FY 2010 Annual Performance Report elsewhere in this chapter. In FY 2011, NSF is conducting a portfolio analysis of the way these FY 2010 funds were used to investigate which methods, techniques, and approaches could foster PTR. NSF is collecting information from each directorate and office regarding the nature of the work funded and the underlying decision-making processes that were used.

[1] "Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5." The National Academies Press, 2010.
[2] National Science Board. "Enhancing Support of Transformative Research at the National Science Foundation." NSB-07-32: May 7, 2007. (http://www.nsf.gov/pubs/2007/nsb0732/nsb0732.pdf)
[3] America COMPETES Reauthorization Act of 2010 (Public Law 111-358).
[4] United States, OMB/OSTP. "Science and Technology Priorities for the FY 2012 Budget." M-10-30: July 21, 2010.

Performance Goal T-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.

- FY 2011 Goal Statement: NSF science, technology, engineering, and mathematics (STEM) workforce development programs at the graduate, professional, or early career level participate in evaluation and assessment systems.
- Lead Organization: Directorate for Education and Human Resources.
- Goal Target: Six programs.
- Target Explanation: In FY 2010, Federal agencies identified a limited set of Priority Goals to be achieved by the end of FY 2011. This Goal overlaps with NSF's Priority Goal, described in the first section of this chapter. Achieving this Goal should be equivalent to achieving the Priority Goal.

Performance Goal T-3: Focus international partnerships on transforming the frontiers.

- FY 2011 Goal Statement: Identify number of new NSF program solicitations, announcements, and Dear Colleague Letters with international implications.
- Lead Organization: Office of International Science and Engineering (OISE).
- Goal Target: Establish baseline.
- Target Explanation: NSF has a system for program officers to indicate which solicitations, announcements, and Dear Colleague Letters have international implications in the internal clearance stages. OISE will conduct a baseline count of such materials and will also examine non-indicated materials for potential international implications.

Performance Goal T-4: Enhance research infrastructure and promote data access to enable transformation at the frontiers.

- FY 2011 Goal Statement: For all MREFC facilities under construction, keep negative cost and schedule variance at or below 10 percent.
- Lead Organization: Large Facilities Office.
- Goal Target: 100 percent of construction projects that are over 10 percent complete.
- Target Explanation: This is an existing NSF Performance Goal. Overall context, past trends, and current results can be found in the FY 2010 Performance Report. This goal provides a monitoring component for the "no cost overrun" policy that NSF has established, as discussed on page 2 of the MREFC chapter.

- FY 2011 Goal Statement: Determine current data management practices at NSF-funded facilities.
- Lead Organization: Directorate for Mathematics and Physical Sciences.
- Goal Target: Current data management practices documented for 100 percent of NSF-funded facilities.
- Target Explanation: NSF will contact its large facilities and document existing procedures. This is expected to aid future development of Foundational data management policies.

Innovate for Society

Innovate for Society points to the tight linkage between NSF programs and societal needs, and it highlights the role that new knowledge and creativity play in economic prosperity and society's general welfare.

By forging links between fundamental research and society's needs, NSF helps articulate important new areas of science and engineering, improves quality of life, creates a scientifically literate populace, and empowers future generations. NSF is committed to creating connections between research produced through our investments and the needs of society. This goal requires close interaction with NSF

stakeholders, a clear recognition of the Foundation's role in the nation's innovation enterprise, and an appreciation of the dynamic global context. Through this strategic goal, NSF advances the welfare and prosperity of the nation.

Performance Goal I-1: Make investments that lead to results and resources that are useful to society.

- FY 2011 Goal Statement: Industrial & Innovation Partnerships (IIP): Identify the number and types of grantee's partnerships.
- Lead Organization: Directorate for Engineering (ENG).
- Goal Target: Establish baseline.
- Target Explanation: Using ENG's IIP division as the model to start the process of collecting data on diverse types of partnerships is intended as the beginning of a process to identify how the links between science, industry, and innovation mediate the long term impacts of NSF investments.

Performance Goal I-2: Build the capacity of the nation's citizenry for addressing societal challenges through science and engineering.

- FY 2011 Goal Statement: Identify number of programs that fund activities that address public understanding and communication of science and engineering.
- Lead Organization: Division of Research on Learning in Formal and Informal Settings (DRL), EHR.
- Goal Target: Establish baseline.
- Target Explanation: Certain DRL programs explicitly aim to address public understanding and communication of science and engineering, but other NSF activities may also work towards this aim. This Goal's intent is to identify all such activities across the Foundation. With such an inventory, targets for subsequent years can be designed that take into account the totality of activities across NSF, not just those within DRL.

- FY 2011 Goal Statement: Identify number of programs that fund activities with K-12 components.
- Lead Organization: Directorate for Education and Human Resources.
- Goal Target: Establish baseline.
- Target Explanation: Certain EHR programs explicitly aim to support K-12 education activities, but other NSF activities may also work towards this aim. This Goal's intent is to identify all such activities across the Foundation. With such an inventory, targets for subsequent years can be designed that take into account the totality of activities across NSF, not just those within programs known to impact K-12 education.

Performance Goal I-3: Catalyze the development of innovative learning systems.

- FY 2011 Goal Statement: Identify number of programs that fund the development of research-based innovative learning systems.
- Lead Organization: Directorate for Education and Human Resources.
- Goal Target: Establish baseline.
- Target Explanation: This Goal's intent is to identify activities across the Foundation that contribute to development of innovative learning systems. Such activities are not funded by any one program within NSF. After determining NSF's baseline for this area of research, targets for subsequent years can be designed.

- FY 2011 Goal Statement: Identify number of programs that fund activities that promote partnerships that support development of learning technologies.
- Lead Organization: Directorate for Education and Human Resources.
- Goal Target: Establish baseline.

- Target Explanation: Interdisciplinary partnerships that support development of learning technologies are funded by organizational units across the Foundation. This Goal's intent is to identify all such activities so an NSF-wide baseline can be determined. Only then can targets for subsequent years be designed.

Perform as a Model Organization

Perform as a Model Organization emphasizes the importance to NSF of attaining excellence and inclusion in all operational aspects.

NSF sets high standards for performance and integrity in support of our mission and in enabling our workforce to carry out activities efficiently, effectively, and sustainably. The Foundation promotes a culture of excellence that encourages diversity, creativity, and initiative. NSF is committed to broadening participation. This is reflected in our recruitment and selection of reviewers and panelists as well as the selection and empowerment of staff. We implement first-rate administrative, financial, information technology, and infrastructure systems that support individual staff members and provide high-quality customer service to the public. NSF aspires to be a learning organization that aims for continual improvement in our processes and continual development of our people. NSF is committed to the principles underlying open government including transparency, participation, and collaboration, and to translating this commitment into action. NSF serves as a model for other organizations that fund research and education and takes a leadership role in cross-agency activities.

Performance Goal M-1: Achieve management excellence through leadership, accountability, and personal responsibility.

- FY 2011 Goal Statement: Include temporary staff appointed under the Intergovernmental Personnel Act (IPAs) under NSF's performance management system.
- Lead Organization: Division of Human Resources Management.
- Goal Target: 80 percent of all IPAs and 90 percent of IPAs in executive-level positions have performance plans as of July 1, 2011.

- FY 2011 Goal Statement: Pilot use of OPM's 360 degree evaluation instrument to provide feedback to NSF leaders and managers on skills and abilities.
- Lead Organization: Division of Human Resources Management.
- Goal Target: By July 1, 2011, at least 20 NSF managers use OPM's 360 instrument. By September 30, 2011, at least 20 NSF managers who used OPM's 360 instrument establish a plan for improving performance.

- FY 2011 Goal Statement: Attain essential elements of a model Equal Employment Opportunity (EEO) program, as defined in Equal Employment Opportunity Commission (EEOC) requirements.
- Lead Organization: Office of Diversity and Inclusion.
- Goal Target: Three elements.
- Target Explanation: For NSF to become a model EEO agency, it needs to meet each of the six criteria established by the EEOC. The target of three is based on the progress reported for last year (one) as compared to resource-responsive expectations for this fiscal year. EEOC refers to these criteria as the "Essential Elements" of a Model Agency, which are:
  - Demonstrated commitment from agency leadership;
  - Integration of EEO into the agency's strategic mission;
  - Management and program accountability;
  - Proactive prevention of unlawful discrimination;

- Efficiency; and
- Responsiveness and legal compliance.

Performance Goal M-2: Infuse learning as an essential element of the NSF culture with emphasis on professional development and personal growth.

- FY 2011 Goal Statement: Pilot process for assessing developmental needs and addressing them.
- Lead Organization: Division of Human Resources Management.
- Goal Target: By March 31, 2011 commence survey of administrative support staff. By September 20, 2011, obtain contract support for assessment of non-administrative-support staff.
- Target Explanation: NSF stresses personal learning and development to enhance performance, further our knowledge base on all aspects of NSF activity, and continue to build for the future. This directly reflects the specific action identified in the Strategic Plan: "review current NSF learning opportunities and develop a plan for addressing gaps."

Performance Goal M-3: Encourage and sustain a culture of creativity and innovation across the agency to ensure efficiency and effectiveness in achieving high levels of customer service.

- FY 2011 Goal Statement: Gather functional requirements for changes in current system processes that will accommodate the transition to a grant by grant payment method.
- Lead Organization: Division of Financial Management.
- Goal Target: Documentation of functional requirements.
- Target Explanation: NSF is committed to transition its financial processing of grants from a pooled system (quarterly reporting of expenditures by institution) to grant-by-grant (real-time reporting of expenditures by award) by FY 2013. This change will have many advantages for both NSF and its grantees, such as better and more timely financial data and stronger recipient monitoring programs. This is an essential aspect of establishing the capability to monitor expenditures at the award level as part of NSF's financial system modernization.

- FY 2011 Goal Statement: Inform applicants whether their proposals have been declined or recommended for funding within six months of deadline, target date, or receipt date, whichever is later.
- Lead Organization: Office of the Director.
- Goal Target: 70 percent.
- Target Explanation: This is an existing NSF Performance Goal. Overall context, past trends, and current results can be found in the FY 2010 Performance Report.

FY 2010 ANNUAL PERFORMANCE REPORT

NSF Funding by FY 2006-FY 2011 Strategic Outcome Goal

(Dollars in Millions)

	FY 2010 Total Actual	FY 2010 Enacted/ Annualized FY 2011 CR	FY 2012 Request	Change over FY 2010 Enacted	
				Amount	Percent
Discovery	$3,860.69	$3,826.68	$4,514.70	$688.02	18.0%
Learning	973.38	953.90	1,031.34	77.44	8.1%
Research Infrastructure[1]	2,307.82	1,662.18	1,727.37	65.19	3.9%
Stewardship	430.54	429.75	493.59	63.84	14.9%
Total, NSF	**$7,572.43**	**$6,872.51**	**$7,767.00**	**$894.49**	**13.0%**

Totals may not add due to rounding.

Funding for all years is shown in the FY 2010 structure for compatibility.

[1] Funding for Research Infrastructure for FY 2010 excludes a one-time appropriation transfer of $54.0 million to U.S. Coast Guard per P.L. 111-117.

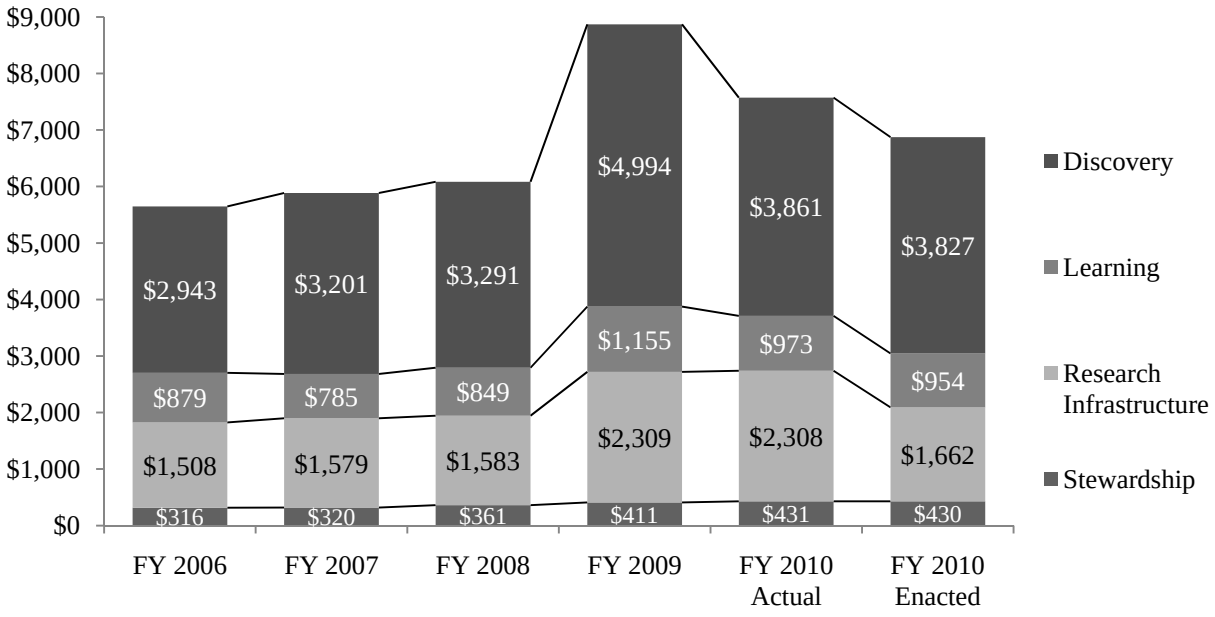
NSF's Strategic Plan for FY 2006–2011 established four long-term strategic outcome goals for the agency's activities and performance: Discovery, Learning, Research Infrastructure, and Stewardship. The first three goals focus on NSF's long-term investments in science and engineering research and education. The fourth goal emphasizes improving effectiveness and efficiency in agency management.

- **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.

At a Glance: FY 2010 GPRA Performance Goals and Results

Strategic Goal	Performance Goal		Target	Result	Status
Discovery	Time to decision		70%	75%	✓
	Potentially transformative research		$94.0 million	$138.4 million	✓
Learning	Portfolio metrics		100%	100%	✓
Research Infrastructure	Major Research Equipment and Facilities Construction		100%	3 of 5 (60%)	✗
	Operational facilities		100%	100%	✓
Stewardship	Business Systems Reviews of large facilities		3	4	✓
	Merit review	Context statements	95%	93%	✗
		COV report analysis	One report	One report	✓
	Post-award monitoring	Site visits	95%	80%	✗
		Desk reviews	95%	146%	✓
		Transaction testing	95%	100%	✓
		ARRA recipient reporting rate	98%	99.5%-99.8%	✓
		ARRA significant error rate	< 1%	0%-0.0004%	✓

Funding Trends by Strategic Goal, FY 2006-FY 2010
(Dollars in Millions)

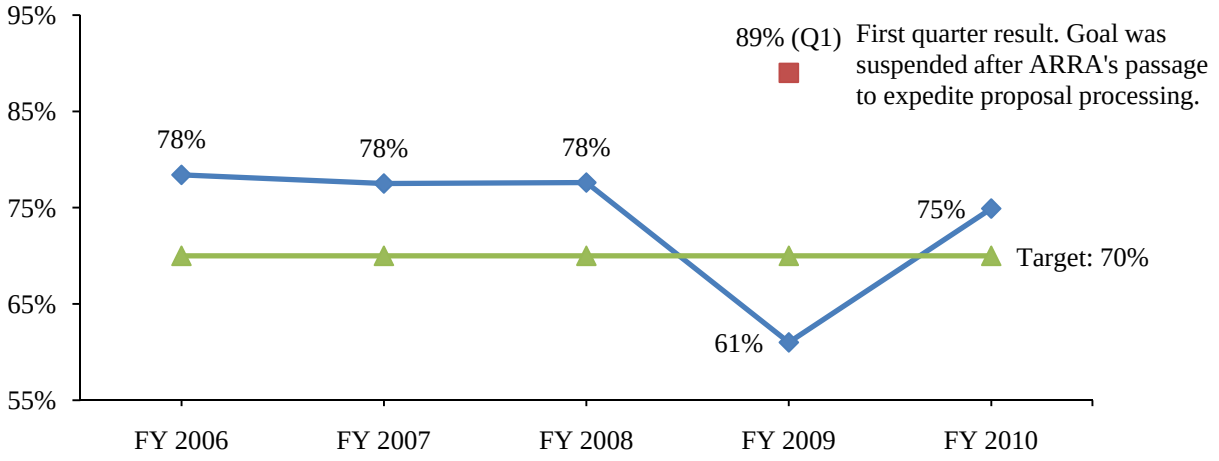


Goal 1 – Discovery/Time to Decision

Inform applicants whether their proposals have been declined or recommended for funding within six months of deadline, target date, or receipt date, whichever is later.

Result: Goal achieved.

Time to decision performance trends, FY 2006-FY 2010



Motivation behind goal
One of the most significant issues raised in customer satisfaction surveys is the time it takes NSF to process proposals. This goal seeks to improve that time for proposals while balancing the need for a credible and efficient merit review system.

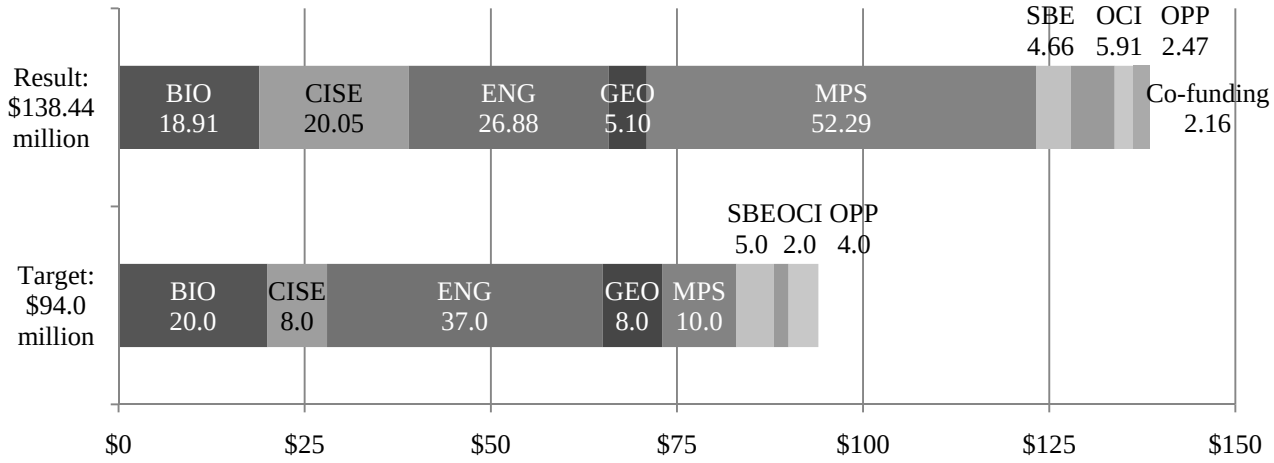
Discussion of result
NSF exceeded this goal in FY 2010 despite a significant increase in workload. The number of competitive proposal actions increased 23 percent in FY 2010, while the workforce increased only 3 percent.

Goal 2 – Discovery/Potentially Transformative Research (PTR)[1]

Each directorate in the Research and Related Activities account will invest a minimum of $2.0 million per research division to leverage and facilitate activities that foster PTR.

Result: Goal achieved.

FY 2010 funding for PTR, by directorate/office
(Dollars in Millions)



Motivation behind goal
NSF identifies PTR as work that may lead to

- Dramatically new ways of conceptualizing or addressing major scientific and technological challenges.
- New methods or analytical techniques that could put a discipline on a new scientific pathway, provide tools that allow unprecedented insights, or radically increase the rate of data collection.

In FY 2010, each R&RA directorate allocated a minimum of $2.0 million per research division ($94.0 million Foundation-wide) to explore methodologies that help support PTR.

Discussion of result
Collectively, R&RA directorates obligated a total of $138.44 million towards explorations of methodologies that help support potentially transformative research (PTR). This exceeded the collective target of $94.0 million by over 47 percent.

Following this FY 2010 investment, NSF will engage in activities to compare the different approaches used across directorates and offices. NSF expects that this process will help to determine the most effective approaches to employ in future years to support PTR. Specific FY 2011 activities are indicated in the section presenting the FY 2011 Annual Performance Plan.

[1] This report of NSF's PTR activities is provided also per Section 1008 of the 2007 America COMPETES Act.

Goal 3 – Learning: Portfolio Metrics

Develop goals and metrics for NSF's programmatic investments in its FY 2010 Learning portfolio.

Result: Goal achieved.

Motivation behind goal
NSF's Learning portfolio includes activities funded by the Education and Human Resources (EHR) and Research and Related Activities (R&RA) accounts. In FY 2009, an EHR Directorate working group developed metrics for all EHR programs. In FY 2010, EHR expanded and refined these goals and metrics, and goals and metrics were developed for R&RA-funded activities in the Learning portfolio. Programs also submitted evaluation plans.

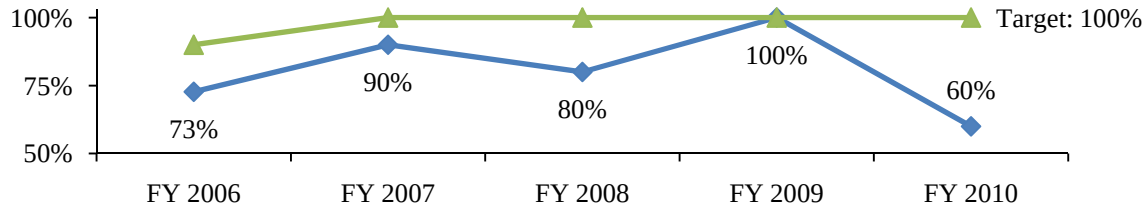
Discussion of result
All Learning programs that received funds in FY 2010 have established goals and metrics. Current metrics, goals, and evaluation plans for the following FY 2010 Learning portfolio programs can be found at NSF's website under "Additional Performance Information" (http://nsf.gov/about/budget/fy2012).

Goal 4 – Research Infrastructure: Major Research Equipment and Facilities Construction

For all MREFC facilities under construction, keep negative cost and schedule variance at or below 10 percent.

Result: Goal not achieved.

Major Research Equipment and Facilities Construction performance trends, FY 2006-FY 2010



Motivation behind goal

NSF uses the Earned Value Management (EVM) system to track its construction projects. EVM is an integrated management control system for assessing, understanding, and quantifying what a contractor or field activity is achieving with program dollars. It is a standard measure of performance for construction projects.

Projects that are under ten percent complete are not considered eligible for this goal because EVM data is less meaningful statistically in the very early stages of a project. Early in a project, the actual costs of the work, and the total values of the work scheduled and performed, are small compared to the total project cost and schedule. Consequently, their ratios - the reported cost and schedule variances - can change by large amounts even though the real values of their differences are small.

Discussion of result

At the end of FY 2010, two projects were behind schedule out of a total of five active projects. OOI and AdvLIGO are suffering lagging procurements and delays in staffing at the implementing organizations. Active schedule management is underway to recover from these delays.

One MREFC project, South Pole Station modernization, is not included in the denominator for the FY 2010 result (60 percent) on the chart above. SPSM concluded on time and within cost in FY 2010.

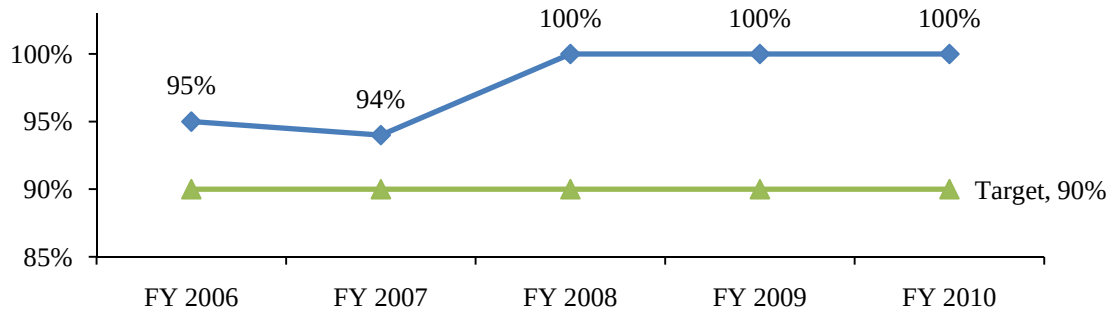
MREFC Project		**Goal Status, September 2010**
ARRV	Alaska Regional Research Vessel	Achieved
IceCube	IceCube Neutrino Observatory	Achieved
ALMA	Atacama Large Millimeter Array	Achieved
OOI	Ocean Observatories Initiative	Not achieved (behind schedule)
AdvLIGO	Advanced Laser-Interferometer Gravity-wave Observatory	Not achieved (behind schedule)
SPSM	South Pole Station (modernization)	Achieved, but not included in goal calculation
ATST	Advanced Technology Solar Telescope	Not included in goal—project under 10 percent complete

Goal 5 – Research Infrastructure: Operational Facilities

For facilities in the operational phase, keep scheduled operating time lost to less than 10 percent for 90 percent of those facilities.

Result: Goal achieved.

Operational facilities performance trends, FY 2006-FY 2010



Motivation behind goal
To qualify as a facility in the operational phase, the project must be funded by an award or collection of awards that 1) Operates infrastructure, instrumentation, equipment, and/or software that is intended to enable a broad segment of researchers and/or educators to conduct research and/or education activities and 2) Has an Operations and Maintenance portion of the expenditure plan that is at least $8.0 million annually.

Discussion of result
All NSF facilities met this goal. See the Facilities chapter for more information about the facilities covered under this goal.

Goal 6 – Stewardship: Management of Large Facilities

Conduct a Business System Review (BSR) once per 5-year award cycle for all institutions hosting NSF-supported large facilities. FY 2010 target: three BSRs.

Result: Goal achieved.

Motivation behind goal
A BSR is conducted in order to provide a reasonable assurance that the business systems employed to support a facility are capable of supporting activities conducted by the large facility. They verify that administrative business policies and procedures are written and determine whether these policies and procedures conform to OMB requirements, NSF expectations, and other applicable federal regulations.

Discussion of result
NSF exceeded this goal. BSRs were performed on the following facilities:

- EarthScope
- National Center for Atmospheric Research
- Alaska Regional Research Vessel
- Academic Research Fleet

Goal 7 – Stewardship: Merit Review, Context Statement

Provide a written context statement to the Principal Investigator (PI) whose proposal is awarded or declined 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 2010 target: 95 percent.

Result: Goal not achieved

Motivation behind goal
Context statements provide a level of transparency to the investigator. Examples of broader contexts which might affect a funding decision include: portfolio shaping (targeting support for potentially transformative advances in a field, building capacity in a particular research area; achievement of special program objectives and initiatives); fostering of novel approaches to significant research questions; assessment of potential impact on the development of human resources and infrastructure; support of NSF core strategies, such as the integration of research and education and/or broadening participation; availability of other funding sources; and geographic distribution.

Discussion of result
Statements were provided for 93.3 percent of eligible proposals.

Goal 8 – Stewardship: Merit Review, Committees of Visitors report

Analyze Committees of Visitors (COV) reports in order to identify issues of quality and the transparency of the merit review process

Result: Goal achieved.

Motivation behind goal
A Committee of Visitors is a panel of external experts that meet at regular intervals of approximately three years to review the work conducted by programs and offices that recommend or award grants, cooperative agreements, and/or contracts and whose main focus is the conduct or support of NSF research and education in science and engineering. COV reports perform two functions: 1) they list process issues identified by reviewers that could affect agency operations, and 2) they provide reviewers' determinations of the potential outcomes of NSF investments.

Discussion of result
In FY 2008 and FY 2009, NSF defined, tested, and implemented a process for assessing COV reports on an annual basis. In FY 2010, NSF produced its second annual assessment related to issues of quality and the transparency of the merit review process. One report was completed and delivered to the Office of the Director.

Goals 9, 10, and 11 – Stewardship: Post-award Monitoring

Appropriately apply NSF's risk assessment strategy to ensure adequate post-award financial and administrative monitoring of NSF's riskiest awards.

Results: Two of three goals achieved.

Measure	Target	Result
Site monitoring visits (30 projected)	95 percent	Goal not achieved. 80 percent (24 visits)
Desk reviews (73 projected)	95 percent	Goal achieved. 146 percent (107 reviews)
FFR transaction testing	Completion of testing	Goal achieved. Completed Q3. Error rate 0.087 percent

Motivation behind goals
Post-award monitoring activities manage risk, provide broad oversight coverage of its award portfolio, and ensure that awardee institutions administer grants and cooperative agreements in compliance with federal regulations and NSF policies.

Discussion of results

- The purpose of a site visit is to assess awardees' capability, performance, and compliance against the applicable elements that make up each award. NSF did not achieve its goal of conducting 95 percent of planned site visits to NSF awardee institutions. In FY 2010, NSF award monitoring personnel were temporarily redeployed to support a high-priority, high-dollar procurement. NSF readjusted its award monitoring plan by deferring site visits to the six institutions with the lowest risk (as determined using NSF's risk assessment methodology). The six institutions received advanced monitoring through increased application of the desk review process and have been assigned site visit priority as part of the FY 2011 risk assessment.

- Desk reviews collect and analyze information to assess recipients' capacity to manage federal awards. Desk reviews include a review of an institution's policies and general management practices. This goal was achieved.

- The Federal Financial Report (FFR) Transaction Testing process is an assessment of the adequacy of the institution's accounting and financial systems, and reconciliation between amounts included in an FFR submitted to NSF and corresponding amounts tracked by the awardee for the previous fiscal year's transactions. This goal was achieved.

Goals 12 and 13 – Stewardship: Post-award Monitoring, American Recovery and Reinvestment Act

Appropriately apply NSF's risk assessment strategy to ensure adequate post-award financial and administrative monitoring of NSF's riskiest awards.

Results: Both goals were achieved.

Measure	Quarterly Target	Result
Recipient reporting rate	98 percent	Goal achieved. Q1: 99.7 percent Q2: 99.5 percent Q3: 99.8 percent Q4: 99.6 percent
Uncorrected significant error rate	Under 1 percent	Goal achieved. Q1: 0.0003 percent (1 in 4535) Q2: 0 percent Q3: 0.0004 percent (2 in 4703) Q4: 0 percent

Motivation behind goals

Each quarter, American Recovery and Reinvestment Act (ARRA) award recipients report financial and programmatic information. Two Stewardship performance goals in FY 2010 involved monitoring ARRA awardee performance. NSF implemented a quarterly, multi-phase recipient reporting review process that aided compliance with requirements for quarterly recipient reporting, improved the quality of data reported by those award recipients, and increased awardee communication, outreach, and oversight to ensure the timely expenditure of award funds. A coordinated communications plan reminded awardees of their reporting obligations at defined stages during the reporting cycle and notified them of data quality issues and reporting errors. These measures enabled NSF to quickly recognize and address potential problems.

Discussion of results

NSF achieved excellent results in its data quality program and is a government leader with a high degree of compliance among NSF awardees and a low error rate.

- ARRA award recipients are required to submit a report for their previous quarter's ARRA funded activities. NSF identifies, documents, and alerts recipients who have failed to submit a report thirty days following the end of the previous quarter.
- The uncorrected significant error rate (reported to OMB) on ARRA award recipients on Day 30 after federal review and continuous correction period was maintained well below the target.

AMERICAN RECOVERY AND REINVESTMENT ACT PERFORMANCE REPORT

In February 2009, NSF received $3.0 billion dollars through the American Recovery and Reinvestment Act of 2010 (ARRA). Eighty percent – $2.4 billion – of NSF's ARRA funds were obligated in FY 2009, and the remaining $600 million in FY 2010. At the end of 2010, outlays of the agency's total ARRA funds were $598 million.

NSF's FY 2009 APR reported on ARRA measures, and this report on FY 2010 performance includes those FY 2009 data for context and coherence. When NSF set its performance goals for its ARRA investments, it anticipated reporting on activity over varying timeframes as appropriate to each investment:

- Research and Related Activities-funded performance was measured with award characteristics metrics (number of awards made, number of investigators supported) and were therefore measurable immediately once the award was made.
- The Education and Human Resources account made awards to institutions in the first year, and the performance of the awards is also being measured over time (number of participants supported over the award duration).
- Projects funded through the Major Research Equipment and Facilities Construction account will generate performance metrics throughout the construction period.

When appropriate, NSF will continue to report on the performance of its ARRA-funded investments in future years.

NSF American Recovery and Reinvestment Act Funding by Account

(Dollars in Millions)

	FY 2009 Actual	FY 2010 Actual	Adjustment to Prior Year Accounts	Total
Research and Related Activities	**$2,062.64**	**$439.17**	**-$1.81**	**$2,500.00**
Academic Research Infrastructure (ARI)	-	*200.00*	-	*200.00*
MRI Instrumentation	*99.85*	*200.15*	-	*300.00*
Education and Human Resources	-	-	-	**100.00**
Robert Noyce Teacher Scholarship Programs	60.00	-	-	60.00
Math and Science Partnership Program	25.00	-	-	25.00
Science Masters Program	-	15.00	-	15.00
Major Research Equipment and Facilities Construction	-	-	-	**400.00**
Alaska Regional Research Vessel (ARRV)	148.07	-	-	148.07
Ocean Observatories Initiative (OOI)	105.93	-	-	105.93
Advanced Technology Solar Telescope (ATST)	-	146.00	-	146.00
Office of Inspector General	**0.02**	-	-	**0.02**
Total, NSF	**$2,401.66**	**$600.17**	**-$1.81**	**$3,000.02**

Totals may not add due to rounding.

At A Glance: ARRA Performance Highlights

Program/Subprogram		Measure	2009		2010		Status
			Target	Result	Target	Result	
Research and Related Activities	Competitive Awards	Number of awards*	4,000	4,599	-	5,027	✓
		Number of ARI-R2 and MRI-R2 awards	-	-	500	398	✗
	Principal Investigators (PIs)	Total number of Primary Investigators*	6,400	6,762	-	8,030	✓
		Number of new Primary Investigators*	2,400	2,352	-	2,839	✓
Education and Human Resources	Robert Noyce Teacher Scholarship Program	Number of new awards	67	67	-	-	✓
		New pre-service teachers and teacher participants	30	124	370	420	✓
		New teachers teaching in high-need districts	0	0	28	75	✓
	Math and Science Partnership (MSP) Program	Number of new awards	9	9	-	-	✓
		Number of MSP teacher leader/master teacher participants	15	24	133	180	✓
		Number of post-baccalaureate credentials or master's degree recipients	13	15	119	110	✗
	Science Masters Program	Number of new awards	New program in FY 2010		21	21	✓
		Number of students supported			80	100	✓
		Number of students earning science master's degrees			-	-	-
Major Research Equipment and Facilities Construction	Alaska Region Research Vessel (ARRV)	Variance from target cost and schedule: <10% behind schedule <10% above cost	> -10%	ns	>-10%	Achieved	✓
	Advanced Technology Solar Telescope (ATST)		> -10%	ns	>-10%	ns	-
	Ocean Observatories Initiative (OOI)		> -10%	ns	>-10%	Not Achieved	✗

** FY 2010 results are cumulative. All other targets and results in the table are annual values.*
ns*: Variance data from projects less than 10 percent complete are not considered significant.*
ARI-R^2: Academic Research Infrastructure-Recovery and Reinvestment solicitation
MRI-R^2: Major Research Instrumentation-Recovery and Reinvestment solicitation

Research and Related Activities Account

"Research and related activities" include investigator-initiated research projects, postdoctoral fellowships, instrumentation awards, workshop and planning grants, and cooperative agreements for facilities. For existing programs, NSF set targets for R&RA-related variables of interest for FY 2009 only, in expectation that all ARRA funds would be expended in FY 2009. Targets were set for FY 2010 only for new programs and solicitations. Only 80 percent of ARRA funds were obligated in FY 2009. No targets were set for these measures for FY 2010.

R&RA ARRA Performance Measures, FY 2009-FY 2010

Fiscal Year	Number of competitive awards		Number of ARI-R2 and MRI-R2 awards		Total number of Primary Investigators		Number of new Primary Investigators	
	Target	Result	Target	Result	Target	Result	Target	Result
FY 2009	4,000	4,599	*(New solicitations in FY 2010)*		6,400	6,762	2,400	2,352
FY 2010	*No target*	428	500	398	*No target*	1,268	*No target*	487
Cumulative	4,000	5,027	500	398	6,400	8,030	2,400	2,839

FY 2009 Goals: Core Research, Facilities, and Infrastructure

Number of competitive awards made with ARRA funds: This target was based on a formula taking into account the amount of funding and the average award size and duration. It assumed a $155,000 average annual award size and a three-year duration.

Number of investigators supported: The target for the number of investigators was based on a ratio of 1.6 principal investigators per award, according to FY 2008 figures.

Number of new investigators supported: New investigators were defined as those who have not served as the principal investigator or co-principal investigator on any award from NSF, with the exception of doctoral dissertation awards; graduate or postdoctoral fellowships; research planning grants; or conference, symposia, and workshop awards. NSF's target in FY 2009 took into account the emphasis on supporting first-time investigators with ARRA funds, and the target ratio of new investigators (0.6) was adjusted upward from the ratio from FY 2008 (0.5). While the target was not met in FY 2009, the result of 2,352 new investigators corresponds to a ratio of 0.59 new investigators per award. The FY 2009 target was exceeded in FY 2010.

FY 2010 Goals: Major Research Instrumentation and Academic Research Infrastructure

The Major Research Instrumentation (MRI) Program provides funds to purchase shared scientific and engineering instruments for research and training in institutions of higher education, museums and science centers, and non-profit organizations. The Academic Research Infrastructure Program provides funds to purchase equipment or services to repair, renovate, improve, or replace research facilities and cyberinfrastructure. NSF did not achieve its goal to make 500 awards under the new Major Research Instrumentation Recovery and Reinvestment (MRI-R2) and Academic Research Infrastructure Recovery and Reinvestment (ARI-R2) solicitations. The goal was based on an extrapolation of FY 2008 MRI program data on requested and awarded amounts. The average request and award under the MRI-R2 competition were over 50 percent higher than projected, so fewer awards could be made.

Education and Human Resources Account

The EHR Program promotes excellence in STEM education through the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators; a well-informed citizenry; and access to the ideas and tools of science and engineering for all. ARRA awarded EHR resources totaling $100.0 million to:

- Expand the Robert Noyce Teacher Scholarship Program, which produces STEM K-12 teachers who commit to teaching in high need school districts.
- Expand the Math and Science Partnership (MSP) Program, which focuses on the development of STEM K-12 master teachers and school-based instructional leaders in mathematics and science education.
- Establish the Science Master's (SM) Program, which will further broaden graduate training and talent for industry, the national laboratories, and non-governmental agencies. This new ARRA program made its awards early in FY 2010.

The programs are managed by the Divisions of Undergraduate Education and Graduate Education.

Robert Noyce Teacher Scholarship Program

The Robert Noyce Teacher Scholarship Program seeks to encourage talented science, technology, engineering, and mathematics majors and professionals to become K-12 mathematics and science teachers. The ARRA funds support Phase I projects from institutions that have not previously been funded or are requesting funding for a department or academic unit that has not participated in a previous Noyce award. These funds also support Phase II projects from institutions that have previously been funded and whose award expiration date occurs on or before December 31, 2009, enabling these institutions to support additional cohorts of prospective teachers while conducting longitudinal studies of previous cohorts. In addition, ARRA funds will support proposals submitted under the Noyce Program's NSF Teaching Fellowships and Master Teacher Fellowships track.

Subgoal 1: Number of new awards to lead institutions of higher education. The target for FY 2009 (67) was met. Only one round of competitions was held so there are no targets in subsequent years.

Subgoal 2: Number of new pre-service teachers and teacher participants. This measure represents the total number of teachers and teacher participants supported over the five-year duration of awards. Cumulative target for FY 2013: 1,530 participants.

Subgoal 3: Number of new teachers teaching in high need districts. This measure represents the total number of people moving into teaching in high need districts over the five-year duration of awards. Cumulative target for FY 2013: 1,440 teachers.

Robert Noyce Teacher Scholarship Program: Annual Targets and Results through FY 2010

Fiscal Year	Number of new awards to institutions		Number of New Pre-service and Teacher Participants		Number of New Teachers Teaching in High Need School Districts	
	Target	Result	Target	Result	Target	Result
FY 2009	67	67	30	124	0	0
FY 2010	*No targets*		370	420	28	75
FY 2011			415	-	270	-
FY 2012			415	-	475	-
FY 2013			300	-	667	-
Cumulative	67	67	1530	544	1440	75

Math and Science Partnership Program

The Math and Science Partnerships Program supports innovative partnerships to improve K-12 student achievement in math and science. MSP projects are expected to raise the achievement levels of all students and significantly reduce achievement gaps in the math and science performance of diverse student populations. The ARRA funds support three categories of projects: (1) Institute Partnerships – Teacher Institutes for the 21st Century, which focus on meeting national needs for teacher leaders/master teachers who have deep knowledge of disciplinary content for teaching and are fully prepared to be school- or district-based leaders in math or the sciences; (2) Phase II Partnerships for prior MSP Partnerships awardees who focus on specific innovative areas of their work where evidence of the potential for significant positive impact is clearly documented; and (3) MSP-Start Partnerships for awardees new to the MSP Program, especially from minority-serving institutions, community colleges, and primarily undergraduate institutions, to support the necessary data analysis, project design, evaluation, and team building activities needed to develop a full MSP Targeted or Institute Partnership.

Subgoal 1: Number of new awards to lead institutions of higher education. The target for FY 2009 (9) was met. Only one round of competitions was held so there are no targets in subsequent years.

Subgoal 2: Number of MSP teacher leader/master teacher participants. This measure represents the total number of people supported over the five-year duration of awards. Cumulative target for FY 2013: 369 participants.

Subgoal 3: Number of Post-baccalaureate credential or master's degree recipients. This measure represents the total number of people receiving master's degrees or other credential over the five-year duration of awards. Cumulative target for FY 2013: 331 recipients.

Math and Science Partnership: Annual Targets and Results through FY 2010

Fiscal Year	Number of new awards to institutions		Number of Leader/Master Teacher Participants		Number of Participants Receiving Graduate Credit/Degree or Other Credential	
	Target	Result	Target	Result	Target	Result
FY 2009	9	9	15	24	13	15
FY 2010	*No targets*		133	180	119	110
FY 2011			73	-	67	-
FY 2012			74	-	66	-
FY 2013			74	-	66	-
Cumulative	9	9	369	204	331	125

Science Master's Program

The Science Master's program is a new program in FY 2010. From Program Solicitation 09-607 (http://www.nsf.gov/pubs/2009/nsf09607/nsf09607.htm): "The Science Master's Program prepares graduate students for careers in business, industry, nonprofit organizations, and government agencies by providing them not only with a strong foundation in science, technology, engineering and mathematics (STEM) disciplines, but also with research experiences, internship experiences, and the skills to succeed in those careers. The program is intended to catalyze the creation of institution-based efforts that can be sustained without additional federal funding. This program is also intended to encourage diversity in student participation so as to contribute to a broadly inclusive, well-trained science and engineering workforce."

Subgoal 1: Number of new awards to lead institutions. The target for FY 2010 (21) was met. Only one round of competitions was held so there are no targets in subsequent years.

Subgoal 2: Number of new students supported. This measure represents the total number of people to be supported over the three-year duration of awards. Cumulative target for FY 2012: 220.

Subgoal 3: Number of students earning science master's degrees. This measure represents the total number of degree recipients over the three-year duration of awards. Cumulative target for FY 2012: 200.

Science Masters Program: Annual Targets and Results through FY 2010

Fiscal Year	Number of new awards to institutions		Number of New Students Supported		Number of Students Earning Science Master's Degrees	
	Target	Result	Target	Result	Target	Result
FY 2010	21	21	80	100	0	0
FY 2011	*No targets*		140	-	80	-
FY 2012			0	-	120	-
Cumulative	21	21	220	100	200	0

Major Research Equipment and Facilities Construction Account

ARRA funds supported the following Major Research Equipment and Facilities Construction (MREFC) projects:

- the Advanced Technology Solar Telescope (ATST), which will enable the study of solar activity in unprecedented detail,
- the Alaska Region Research Vessel (ARRV), a new multipurpose research ship to operate in seasonal sea ice and open ocean waters in the Bering Sea and the Gulf of Alaska, and
- the Ocean Observatories Initiative (OOI), an integrated observatory network to study the complex, interlinked physical, chemical, biological, and geological processes operating throughout the global ocean.

NSF uses the Earned Value Management (EVM) system to track its construction projects. EVM is an integrated management control system for assessing, understanding, and quantifying what a contractor or field activity is achieving with program dollars. It is a standard measure of performance for construction projects.

In FY 2009, all projects were under 10 percent complete. Projects that are under ten percent complete are not considered eligible for this goal because EVM data is less meaningful statistically in the very early stages of a project. Early in a project, the actual costs of the work, and the total values of the work scheduled and performed, are small compared to the total project cost and schedule. Consequently, their ratios - the reported cost and schedule variances - can change by large amounts even though the real values of their differences are small.

Two projects crossed the ten percent threshold in FY 2010. Of those, one (OOI) was off schedule at the end of the fiscal year. OOI is suffering lagging procurements and delays in staffing at the implementing organizations. Active schedule management is underway to recover from these delays.

MREFC Project	Target	FY 2009	FY 2010
Advanced Technology Solar Telescope (ATST)	< -10%	*Results not significant--projects under 10 percent complete*	*Results not significant--project under 10 percent complete*
Alaska Region Research Vessel (ARRV)			Achieved (schedule: 0%, cost: 58%)
Ocean Observatories Initiative (OOI)			Not achieved (schedule: -29%, cost: 12%)