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## **FY 2010 EXTERNAL EVALUATIONS**

NSF directorates, divisions, and programs use the recommendations of external experts in their decision-making. During FY 2010, seven external evaluations of NSF's existing programs and strategic investments were published and include the results of studies, reports, and workshops commissioned by various programmatic offices within the National Science Foundation. Descriptions of these evaluations can be found on the following pages.

- EHR: Capacity Building to Diversify STEM: Realizing Potential among HBCUs
- EHR: Robert Noyce Teacher Scholarship Program Evaluation Highlights
- EHR: Evaluation Pilot Study of Research in Disabilities Education Program
- ENG, GEO, SBE: Review of the WATERS Network Science Plan
- ENG: Research Experiences for Undergraduates in the Directorate For Engineering: Follow-up of FY 2006 Student Participants
- MPS: Enhancing the Mathematical Sciences Workforce for the 21<sup>st</sup> Century (EMSW21)/Vertical Integration of Research and Education (VIGRE)
- OCI: Software Institute and Computational Resources (Clusters, Clouds and Grids) for Scientific Computing Needs Assessment

In addition, Committees of Visitors for the following divisions and programs were convened in FY 2010:

- BIO: Biological Infrastructure
- EHR: Human Resources Development
- ENG: Engineering, Education, and Centers
- ENG: Industrial Innovation and Partnerships
- GEO: Education and Diversity Programs
- GEO: Lower Atmosphere Research Section
- GEO: Atmospheric and Geospace Sciences
- GEO: UCAR and Lower Atmospheric Facilities
- GEO: Instrumentation and Facilities Section
- MPS: Mathematical Sciences
- MPS: Chemistry
- OIA: Major Research Instrumentation
- SBE: Social and Economic Sciences

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES Division of Human Resource Development (HRD)	
Evaluation Name	Capacity Building to Diversify STEM: Realizing Potential among HBCUs
Contractor or grantee	Urban Institute (Beatriz Chu Clewell, Lead)
Program Name	HBCU-UP
Completion date	2010

### **Program Description**

The goal of the HBCU-UP program is to enhance the quality of undergraduate education and research in science, technology, engineering, and mathematics (STEM) at Historically Black Colleges and Universities (HBCUs) as a means to broaden participation in the nation's STEM workforce.

### **Evaluation Description**

The evaluation focused on the implementation projects, which are five-year institution-building projects. Between 1998 and 2009 the program made 139 institutional awards for a total of over \$200 million.

### **Findings**

- The HBCU-UP program yielded a comprehensive intervention model characterized by a core set of strategies associated with successful student outcomes. These strategies included changes to institutional infrastructure (e.g., curriculum and course enhancement), faculty training in pedagogy and research support, and the creation of student support services such as pre-freshman academies, research opportunities and graduate school assistance.
- Successful HBCU-UP projects were able to institutionalize several components of their HBCU-UP projects.
- HBCU-UP graduates outperformed national samples of STEM baccalaureate degree holders in terms of degree completion and participation in the STEM workforce with a graduate degree.
- HBCU-UP graduates are more likely to complete master's degrees and equally likely to complete doctoral and professional degrees as the national comparison group.
- The HBCU-UP program successfully contributed to the education and retention of women and minority women in STEM.

### **Recommendations, agency response**

n/a

### **Publications**

Beatriz Chu Clewell et. al. (2010) Capacity Building to Diversify STEM: Realizing Potential among HBCUs. Urban Institute, Washington, DC

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES Division of Undergraduate Education (DUE)	
Evaluation Name	Robert Noyce Teacher Scholarship Program Evaluation Highlights
Contractor or grantee	University of Minnesota Evaluation Team (Frances Lawrenz, PI)
Program Name	Robert Noyce Teacher Scholarship Program
Completion date	June 2010

**Evaluation Description**

The evaluation gathered survey data from PIs, disciplinary faculty whom PIs identified as interacting with Noyce projects, and Noyce scholarship and fellowship recipients. Interviews were also conducted with school district representatives. Demographic data on the scholars were obtained from the Noyce program monitoring data provided by PIs. Survey data were gathered in 2007 from projects awarded between 2002-2006.

**Program Description**

The Robert Noyce Teacher Scholarship program encourages talented science, technology, engineering and mathematics majors and professional to become K-12 mathematics and science teachers. The program provides funds to institutions of higher education to support scholarships, stipends, and academic programs for undergraduate STEM majors and post-baccalaureate students holding STEM degrees who commit to teaching in high-need K-12 school districts.

**Findings**

Programs

- Noyce teacher preparation certification programs are diverse but all include some specific preparation for teaching in high-need schools; Noyce scholars perceive that the most beneficial aspects of their preparation programs include experiences in high-need settings.
- School districts perceive that more high-quality and diverse job candidates are being provided through the Noyce program.

Noyce scholars

- Becoming a teacher and becoming a teacher in a high-need setting appear to be separate motivations.
- Job satisfaction affects whether or not scholars stay in high-need settings. Job satisfaction is influenced by the school’s administration, availability of supportive colleagues, and the existence of a stimulating environment including leadership opportunities.
- The proportion of Noyce scholars of color (33%) is higher than the proportion of teachers of color in the existing STEM teaching force (9-14%, depending on subject and grade).

Funding (stipends and scholarships)

- Funding is viewed as most influential by scholars who had not intended to teach until they heard about the scholarship.
- Funding appears to be more influential in encouraging scholars to teach in high-need schools than in encouraging them to be teachers.

**Recommendations, agency response**

n/a

**Publications**

<http://cehd.umn.edu/EdPsych/NOYCE>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES Division of Human Resource Development (HRD)	
Evaluation Name	Evaluation Pilot Study of Research in Disabilities Education Program
Contractor or grantee	SRI International (Katherine Nagel, PI)
Program Name	Research in Disabilities Education (RDE)
Completion date	2010

### **Program Description**

The RDE program seeks to broaden the participation and achievement of people with disabilities in all fields of science, technology, engineering and mathematics (STEM). One track of the program supports Regional Alliances that create partnerships of high schools, two-year institutions, four-year institutions, and graduate degree granting institutions to use evidence-based practices to recruit, retain, and graduate students with disabilities and support successful transitions to graduate school and the STEM workforce.

### **Evaluation Description**

The report summarizes a pilot study that provides information that can guide and inform the design of a larger national RDE program evaluation. SRI examined two Alliances underway for five or more years to investigate their models and operation. The Alliance sites were compared to two comparison institutions without Alliance programs.

### **Findings**

- Obtaining relevant data on students with disabilities at all institutional levels was difficult to obtain for various reasons: (1) institutional data did not include disability, (2) institutional data could not be linked with data on students with disabilities, or (3) institutions wouldn't allow such linking because of confidentially concerns.
- There are not definitive models for Alliances; rather the design and operation of Alliances are more related to size of primary institution and contextual issues.
- Offices of Disabilities Services in Alliance institutions were partners of RDE Alliances but were not more effective or innovative than at non-Alliance institutions.

### **Recommendations**

The results will inform the design of a full program evaluation and suggest that Disability Services Offices should not be used as a variable, and that investigating faculty attitudes and instructional skills might be more productively used to determine unintended outcomes of Alliances.

### **Agency response to recommendations**

n/a

### **Publications**

n/a

DIRECTORATE FOR ENGINEERING DIRECTORATE FOR GEOSCIENCES DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES	
Evaluation Name	Review of the WATERS Network Science Plan
Contractor or grantee	Committee on the Review of the Water and Environmental Research Systems (WATERS) Network; National Research Council
Program Name	Water and Environmental Research Systems (WATERS) Network
Completion date	Published by NAP with copyright 2010

**Program Description**

The WATERS Network is envisioned as an integrated national network of observatories and experimental facilities supporting research, outreach, and education on large-scale, water-related environmental problems. The proposed observatories would provide researchers with access to linked sensing networks, data repositories, and computational tools connected through high-performance computing and telecommunications networks.

**Evaluation Objectives**

To review the WATERS Science Plan and provide advice on collaborating with other federal agencies.

**Findings**

The Plan outlines a compelling vision for ways in which new, integrative hydrologic, environmental science and engineering, and social science research can help address pressing water management concerns while advancing water science and education. The argument for construction of a simultaneously operated national observatory network with funding from the Major Research Equipment and Facilities (MREFC) program is not as convincing in the Science Plan.

**Recommendations**

“As the WATERS team goes forward, it should bolster its case that a national network of observatories is required to address the science questions that are posed.... Alternatively, a different funding mechanism within NSF might be considered, if feasible, for establishing a phased network of observatories that could address the questions posed in the WATERS Science Plan while taking better advantage of advances in technology over time.”

**Agency response to recommendations**

NSF has decided not to proceed on the MREFC path at this time and instead has embarked on the Research and Related Activities (R&RA) path, with the issuing and implementation of the Water, Sustainability, and Climate (WSC) solicitation.

**Publications**

[http://www.nap.edu/catalog.php?record\\_id=12898](http://www.nap.edu/catalog.php?record_id=12898)

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES Division of Mathematical Sciences	
Evaluation Name	Enhancing the Mathematical Sciences Workforce for the 21 <sup>st</sup> Century (EMSW21) / Vertical Integration of Research and Education (VIGRE)
Contractor or grantee	Board on Mathematical Sciences and Applications (BMSA), National Research Council (NRC)
Program Name	Enhancing the Mathematical Sciences Workforce for the 21 <sup>st</sup> Century (EMSW21) / Vertical Integration of Research and Education (VIGRE)
Completion date	October 2009

### **Evaluation objectives, description, and scope**

At NSF's request, the National Research Council of the National Academy of Sciences appointed a committee to conduct an assessment of the Vertical Integration of Research and Education (VIGRE) program. The NRC established a study committee with the following charge:

- Review the goals of the VIGRE program and evaluate how well the program is designed to address those goals;
- Evaluate past and current practices at NSF for steering and assessing the VIGRE program;
- Draw tentative conclusions about the program's achievements based on the data collected to date;
- Evaluate NSF's plans for future data-driven assessments and identify data collection priorities that will, over time, build understanding of how well the program is attaining its goals; and
- Offer recommendations for improvements to the program and NSF's ongoing monitoring of it.

### **Findings**

Overall, the committee found that the goals of the VIGRE program are worthwhile and that VIGRE is an appropriate way to foster these goals. The committee recommended the continuation of VIGRE, but only if eight further recommendations are implemented.

### **Recommendations**

The report made one overall recommendation (#1) and eight additional recommendations:

- Recommendation 1: Continue the National Science Foundation's program of Grants for Vertical Integration of Research and Education in the Mathematical Sciences (VIGRE) but with critical policy and programmatic changes identified in the eight recommendations below.
- Recommendation 2: Clarify the goals of the VIGRE program and emphasize scientific quality in making awards.
- Recommendation 3: While retaining the VIGRE program's distinctive focus on projects that span the entire spectrum of educational levels from the undergraduate through the postdoctoral associate levels, allow greater flexibility in proposal design by encouraging VIGRE projects that address some, but not necessarily all, of the goals of the VIGRE program.
- Recommendation 4: To ensure the sustainability of an institution's successful VIGRE-initiated reforms, establish longer-term original awards and renewal awards, and require and enforce institutional support for grantees in the out-years of awards.
- Recommendation 5: Institute a preproposal step into the VIGRE application process.
- Recommendation 6: Allow international students and postdoctoral fellows to receive financial support from VIGRE projects.
- Recommendation 7: Expand the scope of the VIGRE program to include students preparing to apply advanced mathematics in nonacademic settings.
- Recommendation 8: Create a rigorous assessment process with a small number of carefully chosen benchmarks for which data can be collected and compared across VIGRE projects on an annual basis.



- Recommendation 9: Develop systematic and highly visible strategies for the dissemination of successful VIGRE projects.

**Agency response to recommendations**

Some of these recommendations have already been carried out. In particular:

- Recommendation #3 has been implemented through the introduction of grants for Research Training Groups (RTG) and Mentoring through Critical Transition Points in the Mathematical Sciences (MCTP).
- Recommendation #7 is already incorporated into several divisional/agency activities, including GOALI, Mathematical Sciences Research Institutes, and unsolicited Workforce proposals.

However, in response to the above recommendations, it has been decided to terminate the VIGRE program for the following reasons:

- While the overall recommendation of the report was to continue the program, the additional recommendations would make the VIGRE program unsustainable.
- The two most recent competitions yielded a very small number of proposals, a sign that the program had reached its final stage.

**Publications**

[http://www.nap.edu/catalog.php?record\\_id=12716](http://www.nap.edu/catalog.php?record_id=12716)

OFFICE OF CYBERINFRASTRUCTURE	
Evaluation Name	Software Institute, and Computational Resources (Clusters, Clouds and Grids) for Scientific Computing Needs Assessment
Contractor or grantee	Workshops Held by the University of Florida, University of Illinois at Urbana Champaign, the University of North Carolina, Purdue University, the University of Tennessee Knoxville, the University of Southern California the University of Wisconsin Madison, Georgia Institute of Technology
Program Name	SI2, STCI, Cyberinfrastructure PEC7231
Completion date	August 6, 2010; August 10, 2010; August 30, 2010; September 4, 2010; September 10, 2010; September 21, 2010; October 4, 2010; October 13, 2010

### Workshop Objectives

Explore the need for Scientific Software Innovation Institutes (S2I2) centered on various topics including:

- Security;
- Virtual execution infrastructures for next generation scientific programming languages;
- Dynamic programming languages for scientific computing, the quality of the virtual execution environments that support them, and the degree to which such languages allow scientists to interact with the rest of the software and hardware infrastructure;
- Distributed computing software and multidisciplinary science;
- Accelerators for data intensive applications;
- Environmental observatories;
- Molecular and material sciences focusing on solving the Schrodinger equation with the Coulomb Hamiltonian for nuclear and electronic degrees of freedom through atomistic modeling and simulation; and
- The set of software tools (editors, compilers, debuggers, optimization tools, etc.) needed to develop applications for petascale and beyond computers as well as the numerical and communications libraries, programming languages, and software engineering practices needed by the scientists and engineers to develop these applications.

Investigate the implications of cluster, cloud and grid computing brought about by the emergence of multicore and hybrid microprocessor designs and by the escalation in the amount of data that leading edge scientific applications either generate or must assimilate and analyze.

### Scope

Workshop participants included major stakeholder communities and were chosen to represent a cross section of active investigators (end users) in the various scientific areas that were the target of each workshop (including several with significant administrative experience), and also to represent areas of computer science that are relevant to software innovation (including scientific software package and library developers, and experts working at the intersection between programming languages and application domains, language implementers) and computer science researchers.

### Workshops Description

Key topics addressed in the workshops:

- The competitive landscape of software security options;
- Domain scientists' security needs;
- Parameters influencing sustainability and security for research cyberinfrastructure;

- Software-infrastructure related requirements and expectations from science and research communities that build applications for distributed computing resources, and the collective experiences and drivers from software developers and integrators supporting the needs of these communities;
- The latest results in programming languages, compiler, and runtime research and the potential for common shared software infrastructures for supporting multiple dynamic languages;
- The opportunities of multi-core, GPGPU, FPGA and other accelerator technologies for the biology, computational social science and security application domains;
- Scientific communities that can benefit from advances in data, software services, and language technologies;
- The feasibility of developing an integrated software development environment for science and engineering applications, similar in concept, although not in detail, to the IDEs used in the commercial world;
- The role of S2I2 and of partner projects, organizational structures and services that could comprise appropriate institutes for the development of software security and scientific computing languages and tools;
- How S2I2 can leverage the open source/free software development model;
- Key technical areas to focus on and prioritize long-term and short-term goals;
- Development of software standards so that scientific communities can develop interoperable tools that enable construction of additive solutions to more complex problems;
- Metrics, evaluation mechanisms, and challenge problems for S2I2 focused on virtual execution environments for scientific computing;
- The expected impact of S2I2 on the science and engineering community;
- Commonalities, architectural similarities, interfaces and interoperability among between clusters, clouds and grids to support today's data intensive collaborations;
- Survey and analyze the key deployment, operational and usage issues for clusters, clouds and grids, especially focusing on discontinuities produced by multicore and hybrid architectures, data intensive science, and the increasing need for wide area/local area interaction;
- Document the current state of the art in each of these areas, identifying interesting questions and limitations; and
- Explore directions for future research and development against the background of disruptive trends and technologies and the recognized gaps in the current state of the art.

### **Findings**

There is a growing need for a set of software institutes focusing on:

- Providing leadership, guidance, documentation, training, recommendations, consulting, software assessments, synthesis and interoperability, short-term support for orphaned critical software, design reviews of MREFC projects or smaller CI development and integration efforts, ratings of software, and auditing services for a variety of communities including environmental observation, security and atomistic modeling and simulation;
- Security as a critical crosscutting issue for NSF software infrastructure;
- Community-based software architecture, design and production; expertise and services in support of software life cycle practices; marketing, documentation and networking services; and transformative workforce development activities;
- Supporting scientific advances by acting as a bridge between advances in computing, languages, compilers, middleware, distributed systems, and the broader scientific community;
- Deployment, operational and usage issues surrounding the high performance clusters that typically make up the major compute nodes of grids and clouds that form the superset of issues surrounding clusters; and

- Scalable data analytics as an umbrella application domain addressing the problem of rapid acquisition, transformation, and analysis of experimental data, a challenge that crosscuts many scientific disciplines. Data analytics has roots in statistics with a strong computational emphasis and wide potential for impact. The challenge is to support data analytics as problem size and complexity scale from the laptop to cloud fabrics, to open scientific discovery infrastructure (e.g. TeraGrid).

### **Recommendations**

- A more powerful and coherent cyberinfrastructure is needed to support software activities, and can best be provided through the formation of an S2I2 institute.
- Institutes should be adequately equipped and funded.
- Institutes should be enthusiastically and effectively supported by stakeholder groups including faculty and administration.
- A clear progress plan is required with an external oversight board selected from world recognized leaders in the field. Periodic review with potential for reallocation of funding is recommended. Metrics must be clearly established. These can include statistics on downloads (not very useful), external committers, registered users, blog and support site traffic, and user projects and papers that use the infrastructure.
- Institutes should be governed in an open fashion and be a synthesis point for expertise, but not necessarily own all of the expertise in-house or develop software.
- Institutes should coordinate their efforts and seek support across appropriate federal agencies including DHS, DOE, DARPA, NOAA, USGS, NASA, EPA, Army Corps of Engineers, and NIH.
- Institutes should have well defined relationships with other related institutes, organizations and activities as appropriate such as CMU Software Engineering Institute, InCommon, Internet2, XD TAIS, DataNet, etc.

### **Agency response to recommendations**

The solicitation for SI<sup>2</sup> is being rewritten to address identified needs and recommendations.

### **Publications**

<http://security.ncsa.illinois.edu/s3i2/>

[http://www.acsu.buffalo.edu/~abani/RENCI\\_NCSA\\_NSF\\_1049273\\_workshop\\_report.pdf](http://www.acsu.buffalo.edu/~abani/RENCI_NCSA_NSF_1049273_workshop_report.pdf)

<http://www.acsu.buffalo.edu/~abani/Viktor.pdf>

<http://www.acsu.buffalo.edu/~abani/S2I2Report-1.pdf>

<http://www.acsu.buffalo.edu/~abani/veescreport.pdf>

<http://web.eecs.utk.edu/~dongarra>

<http://www.ncsa.illinois.edu/Conferences/SDESEA/>

[https://docs3.google.com/document/edit?id=1GVZ0KshsJxWuZDIuZtzFyGflgcmI\\_6opp0Y9uspxIIw&authkey=CKKZkugF&hl=en&pli=1#/ccgsc2010/](https://docs3.google.com/document/edit?id=1GVZ0KshsJxWuZDIuZtzFyGflgcmI_6opp0Y9uspxIIw&authkey=CKKZkugF&hl=en&pli=1#/ccgsc2010/)

## VERIFICATION AND VALIDATION OF DATA QUALITY

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 2010 GPRA and ARRA 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. The FY 2010 Performance Measurement Verification and Validation Report concludes:

Government Accountability Office (GAO) evaluation guidelines indicate that federal agencies "...should have in place or propose credible procedures for ensuring that their performance data are reasonably complete, accurate, and consistent." To that end, NSF tasked IBM Global Business Services with assessing the validity of the data and reported results for its performance goals and verifying the reliability of the processes used to compile and report data for those goals.

Based on IBM's FY 2010 verification and validation (V&V) review, we were able to verify the reliability of the processes and validate the accuracy of results reported for all 13 targets for NSF's GPRA Annual Performance Goals and eight of the nine targets for the ARRA Program Goals. Also, due to unreported results, we were unable to verify and validate the results for one of the nine targets for the ARRA Program Goals.

Overall, we verify that NSF relies on sound business practices, internal controls, and manual checks of system queries to ensure accurate performance reporting. NSF maintains adequate documentation of its processes and data to allow for an effective V&V review. Based on our assessment, IBM has confidence in the systems, policies, and procedures used by NSF to calculate results for its performance measures. NSF continues to take concerted steps to improve the quality of their systems and data. We confirm NSF's commitment to ensuring the accuracy of its reported GPRA and ARRA results, and the reliability of its processes for collecting, processing, maintaining, and reporting data for its performance goals.<sup>1</sup>

### Information on Use of Non-Federal Parties

The NSF Annual Performance report was prepared solely by NSF staff. External, non-federal sources of information used in preparing the report include:

- Reports from awardees demonstrating results
- Reports from facilities managers on construction cost and schedules and operations.
- Reports prepared by Committees of Visitors assessing NSF programs; and

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<sup>1</sup> Executive Summary, *NSF Performance Measurement Verification and Validation Report, FY 2010*. IBM Global Business Services, 2011.

*Additional Performance Information*

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- Reports prepared by an external, independent management consulting firm to validate and verify the procedures used to collect, process, maintain, and report performance goals. In Fiscal Year 2010 that firm was IBM Global Business Services.

**Classified Appendixes Not Available to the Public**

None

## LEARNING PORTFOLIO METRICS PROGRAM LIST

\*Starred programs are part of NSF's STEM Workforce Priority Goal.

### **BIO**

- UBE: Undergraduate Biology Education
- \*PRFB: Postdoctoral Research Fellowships in Biology

### **CISE**

- Computing Workforce (BPC, CPATH and CE21)

### **ENG**

- \*GRDS: ENG Graduate Research Diversity Supplements
- Engineering Education Research
- NUE: Nanotechnology Undergraduate Education in Engineering
- PFI: Partnerships for Innovation
- RET: Research Experiences for Teachers in Engineering and Computer Science

### **GEO**

- COSEE: Centers for Ocean Science Education Excellence
- \*EAR-PF: Earth Sciences Postdoctoral Fellowships
- GEO Disciplinary Education
- GEO-Teach
- GEO-LSAMP Linkages
- GeoEd: Geoscience Education
- GLOBE: Global Learning and Observations to Benefit the Environment
- \*Ocean Sciences Postdoctoral Fellowships
- \*OEDG: Opportunities for Enhancement of Diversity in Geosciences

### **MPS**

- \*ACC-F: American Competitiveness in Chemistry Fellowships
- \*AAPF: Astronomy & Astrophysics Postdoctoral Fellowships
- \*MSPRF: Mathematical Sciences Postdoctoral Research Fellowships
- PAARE: Partnerships in Astronomy & Astrophysics Research Education
- EMSW21: Enhancing the Mathematical Sciences Workforce in the 21st Century
- URC: Undergraduate Research Collaboratives

### **SBE**

- NGW: Next Generation Workforce
- \*SBE Minority Postdoctoral Fellowships

### **OCI**

- CI-TEAM: Cyberinfrastructure Training, Education, Advancement & Mentoring
- \*CI TRaCS: Cyberinfrastructure Postdoctoral Fellowship

### **OISE**

- Doctoral Dissertation Enhancement Program
- \*EAPSI: East Asia & Pacific Summer Institutes for U.S. Graduate Students
- \*IRES: International Research Experiences for Students

- \*PASI: Pan-American Advanced Studies Institutes
- \*IRFP: International Research Fellowship Program
- \*PIRE: Partnerships for International Research and Education

### **OLPA**

- Communicating Science Broadly

### **OPP**

- Antarctic Education
- Arctic Education
- \*Polar Postdoctoral Fellowship Program

### **EHR – DRL**

- ISE: Informal Science Education
- CTE: Cyberlearning Transforming Education
- DR-K12: Discovery Research K-12
- \*REESE: Research and Evaluation on Education in Science and Engineering
- ITEST: Innovative Technology Experiences for Students and Teachers
- TLF: Teacher Learning for the Future
- PPE: Project and Program Evaluation

### **EHR – HRD**

- HBCU-UP: Historically Black Colleges and Universities Undergraduate Program
- LSAMP: Louis Stokes Alliances for Minority Participation
- TCUP: Tribal Colleges and Universities Program
- GSE: Research on Gender in Science and Engineering
- RDE: Research in Disabilities Education
- \*AGEP: Alliances for Graduate Education and the Professoriate
- CREST: Centers of Research Excellence in Science and Technology
- ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers

### **EHR – DGE**

- \*GRFP: Graduate Research Fellowship Program
- \*IGERT: Integrative Graduate Education and Research Traineeships Program
- \*GK-12: Graduate STEM Fellows in K-12 Education Program
- \*SMP: Science Masters Program
- ATE: Advanced Technological Education Program

### **EHR – DUE**

- TUES: Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics Program
- CCE: Climate Change Education Program
- EASE: Excellence Awards in Science and Engineering
  - PAEMST: Presidential Award for Excellence in Mathematics and Science Teaching
  - PAESMEM: Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring
- MSP: Math and Science Partnership Program
- \*NOYCE: Robert Noyce Teacher Scholarship Program



- \*SFS: Federal Cyber Service: Scholarship for Service Program
- S-STEM: Scholarships in Science, Technology, Engineering, and Mathematics Program
- STEP: Science, Technology, Engineering and Mathematics Program
- REU: Research Experiences for Undergraduates Program–Sites and Supplements



DIRECTORATE FOR BIOLOGICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Undergraduate Biology Education (UBE)	Building on the 2009 “Vision and Change” conference, in FY 2010 BIO began redirecting learning investments towards new activities to transform the undergraduate biology experience. Gaps were identified in these areas: institutional culture change, professional development in pedagogy, student-centered instruction, and communities of scholars. In FY 2012, BIO will continue to enhance support for targeted programs in Transforming Undergraduate Education in STEM (TUES), STEP Centers, and Research Coordination Networks – Undergraduate Biology Education (RCN-UBE).	Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.	<ol style="list-style-type: none"> <li>1. Number and/or percentage of students in STEP sites who declare and complete a STEM major or program of study.</li> <li>2. Number of STEM and non-STEM students who enroll in and complete TUES-supported STEM courses created or improved by new materials or innovative pedagogies.</li> </ol>	<p>Data on program participation and completion, and course and curriculum development, will be collected from annual reports, final reports and Statement of Work currently under development. *</p> <p>*See Evaluation Design/Plan</p>	<p>Annual data about research activities and accomplishments are collected through annual and final reports submitted via FastLane for descriptive analyses. EHR developing Statement of Work for program evaluation that requires portfolio analyses, criterion-referenced case studies, and backward tracing methods.</p>

DIRECTORATE FOR BIOLOGICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Postdoctoral Research Fellowships in Biology (PRFB)  (Priority Goal program)</p>	<p>BIO awards Postdoctoral Research Fellowships in Biology to meet human resource infrastructure needs in biology. The fellowships seek to broaden participation and to offer support for research and training in selected interdisciplinary areas. The fellowships encourage independence at an early stage of a research career to permit Fellows to pursue their research and training goals in the most appropriate research locations regardless of the availability of funding for the Fellows at that site. The selected areas change periodically as new scientific and infrastructure opportunities arise. The fellowships are also designed to prepare Fellows for leadership roles in academia, industry, and government in newly emerging research areas in biology. The host laboratories will benefit from having these talented young scientists in their research groups.</p>	<p>Innovate for Society-2: Build the capacity of the nation's citizenry for addressing societal challenges through science and engineering.</p>	<ol style="list-style-type: none"> <li>1. Percentage of fellowship recipients who complete the fellowship.</li> <li>2. Percentage of recipients transitioning to academic or other research positions.</li> <li>3. Number of peer-reviewed publications by fellowship recipients.</li> </ol>	<p>FastLane annual and final reports, monitoring system(s) under development, and publicly available databases.</p>	<p>Outcomes assessment study conducted in 2004 to be updated with inclusion of other NSF postdoctoral fellowship programs.</p>

DIRECTORATE FOR COMPUTER AND INFORMATION SCIENCE AND ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Computing Workforce	<p>The Computing Workforce program aims to increase the number and diversity of K-14 students who are engaged in computing, who can apply computational thinking competencies in a variety of contexts, and who are prepared to successfully pursue degrees in computing and computationally intensive disciplines. The program supports research into the teaching and learning of computing, the creation of new instructional materials and interventions, the development of K-12 teaching expertise, and the deployment of promising learning interventions at scale.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p>	<p>Percentage of projects that demonstrate significant improvements in the rigor of computing instruction available to students and/or student achievement based on appropriate evaluation methods.</p>	<p>Metric measurement/trend analyses: Annual monitoring of project activities, outputs, and outcomes. (FY 2011 contract anticipated)</p>	<p>Annual portfolio review of research designs and assessment of quality and rigor of project level evaluations (required of all projects). Synthesis of outcomes of models and deployed interventions in use by Computing Workforce projects. (FY 2011 contract anticipated)</p>

DIRECTORATE FOR ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>ENG Graduate Research Diversity Supplements (GRDS)  (Priority Goal program)</p>	<p>GRDS is designed to increase the number of graduate students involved in ongoing faculty research programs, promote intellectual synergy between faculty and students, and foster a supportive environment that leads to greater retention of students from female and underrepresented minority populations.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p>	<p>1. 85 percent of the GRDS-funded students will complete their doctoral degrees within 6 years.</p> <p>2. 90 percent of the GRDS-funded students who have completed their doctoral degrees will enter full time academic jobs within 12 months of graduation.</p> <p>3. 100 percent of GRDS PIs will develop and implement mentoring programs to help ensure the career success of their GRDS-funded doctoral students.</p>	<p>All future Dear Colleague Letters and/or solicitations will require PIs to provide baseline data for their current female and underrepresented minority doctoral students. PIs will also be asked to provide data in annual and final reports with respect to the metrics for GRDS-funded students and to track and provide subsequent updates on the graduation (or termination) and initial career placement of the GRDS-funded students.</p>	<p>An external evaluator will conduct a study of program effectiveness by comparing graduation rates and rates of full time academic placement for GRDS-funded students to a control group of female and underrepresented minority doctoral students. For example the performance of GRDS-funded doctoral students could be compared to matched students at other universities. Data on the performance of the GRDS-funded students could also be compared to the baseline data on the PIs' doctoral students.</p>

DIRECTORATE FOR ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Engineering Education Research	Engineering Education Research encourages the integration of engineering research and education to accelerate technological and educational innovation and improve the quality and diversity of engineering graduates entering the technical workforce.	Innovate for Society-3: Catalyze the development of innovative learning systems.	1. Short term (~1 year): Number of awards made distributed over demographic groups, institution type, anticipated students impacted, and geographic region. Proposal pressure and geographic distribution tracked annually.	Existing annual and final project reports and data from NSF’s Enterprise Information System.	Ongoing annual evaluation of quantitative program metrics that will be normalized by the number of funded proposals and program amount will be used to establish baselines and changes over time.
			2. Medium Term (~3 year): Portfolio effectiveness evaluated using bibliometric and social network analysis tools (project dependent), number of students impacted, overall portfolio balance from self-reporting of PIs.	NSF award database and existing bibliometric databases, such as Web of Science.	Evaluate the impact of funding on knowledge, students, and programs for a set of low-performing and high-performing projects to establish baseline expectations and work to improve program output.
			3. Long Term (~5-7 year): External evaluation of projects and impact on degree programs and students through STPI. Retrospective meta-analysis of significant advances in engineering education to compare with funded awards.	Data collection will be determined by external evaluator but will likely include: <ul style="list-style-type: none"> <li>• Award and report databases,</li> <li>• Bibliometric analysis, and</li> <li>• Surveys and interviews.</li> </ul>	The goal of this analysis is to determine the major advances/changes in engineering education over 5-7 years and subsequently determine the extent to which these arose from awards in this program.

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Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Nanotechnology Undergraduate Education (NUE) in Engineering	<p>This program seeks the inclusion of nanoscale science and engineering (NSE) content into undergraduate courses. This program addresses the need for both the general public and future professionals to understand the impact of nanotechnology both on social and ethical decision making and development of new technologies.</p>	<p>Innovate for Society-1: Make investments that lead to results and resources that are useful to society.</p>	<p>1. Short term (~1 year): Number of awards made distributed over demographic groups, institution type, and geographic region. Proposal pressure and geographic distribution tracked annually.</p>	<p>Data will be pulled from both funded proposals and annual and final project reports.</p>	<p>Ongoing annual evaluation of quantitative program metrics (that will be normalized by the number of funded proposals and funding amount) will be used to establish baselines and changes over time.</p>
			<p>2. Long term (~5 year): Evaluation of the impact of program on developing NSE courses and educating students in NSE. Numbers of students who take NSE courses or are impacted by NSE content.</p>	<p>Data-mining of annual and final project reports to determine number of students taking NSE courses and/or accessing content over time. A random sample of university web sites will be used to determine the number of NSE courses offered for NUE and non-NUE awardees.</p>	<p>Internal or external evaluation will be used to determine the impact on students and university curricula. Curricula comparisons will be made between universities with and without NUE funding to determine the impact on degree programs. A key issue is identifying what constitutes NSE content in a course.</p>



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Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Partnerships for Innovation (PFI)	The general goal of the Partnerships for Innovation program (PFI) is to stimulate the transformation of knowledge created by the research and education enterprise into innovations that create new wealth; build strong local, regional, and national economies; and improve the National well-being.	Innovate for Society-3: Catalyze the development of innovative learning systems.	1. Successful Innovation Partnerships: Number and type of organizations (for profit, not for profit, government) partnering with academic institutions within the PFI program.	PFI data will be collected through the interface of the IIP Divisional Information Management Systems (DIMS) directly from the PI community. The data will be stored in DIMS.	Impact: It is understood that transformation of knowledge into innovations are best facilitated through Academic/ Organizational Partnerships. It is important to grow the number of partnerships and to facilitate growth with specific organizational types.  Mechanism: A data analysis will be performed and the PFI solicitation adjusted based on data findings to drive to the desired distributions for the type of partnerships.
			2) Directed Investment in Innovation: number (dollars) and type of technology investments within the PFI grant portfolio. This may be correlated against other technology trend data.		Impact: To achieve the goal of PFI, desired outcomes in specific technologies can be influenced by grant selection and specific technology topic solicitations. It is important to understand technology trends for IIP proposals and grants.  Mechanism: A data analysis will be performed and the PFI solicitation adjusted in response to technology trends found both in PFI and SBIR programs to reflect areas of growth, gaps, community interest NSF priorities, and the NAE Grand Challenges.

DIRECTORATE FOR ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Research Experiences for Teachers in Engineering and Computer Science (RET)	This program seeks to build long-term collaborative partnerships between K-12 and community college STEM teachers and university researchers in order to attract more students into engineering and related disciplines.	Innovate for Society-2: Build the capacity of the Nation's citizenry for addressing societal challenges through science and engineering.	1. Short term (~1 year): Number of teachers and students impacted distributed over groups and geographic regions. Proposal pressure and geographic distribution tracked annually.	Data will be pulled from both funded proposals and annual and final project reports.	Ongoing annual evaluation of quantitative program metrics (that will be normalized by the number of funded proposals and funding amount) will be used to establish baselines and changes over time.
			2. Long Term (~7 year): External program evaluation conducted through rigorous surveys of participants and PIs.	An external evaluator will survey program participants and examine other artifacts resulting from funded projects. Such data may include: <ul style="list-style-type: none"> <li>Resources developed by RET participants tabulated at the University of Colorado TeachEngineering database (<a href="http://www.teachengineering.org">www.teachengineering.org</a>);</li> <li>Searches of literature databases for papers and conference proceedings published by participants; and</li> <li>Impact of RET programs on students pursuing engineering degrees.</li> </ul>	External evaluation will determine the impact on teacher participants for promoting curriculum innovations in K-12 schools, the impact on students, and the persistence of innovations following RET projects.

DIRECTORATE FOR GEOSCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Centers for Ocean Science Education Excellence (COSEE)	<p>The Centers for Ocean Science Education Excellence (COSEE) program supports efforts to assist ocean scientists, particularly NSF-funded ocean scientists, with their broader impacts related to formal and informal education. The programs build a network of ocean scientists and educators (K-12, undergraduate, community college, informal, and educational researchers) to improve ocean science curriculum and the dissemination of information about the results of NSF-funded ocean research to the education community.</p>	<p>Innovate for Society-2: Build the capacity of the Nation’s citizenry for addressing societal challenges through science and engineering.</p> <p>And:</p> <p>Encourage and support STEM professional collaborations, networks, etc. (ACC Goal #2 of Undergraduate Education)</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation. Reference: “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” – (Invest in the Building Blocks of American Innovation)</p>	<p>1. Number of proposals submitted to the Division of Ocean Sciences that include COSEE projects as part of their broader impacts statement.</p> <p>2. Number of scientists and graduate students involved in COSEE-sponsored activities, events, and workshops (e.g. development and/or implementation of curricular materials, workshops on instructional strategies, assessment tools, education research and/or faculty development).</p>	<p>Data supplied through NSF electronic proposal system (FastLane) and COSEE Center evaluators.</p>	<p>1. Annual monitoring of NSF proposals submitted to the Division of Ocean Sciences.</p> <p>2. Cross-project monitoring system developed in 2009-2010.</p>

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Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Earth Sciences Postdoctoral Fellowships (EAR-PF)  (Priority Goal program)</p>	<p>The Division of Earth Sciences (EAR) awards postdoctoral fellowships to highly qualified investigators within 3 years of obtaining their PhD to carry out an integrated program of independent research and education. The research and education plans of each fellowship must address scientific questions within the scope of EAR disciplines. The program supports researchers for a period of up to 2 years with fellowships that can be taken to the institution or national facility of their choice.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reference: “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” – (Invest in the Building Blocks of American Innovation)</p>	<p>1. Number of Postdoctoral Fellows conducting research/education activities within the purview of research programs in the Division of Earth Sciences.</p> <p>2. Number of contributions to the research enterprise.</p> <p>3. Number of former EAR Postdoctoral Fellows that become PIs in research programs in the Division.</p>	<p>Annual reports.</p>	<p>Annual program monitoring of data about research/education activities and accomplishments as reported in annual and final reports.</p>

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Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>GEO Disciplinary Education</p>	<p>The GEO Disciplinary Education program provides co-funding support for integration of research and education activities within the Divisions of Earth Sciences, Ocean Sciences, and Atmospheric and Geospace Sciences. These include: (1) strategic planning workshops to define the educational and student training components of large research projects; (2) community building and networking events for early career investigators; (3) supplements to support participation of teachers in GEO research projects; and (4) projects funded by other NSF Directorates that provide diverse undergraduate and graduate students with geoscience research and education experiences.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reference: A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs – (Invest in the Building Blocks of American Innovation)</p>	<p>1. Number of large GEO-funded research programs that develop formal education strategic plans.</p> <p>2. Number of geoscience faculty, post-docs, and graduate students who participate in funded strategic planning and community building events.</p> <p>3. Number of teachers and undergraduate students involved in geoscience projects funded by GEO or other Directorates.</p>	<p>1. Annual reports.</p> <p>2. Workshop reports.</p> <p>3. Number of supplemental funding requests to involve undergraduate students or K-12 teachers in GEO research activities.</p>	<p>Annual program monitoring of education workshop reports and supplemental funding proposals submitted to GEO.</p>

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Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
GEO-Teach	<p>The GEO-Teach program is designed to implement, at a national scale, effective teacher professional development and teacher training activities that will have transformative impact on the quality, scientific accuracy, and rigor of geoscience instruction.</p>	<p>Innovate for Society-2: Build the capacity of the nation’s citizenry for addressing societal challenges through science and engineering.</p> <p>And:</p> <p>Reinvigorate the teaching of STEM in America’s classrooms by improving teacher knowledge and recruiting and retaining teachers with STEM backgrounds.</p> <p>Reference: “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” – (Invest in the Building Blocks of American Innovation)</p>	<ol style="list-style-type: none"> <li>1. Number of institutions that provide effective professional development and training for in-service and pre-service teachers of Earth science (or related fields).</li> <li>2. Number of geoscientists engaged in effective teacher professional development activities.</li> <li>3. Improvement in teacher content knowledge and ability to use appropriate pedagogy</li> <li>4. Number of teacher professional development and training activities produced through NSF/GEO investments that are sustained through other funding sources.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Project-level evaluation reports.</li> </ol>	<p>Program evaluation:</p> <p>A program-wide evaluation plan is expected to be implemented in 2011 in conjunction with the next GEO-Teach competition.</p> <p>Metric measurement/trend analyses:</p> <p>Mixed and multiple method evaluation design including experimental or quasi-experimental studies testing efficacy of models, descriptive case studies and/or syntheses of models in use by GEO-Teach projects, and/or assessment of quality and rigor of project level evaluation.</p>

DIRECTORATE FOR GEOSCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
GEO-LSAMP Linkages	The LSAMP-Linkages account provides co-funding for projects submitted to the GEO Education and Diversity programs that help to infuse geoscience content areas into existing LSAMP programs that have had limited geoscience focus.	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reference: A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs – (Invest in the Building Blocks of American Innovation)</p> <p>And:</p> <p>Encourage and support STEM professional collaborations, networks, etc. (ACC Goal #2 of Undergraduate Education)</p>	<p>1. Number of EHR/HRD-sponsored alliance programs affiliated with undergraduate geoscience education and research programs.</p> <p>2. Number of LSAMP undergraduate students who pursue coursework and degrees in geoscience.</p>	<p>1. Annual reports</p> <p>2. Project-level evaluation reports</p>	<p>Annual program monitoring</p>

DIRECTORATE FOR GEOSCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Geoscience Education (GeoEd)</p>	<p>The Geoscience Education (GeoEd) program supports proof-of concept and dissemination projects that: advance geoscience education and learning in formal (K-16) and informal education settings; cultivate the future scientific and technical geoscience workforce; and improve public literacy regarding Earth system science concepts and career opportunities. GeoEd projects help to improve STEM education by addressing unique issues and education research needs within the geoscience disciplines and by developing expertise and networks that foster geoscience education reform.</p>	<p>Innovate for Society-2: Build the capacity of the nation’s citizenry for addressing societal challenges through science and engineering.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reinvigorate the teaching of STEM in America’s classrooms by improving teacher knowledge and recruiting and retaining teachers with STEM backgrounds.</p> <p>Reference: “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” – (Invest in the Building Blocks of American Innovation)</p>	<p>1. Number of secondary school and community college students engaged in authentic geoscience research.</p> <p>2. Number of K-14 educators engaged in professional development or training that incorporates geoscience research.</p> <p>3. Percent of development-intensive projects in the GeoEd portfolio that employ appropriate evaluation methods and apply them with appropriate rigor.</p> <p>4. Number of peer-reviewed publications by GeoEd PIs in geoscience education journals.</p>	<p>1. Annual reports</p> <p>2. Project Level Evaluation Reports</p> <p>3. Geoscience Education Journals</p>	<p>Mixed and multiple method evaluation design including experimental or quasi-experimental studies testing efficacy of models; descriptive case studies and/or syntheses of models in use by GeoEd projects; assessment of quality and rigor of project level evaluation.</p>



DIRECTORATE FOR GEOSCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Global Learning and Observations to Benefit the Environment (GLOBE)</p>	<p>GLOBE (Global Learning and Observations to Benefit the Environment) is a worldwide primary and secondary school-based science and education program built around protocol-based inquiry and student research. GLOBE seeks to improve student achievement across the curriculum through a focus on student environmental research; contribute to scientific understanding of Earth as a system; inspire the next generation of global scientists; and promote environmental stewardship. Primary funding for GLOBE is from NASA and, as of FY 10, NOAA. NSF/GEO funding supports engagement of geoscientists with GLOBE and development of Earth System Science Projects.</p>	<p>Innovate for Society-2: Build the capacity of the nation’s citizenry for addressing societal challenges through science and engineering.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reference: “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” – (Invest in the Building Blocks of American Innovation)</p>	<p>1. Number of NSF-funded scientists that interact with GLOBE students and educators.</p> <p>2. Number and geographic distribution of users of NSF-developed GLOBE resources.</p> <p>3. Effectiveness of NSF-developed GLOBE resources on student learning and attitudes toward science.</p>	<p>1. GLOBE Program Office evaluation reports</p> <p>2. Annual reports</p> <p>3. Project-level evaluation reports for NSF awardees</p>	<p>Program Evaluation:</p> <p>NASA and NOAA are supporting efforts to develop a GLOBE Program logic model and external evaluation plan to be implemented beginning in 2011.</p> <p>Metric measurement/trend analyses:</p> <p>Mixed and multiple method evaluation design including experimental or quasi-experimental studies testing efficacy of models; descriptive case studies and/or syntheses of models in use by NSF-sponsored GLOBE projects; assessment of quality and rigor of project level evaluation.</p>

DIRECTORATE FOR GEOSCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Ocean Sciences Postdoctoral Fellowships  (Priority Goal program)</p>	<p>The Division of Ocean Sciences (OCE) awards Postdoctoral Fellowships to highly qualified investigators within 3 years of obtaining their PhD to carry out an integrated program of independent research and education. The research and education plans of each fellowship must address scientific questions within the scope of OCE disciplines. The program supports researchers for a period of up to 2 years with fellowships that can be taken to the institution or national facility of their choice.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reference: A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs – (Invest in the Building Blocks of American Innovation)</p>	<p>1. Number of Postdoctoral Fellows conducting research/education activities within the purview of research programs in the Division of Ocean Sciences.</p> <p>2. Number of contributions to the research enterprise.</p> <p>3. Number of former OCE Postdoctoral Fellows that become PIs in research programs in the Division.</p>	<p>Annual reports.</p>	<p>Annual program monitoring of data about research/education activities and accomplishments as reported in annual and final reports.</p>

DIRECTORATE FOR GEOSCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Opportunities for Enhancement of Diversity in Geosciences (OEDG)  (Priority Goal program)</p>	<p>The Opportunities for Enhancing Diversity in the Geosciences (OEDG) program is designed to increase participation in the geosciences by African Americans, Hispanic Americans, Native Americans (American Indians and Alaskan Natives), Native Pacific Islanders (Polynesians or Micronesians), and persons with disabilities and to increase the perceived relevance of the geosciences among broad and diverse segments of the population. OEDG seeks to increase the number of underrepresented minorities (URM) who are involved in formal pre-college geoscience education programs, pursue post-secondary and advanced degrees in the geosciences, enter geoscience careers, and participate in informal geoscience education programs.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p> <p>And:</p> <p>Develop the human capital needed for careers in STEM and for advancing American innovation.</p> <p>Reference: “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” – (Invest in the Building Blocks of American Innovation)</p>	<ol style="list-style-type: none"> <li>1. Number of URM students taking higher education classes, earning degrees, or entering the workforce in geoscience fields.</li> <li>2. Number of URM secondary school students participating in mentored geoscience research.</li> <li>3. Number of proposals submitted to OEDG by minority-serving organizations.</li> <li>4. Number of minority-serving institutions that establish new degree programs in geoscience fields.</li> <li>5. Percent of OEDG projects that demonstrate increased geoscience content knowledge or positive attitudes toward geoscience careers.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports (including Supplemental Information Form data).</li> <li>2. Project-level evaluation reports.</li> <li>3. Annual program evaluation reports.</li> <li>4. Longitudinal assessments.</li> </ol>	<p>Program evaluation:</p> <p>Five-year contract with American Institutes for Research to conduct program-wide evaluation (2002 – 2007; renewed 2008-2013) using data collected annually in the Supplemental Information Form and critical incident analysis defined by a pipeline logic model.</p> <p>2010 OEDG expert panel review of portfolio impact, in preparation for 2010 COV.</p> <p>Metric measurement/trend analyses:</p> <p>Mixed and multiple method evaluation design including experimental or quasi-experimental studies testing efficacy of models; descriptive case studies and/or syntheses of models in use by OEDG projects; assessment of quality and rigor of project level evaluation.</p>

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>American Competitiveness in Chemistry Fellowships (ACC-F)  (Priority Goal program)</p>	<p>The American Competitiveness in Chemistry Fellowship program is a program to support postdoctoral associates in chemistry. It seeks to (1) build ties between academic and industrial, and/or national laboratory, and/or Chemistry Division-funded center researchers (partners) and (2) involve beginning scientists in efforts to broaden participation in chemistry. The overarching goal of this program is to make investments that contribute to increasing American competitiveness.</p>	<p>Innovate for Society-1: Make investments that lead to results and resources that are useful to society.</p>	<ol style="list-style-type: none"> <li>1. Number of unique collaborations, numbers of publications, numbers of patents, other products.</li> <li>2. Numbers of underrepresented students impacted; continued broadening participation activity after the award period.</li> <li>3. Participant outcomes (employment after the award period).</li> </ol>	<p>Annual and final project reports; external assessment.</p>	<p>The Program is reviewed on an ongoing basis by the Program Director. At the moment, only a very small number of awards have been made. The program was reviewed in 2010 by the most recent Committee of Visitors. For future COVs, specific targeted questions will be developed to more closely address the specific metrics. An external program evaluation will be conducted, once sufficient time has passed for a meaningful study. (The first cohort of four awardees will complete their awards in August 2010.)</p>

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Astronomy &amp; Astrophysics Postdoctoral Fellowships (AAPF)</p> <p>(Priority Goal program)</p>	<p>NSF Astronomy and Astrophysics Postdoctoral Fellowships (AAPF) provide an opportunity for highly qualified, recent doctoral scientists to carry out an integrated program of independent research and education. Fellows may engage in research in any area of astronomy or astrophysics, in combination with a coherent educational plan for the duration of the fellowship. The program is intended to recognize early-career investigators of significant potential and to provide them with experience in research and education that will establish them in positions of distinction and leadership in the community.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p>	<ol style="list-style-type: none"> <li>1. Quantitative measure of trends in proposal submission and awards, both in absolute numbers and percentage changes annually since program inception (2001)</li> <li>2. Percentage of fellowship award offers accepted by candidates</li> <li>3. Percentages of fellowship recipients who complete the fellowship and/or terminate for other employment</li> <li>4. Numbers of peer-reviewed publications and other significant contributions in research and education by fellowship recipients</li> </ol>	<p>NSF proposal submission and award databases; annual and final project reports; publicly available data sources such as American Astronomical Society membership directory.</p>	<ol style="list-style-type: none"> <li>1. The Program is reviewed on an ongoing basis by the Program Director.</li> <li>2. Committee of Visitors reviews AAPF every three years as a component of AST research and education programs.</li> <li>3. Direct interaction with AAPF awardees and alumni at annual AAPF Symposium and other professional meetings.</li> <li>4. Tracking of AAPF alumni to observe longitudinal career pathways.</li> </ol>

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Math Sci Postdoctoral Research Fellowships (MSPRF)  (Priority Goal program)</p>	<p>Postdoctoral fellowships are designed to permit awardees to choose research environments that will have maximal impact on their future scientific development, providing support for appropriate early-career research in all areas of the mathematical sciences including applications to other disciplines.</p>	<p>Innovate for Society-2: Build the capacity of the nation's citizenry for addressing societal challenges through science and engineering.</p>	<p>1. Quantitative measure of trends in application numbers, both as absolute numbers annually and as percentage increases annually since 1979 (program inception)  2. Percentage of fellowship recipients who complete the fellowship  3. Number of peer-reviewed publications by fellowship recipients</p>	<p>NSF application and award records, final reports delivered to NSF, and publicly available databases such as MathSciNet.</p>	<p>1. Committee of Visitors review of MSPRF as part of the evaluation of DMS every three years. COV was held in FY 2010.  2. Follow-up study (in planning stage) to assess the completion rates and publication records of trainees.</p>

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Partnerships in Astronomy & Astrophysics Research Education (PAARE)	The objective of PAARE is to enhance diversity in astronomy and astrophysics research and education by stimulating the development of formal, long-term, collaborative research and education partnerships among minority-serving institutions and partners at research institutions, including academic institutions (MSIs), private observatories, and NSF Division of Astronomical Sciences (AST)-supported facilities.	Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.	<ol style="list-style-type: none"> <li>1. Percentage of Minority Serving Institutions (MSIs) that choose to apply to the program.</li> <li>2. Number of presentations made (incl. peer-reviewed papers) per PAARE student.</li> <li>3. Number of publications co-authored by PAARE PIs/mentors from partnership institutions.</li> <li>4. Number of PAARE students who graduate with STEM degrees.</li> </ol>	<ol style="list-style-type: none"> <li>1. Official list of MSIs.</li> <li>2. NSF award database.</li> <li>3. Annual reports.</li> <li>4. External publication databases such as the Astrophysics Data System.</li> </ol>	<ol style="list-style-type: none"> <li>1. The Program is reviewed on an ongoing basis by the Program Director. At the moment, only a very small number of awards have been made.</li> <li>2. Site visits to participating PAARE institutions.</li> <li>3. Direct interaction with PAARE student participants at professional meetings.</li> <li>4. A formal external evaluation is now being considered by the AST Division.</li> </ol>

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Enhancing the Mathematical Sciences Workforce in the 21st Century (EMSW21)</p>	<p>EMSW21 comprises three programs: Mentoring through Critical Transition Points (MCTP), Research Training Groups (RTG), and the Vertical Integration of Research and Education (VIGRE). All three programs are directed toward increasing retention of US citizens, nationals, and permanent residents in mathematical sciences studies and careers. The RTG program supports the training activities of a group of faculty who have a common research interest. The MCTP program involves a larger group of faculty but focuses on specified stages (transition points) in the professional development of trainees. The VIGRE program supports activities that involve an entire mathematical sciences department and span all educational levels from undergraduate students through postdoctoral associates.</p> <p>VIGRE did not accept new proposals in FY 2009 or FY 2010 and is being terminated as of FY 2011.</p>	<p>Innovate for Society-2: Build the capacity of the nation's citizenry for addressing societal challenges through science and engineering.</p>	<p>1. Percentage of traineeship recipients who complete a STEM degree.</p> <p>2. Number of peer-reviewed publications by program participants.</p>	<p>NSF award records, annual and/or final reports delivered to NSF, and publicly available databases such as MathSciNet.</p>	<p>1. Annual portfolio review by POs of annual reports, site visits (VIGRE only), and other NSF documentation of program progress.</p> <p>2. Committee of Visitors review of EMSW21 as part of the evaluation of DMS every three years. COV was held in FY 2010.</p> <p>3. Follow-up studies (in planning stage) to assess the graduation/completion rates of trainees in each of MCTP and RTG.</p> <p>4. A National Academies study of the VIGRE program released in 2009 (URL: <a href="http://www.nap.edu/openbook.php?record_id=12716">http://www.nap.edu/openbook.php?record_id=12716</a>), which made use of a preliminary report, Increasing the Quantity and Quality of the Mathematical Sciences Workforce Through Vertical Integration and Cultural Change, written by Dr. M. B. Cozzens and supported under NSF-0637238.</p>



DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Undergraduate Research Collaboratives (URC)	<p>The Undergraduate Research Collaboratives (URC) Program seeks new models and partnerships with the potential (1) to expand the reach of undergraduate research to include first- and second-year college students; and (2) to enhance the research capacity, infrastructure, and culture of participating institutions, thereby strengthening the nation's research enterprise. No new competitions are planned for this Program.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p>	<ol style="list-style-type: none"> <li>1. Number of students participating.</li> <li>2. Student outcomes.</li> <li>3. Institutional changes.</li> </ol>	<p>Annual and final project reports; external evaluation reports.</p>	<p>The CHE Division worked with EHR/DRL to conduct a preliminary study to investigate the different URC models that have been funded. The preliminary study was conducted by Inverness Research as part of an SGER award (DRL-0909720 "Staging the Design and Work of Evaluation: Piloting a Stage-one Evaluation of a Complex Educational Initiative." The results of this stage-one evaluation will be used to develop any further studies.</p>

DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Next Generation Workforce (NGW)- Alliances for Graduate Education and the Professoriate (AGEP)	SBE's commitment to AGEP furthers the graduate education of underrepresented STEM students, explicitly students in SBE sciences, through the Ph.D. level, preparing them for fulfilling opportunities and productive careers as STEM faculty and research professionals. AGEP also supports the transformation of institutional culture to attract and retain STEM doctoral students into the professoriate.	<ol style="list-style-type: none"> <li>1. Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</li> <li>2. Transform institutional culture to attract and retain STEM doctoral students from underrepresented groups.</li> <li>3. Increase number of individuals from underrepresented groups who complete a STEM doctorate or postdoc.</li> <li>4. Increase the number of STEM doctorates who are successful in the professoriate in STEM fields.</li> </ol>	<ol style="list-style-type: none"> <li>1. Number/percentage of individuals from underrepresented groups who enter and complete STEM Ph.D. Programs.</li> <li>2. Number/percentage of STEM graduates who complete STEM postdocs.</li> <li>3. Number of STEM Ph.D. Graduates who successfully pursue careers in academia.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. External program evaluation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual Portfolio Review: By managing Program Officer of Annual reports, Site Visits and other correspondence documenting program's progress.</li> <li>2. Annual program monitoring system (in pilot phase): Annual program monitoring system tracking recruitment, progression and completion data as well as participant activities.</li> <li>3. External Program Evaluation: Quasi-experimental design and case study: comparison of AGEP institutional STEM outcomes to outcomes of non-AGEP institutions; case studies of AGEP models (American Institutes for Research, ongoing).</li> <li>4. Committee of Visitors (COV): Review panel examination of program management (every 3 yrs).</li> </ol>

NOTE: SBE has decided to end its commitment to this program as of FY 2011 due to realignment of its award portfolio. FY 2010's investment in this program was \$1.3 million.

DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>SBE Minority Postdoctoral Fellowships  (Priority Goal program)</p>	<p>The Directorate for Social, Behavioral and Economic Sciences (SBE) offers Minority Postdoctoral Research Fellowships and Research Starter Grants in an effort to increase the diversity of researchers who participate in NSF programs in the social, behavioral and economic sciences and thereby increase the participation of scientists from underrepresented groups in selected areas of science in the United States. These activities (postdoctoral fellowships and follow-up research starter grants) support training and research in the areas of social, behavioral and economic sciences within the purview of NSF.</p>	<p>T-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.  I-2: Build the capacity of the nation's citizenry for addressing societal challenges through science and engineering.</p>	<p>1. Number/percentage of recipients completing postdoc program.  2. Number/percentage of recipients transitioning to academic or other research positions.  3. Number of contributions to research enterprise.</p>	<p>NSF annual and final reports; monitoring system (in development).</p>	<p>Outcomes assessment study conducted in 2004 to be updated with inclusion of NSF other postdoctoral fellowship programs.  Program Evaluation: Experimental or quasi-experimental studies testing efficacy of models; descriptive studies (e.g. case studies)/syntheses of models in use by postdoc projects; assessment of quality and rigor of project level evaluation (SOW for FY 11 contract).</p>

OFFICE OF CYBERINFRASTRUCTURE

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Cyberinfrastructure Training, Education, Advancement &amp; Mentoring (CI-TEAM)</p>	<p>The CI-TEAM Program supports 1) the preparation of the next generation of citizens, scientists, engineers and educators able to exploit &amp; promote the national cyberinfrastructure (CI) and advance computational science and engineering research, education &amp; training; 2) the participation of diverse groups, especially historically underrepresented groups. This program is needed in OCI due to the interdisciplinary nature of this program. OCI is uniquely positioned to support otherwise underserved interdisciplinary computational science efforts.</p>	<p>Innovate for Society-3: Catalyze the development of innovative learning systems.</p> <p>Increase the numbers able to use and deploy the nation's CI.</p> <p>Develop new, adaptable &amp; disseminable strategies for CI education.</p> <p>Broadly disseminate proven strategies for CI education.</p> <p>Increase the percentage of underrepresented individuals and organizations engaged in the nations CI</p>	<p>1. Number of participants engaged in CI learning &amp; education.</p> <p>2. Number of new strategies for promoting learning and education in CI.</p> <p>3a. Number of publications.</p> <p>3b. Number and diversity of institutions &amp; organizations engaged in CI learning, education &amp; workforce training.</p> <p>4. Percentage of underrepresented participant individuals and organizations.</p>	<p>1. Annual reports.</p> <p>2. Final reports.</p> <p>3. External program evaluation.</p>	<p>1. Data will be drawn from standard NSF reports.</p> <p>2. A contract will be issued to an independent organization to measure outcomes success.</p> <p>3. Program directors will monitor project and external reports.</p>

OFFICE OF CYBERINFRASTRUCTURE

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Cyberinfrastructure Postdoctoral Fellowship (CI TRaCS)  (Priority Goal program)</p>	<p>The CI TRaCS Fellowship Program provides postdoctoral fellowships to promote the multidisciplinary computational sciences and education.</p>	<p>Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.</p> <p>Develop the research and education careers of outstanding young computational scientists.</p> <p>Develop the careers of fellows who will make revolutionary advances using the nation’s emerging cyberinfrastructure and/or deploy technologies that enable innovative computational practices.</p>	<ol style="list-style-type: none"> <li>1. Number of new interdisciplinary collaborations.</li> <li>2. Number of participants.</li> <li>3. Percentage of participants from underrepresented groups in the computational and other related sciences.</li> <li>4. Number of supported fellows who plan to go on to research and/or academic positions in computational science.</li> <li>5. Number of publications in computation science by supported fellows.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. External program evaluation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Data will be drawn from standard NSF reports.</li> <li>2. A contract will be issued to an independent organization to measure outcomes success.</li> <li>3. Program directors will monitor project and external reports.</li> </ol>

OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Doctoral Dissertation Enhancement Program	DDEP supports the dissertation research abroad of doctoral students in collaboration with a foreign investigator.	Transform the Frontiers-3: Focus international partnerships on transforming the frontiers	Number of contributions to the research enterprise.	Final report to NSF.	None proposed; program is scheduled for termination in FY2012.
East Asia & Pacific Summer Institutes for U.S. Graduate Students (EAPSI)  (Priority Goal program)	EAPSI introduces students to science and engineering research in the East Asia and the Pacific region, and helps students initiate scientific relationships that will better enable future collaboration with foreign counterparts as part of a globally-engaged STEM workforce.	Transform the Frontiers-3: Focus international partnerships on transforming the frontiers	1. Number of participants.  2. The extent to which students collaborate with international researchers during their graduate program and throughout their careers, as evidenced by international collaborative activities with foreign researchers.	An external evaluator, Abt Associates, will analyze the database of proposals, conduct a survey of awarded and declined applicants, host researchers and thesis advisors.	Mixed methods design with descriptive and outcome data on EAPSI fellows, hosts and advisors. EAPSI fellows will be compared with a control cohort of graduate students that did not participate in the program. The program's effectiveness over time will be assessed by examining different cohorts according to year of entry.

OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
International Research Experiences for Students (IRES)  (Priority Goal program)	IRES educates and trains students for a globally-engaged science and engineering workforce capable of performing in an international research environment in order to remain at the forefront of world science and technology.	Transform the Frontiers-3: Focus international partnerships on transforming the frontiers	<ol style="list-style-type: none"> <li>1. The percentage of students who report increased appreciation for the scientific and personal benefits of international collaboration.</li> <li>2. Percentage of students who report increased motivation to continue this collaboration and/or enter new international collaborative activities.</li> <li>3. Percentage of students who believe that this experience has enhanced their development and advancement within their fields of study, whether at home or abroad.</li> <li>4. Numbers of reports, presentations, and other formal and informal research results within project disciplines, both during and after the international research experience.</li> </ol>	IRES expects to develop a comprehensive survey to be completed by projects' principal investigators and student participants, with longitudinal follow-up surveys to students at specific time points after their participation.	This relatively new program, launched in 2004, has not yet been evaluated. Plans are underway to develop the first evaluation as soon as FY 2012 and no later than FY 2014.
Pan-American Advanced Studies Institutes (PASI)  (Priority Goal program)	PASIs are short courses involving Western Hemisphere scientists and engineers in lectures and discussion at the advanced graduate, postdoctoral, and junior faculty level. In FY 2012, this program will be renamed the Advanced Studies Institute and will be expanded to all global regions.	Transform the Frontiers-3: Focus international partnerships on transforming the frontiers	<ol style="list-style-type: none"> <li>1. Number of PASI participants, their corresponding countries and institutions, and fields of science.</li> <li>2. The extent to which PASI participants engage in international collaborative activities after the award.</li> </ol>	<ol style="list-style-type: none"> <li>1. Program Officer reviews.</li> <li>2. Aggregation of data in final reports.</li> <li>3. PASI web pages (required).</li> </ol>	Internal review with survey to PASI participants every three years.

OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>International Research Fellowship Program (IRFP)  (Priority Goal program)</p>	<p>IRFP introduces scientists and engineers in the early stages of their careers to international collaborative research opportunities.</p>	<p>Transform the Frontiers-3: Focus international partnerships on transforming the frontiers</p>	<p>The extent to which IRFP fellows collaborate with international researchers during their fellowship and throughout their careers, as evidenced by international collaborative activities with foreign researchers.</p>	<p>An external evaluator, Abt Associates, will analyze the database of proposals and conduct a survey of awarded and declined applicants and host researchers.</p>	<p>Mixed methods design with descriptive and outcome data on IRFP fellows and hosts. IRFP fellows will be compared with a control cohort of fellows that did not participate in the program. The program's effectiveness over time will be assessed by examining different cohorts according to year of entry.</p>
<p>Partnerships for International Research and Education (PIRE)  (Priority Goal program)</p>	<p>Supports international research experiences for U.S. students and researchers as part of an international research and education partnership focused on leading edge research topics.</p>	<p>Transform the Frontiers-3: Focus international partnerships on transforming the frontiers</p>	<p>1. Number of international research experiences supported for U.S. students and researchers.  2. The extent to which these participants engage in international collaborative activities during and after the award.</p>	<p>1. Annual reports contain a required table that documents international participation by U.S. students and researchers.  2. Special Program Data Elements information, provided on original proposal.</p>	<p>Evaluation to be undertaken to track numbers of international research experiences for US students and researchers. Evaluation will also examine impacts related to these international experiences (e.g., educational/career outcomes, continued international engagement, internationally co-authored papers, etc.).</p>



OFFICE OF LEGISLATIVE AND PUBLIC AFFAIRS

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Communicating Science Broadly	Communicating Science Broadly Through Multi-media Platforms creates products and processes that make learning and understanding science, technology, engineering, and mathematics part of everyday life. By concentrating its informative efforts toward students and young people on the value of science in their lives, OLPA seeks to increase diversity among the Nation’s future scientists, engineers, and researchers.	Innovate for Society-2: Build the capacity of the nation’s citizenry for addressing societal challenges through science and engineering.	Improved awareness, knowledge, and understanding of effective STEM areas.	<ol style="list-style-type: none"> <li>1. Number of people visiting NSF websites.</li> <li>2. Increased news media coverage.</li> <li>3. Focus group with media professionals to determine how to expand coverage of STEM areas.</li> <li>4. Greater attendance at workshop and events.</li> </ol>	<p>Program Evaluation: Descriptive analyses to assess evolving program conceptualization, implementation, and alignment with key and targeted audiences (news media, scientists, K-12 (teachers and students), higher education, decision makers, the American public, etc.).</p> <p>Experimental or quasi-experimental studies testing efficacy of models to explore approaches for program assessment that meet the Administration’s need for quality and rigor.</p> <p>Metric measurement/trend analyses include monthly web usage and social media statistics, use of news media database to measure and analyze coverage, internal assessments of outcomes of events and workshops, and analyses of feedback from media professionals to adjust program as needed.</p>

OFFICE OF POLAR PROGRAMS

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
Antarctic Education	Formal and Informal Education & Outreach.	Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.	<ol style="list-style-type: none"> <li>1. Formal education: Number of participating teachers and students.</li> <li>2. Informal Education and Outreach: Number of events and, where available, number of attendees/people reached.</li> </ol>	Data on program participation and completion, and course and curriculum development will be collected from annual reports and final reports.	Annual data about research activities and accomplishments are collected through annual and final reports submitted via FastLane for descriptive analyses.
Arctic Education	Formal and Informal Education & Outreach.	Transform the Frontiers-2: Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.	<ol style="list-style-type: none"> <li>1. Formal education: Number of participating teachers and students.</li> <li>2. Informal Education and Outreach: Number of events and, where available, number of attendees/people reached.</li> </ol>	Data on program participation and completion, and course and curriculum development will be collected from annual reports and final reports.	Annual data about research activities and accomplishments are collected through annual and final reports submitted via FastLane for descriptive analyses.

NOTE: The Antarctic and Arctic Education programs will not be supported in FY 2012 due to changes in priorities for the Office of Polar Programs.

OFFICE OF POLAR PROGRAMS

Program	Description	Primary Long Term Performance Goal	Metric/s	Data source/s	Evaluation Design/Plan
<p>Polar Postdoctoral Fellowship Program (Priority Goal program)</p>	<p>The fellowship program develops and trains recent Ph.D.s (especially those new to polar research) with concomitant goals to:</p> <ul style="list-style-type: none"> <li>-promote scientific research in polar regions;</li> <li>-support innovative research in emerging areas;</li> <li>-encourage interdisciplinary research;</li> <li>-foster activities that create broader impacts for science and society; and</li> <li>-increase the participation of under-represented groups in polar regions research.</li> </ul> <p>This program awards 5-6 Fellowships per year.</p>	<p>Transform the Frontiers-1: Make investments that lead to emerging new fields of science and engineering and shifts in existing fields.</p>	<ol style="list-style-type: none"> <li>1. Number of Fellows who secure permanent positions in areas related to polar research.</li> <li>2. Number of Fellows and sponsoring scientists who are new to polar research.</li> <li>3. Number of Fellows and new mentors who later receive research grant from OPP.</li> <li>4. Number of papers published in peer-reviewed journals resulting from Fellowship-sponsored research.</li> <li>5. Number of Fellows (self-identified) from underrepresented groups.</li> </ol>	<p>Direct communication with PIs (1)</p> <p>Program follow up communication with Fellows (2)</p> <p>Information in the proposal (3, 5)</p> <p>Project annual reports (4, 1)</p>	<p>Plans for an internal (or independent) evaluation are under discussion which may involve the use of descriptive statistics for trend analyses over a five- to seven- year timeframe and a qualitative assessment of fellowship experience to examine short and long-terms outcomes as well as the quality indicators of the fellowship experience for informing promising practices for the integration of research and education as well as broadening participation. Each year data will be gathered by the program officers through the identified data sources. Program status and evaluation will be discussed at the twice-yearly meetings of the Office Advisory Committee for OPP. The lead program officer will communicate directly with Fellows about their experience with the program and what they find effective (and not). Program officers will explore ways to advertise and recruit applicants, particularly from underrepresented groups. The lead program officer will meet regularly with program officers for other NSF Postdoctoral programs to address common goals, concerns, and evaluation efforts.</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
Informal Science Education (ISE)	The ISE program supports innovation in anywhere, anytime, lifelong learning, through investments in research, development, infrastructure, and capacity-building for STEM learning outside formal school settings.	Improve practice and build professional and institutional capacity.	<p>Annual Metrics</p> <p>1. Number of professionals made aware of ISE-funded resources to improve their knowledge and/or practice.</p> <p>Long-Term Outcome Metrics</p> <p>2. Percent of development-intensive projects in the ISE portfolio that employ appropriate evaluation methods and apply them with appropriate rigor.</p> <p>3. Percent of development-intensive projects in the ISE program that provide appropriate evidence of formative evaluation and actions taken as a result.</p>	<p>1. Program evaluation data.</p> <p>2. Annual monitoring data.</p>	<p>Mixed and multiple method evaluation design including experimental or quasi-experimental studies testing efficacy of models; descriptive case studies and/or syntheses of models in use by ISE projects; assessment of quality and rigor of project level evaluation (contracted to SRI).</p> <p>Descriptive/Trend Analyses:</p> <p>Annual monitoring of project activities, outputs, evaluation designs and outcomes, including monitoring changes in the portfolio to reflect changes in solicitations (contracted to Westat).</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Cyberlearning Transforming Education (CTE)</p>	<p>The Cyberlearning: Transforming Education (CTE) program integrates advances in technology with advances in what is known about how people learn to:</p> <p>(1) Better understand how people learn with technology through individual use and/or collaborations mediated by technology</p> <p>(2) Better use technology for collecting, analyzing, sharing, and managing data to shed light on learning, promoting learning, and designing learning environments; and</p> <p>(3) Design new technologies for these purposes, and advance understanding of how to use those technologies and integrate them into learning environments so that their potential is fulfilled.</p>	<p>Advance research and development on the use of cybertools to improve learning.</p>	<p>Percentage of projects in the portfolio gathering systematic data about the impact of the technologies on learning using appropriate research designs.</p>	<p>1. Online monitoring system.</p> <p>2. Portfolio analysis by the Resource Network.</p>	<p>A program evaluation framework will be developed that will include meta-analysis of studies that are examining the impact of innovations on learning</p> <p>An online monitoring system will be developed</p> <p>Expert review of implementation of research designs/quality of research evidence</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
Discovery Research K-12 (DR- K12)	The Discovery Research K-12 program enables significant advances in preK-12 student and teacher learning of the STEM disciplines through development and study of innovative resources, models, and technologies for use by students, teachers, administrators and policy-makers.	Increase student learning of STEM skills.	<p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>1. Minimum number of resources (instructional programs, models, or interventions) developed by the DR-K12 program whose effectiveness has been examined using rigorous methods.</li> <li>2. Percent of development-intensive projects in the DR-K12 program that employ appropriate methods to evaluate efficacy and that apply them rigorously.</li> <li>3. Percent of development-intensive projects in the DRK-12 portfolio that have been studied rigorously to determine the impact on student and/or teacher learning.</li> </ol>	Expert review and portfolio analysis validated by independent external review.	<p>Program Evaluation:</p> <ol style="list-style-type: none"> <li>1. Portfolio review of research designs employed and meta-analytic syntheses of project outcomes by topics (activity of Community for Advancing Discovery Research in Education at the Education Development Center).</li> <li>2. Social network analysis of REESE and DR K-12 projects (Science Technology Policy Institute).</li> <li>3. Quasi-experimental impact studies by topical theme (SOW for FY 2010 contract).</li> </ol>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Research and Evaluation on Education in Science and Engineering (REESE)</p> <p>(FIRE, a subcomponent of REESE, is a Priority Goal program)</p>	<p>Research and Evaluation on Education in Science and Engineering (REESE) supports basic and applied research that enhances STEM learning at all levels. REESE supports both synthesis and empirical studies. Synthesis studies synthesize findings and draw conclusions on claims important to research and practice. Empirical studies identify areas that have the potential to advance discovery at the frontiers of STEM learning and education.</p>	<p>Advance research at the frontiers of STEM learning, education, and evaluation.</p>	<p>Annual Metrics</p> <p>1. Index of REESE program impact on knowledge building represented by an average sum for publications produced by awarded projects weighted by journal impact factor.</p> <p>Long-Term Outcome Metric</p> <p>2. Percent of projects in the REESE portfolio that employ appropriate STEM education research methods and that apply them with appropriate rigor.</p>	<p>REESE portfolio analyses by sampling from active projects fiscal year and validated by independent external review.</p>	<p>Program Evaluation:</p> <p>1. Portfolio review of research designs employed and meta-analytic syntheses of project outcomes by topics (activity of Center for Advancing Research and Communication [ARC] at the University of Chicago).</p> <p>2. Social network analysis of REESE and DR K-12 projects (Science Technology Policy Institute).</p> <p>3. Program evaluation as per SOW for FY 2010 (contracted to Westat).</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Innovative Technology Experiences for Students and Teachers (ITEST)</p>	<p>Funded by the H 1-B Visa resources, the ITEST program responds to current concerns and projections about the growing demand for professionals and information technology workers in the U.S. and seeks solutions to help ensure the breadth and depth of the STEM workforce. ITEST supports research studies and the development, implementation, testing, and scale-up of implementation models. ITEST projects may include students or teachers, kindergarten through high school age, and any area of the STEM workforce.</p>	<p>Increase student engagement, awareness, and interest in STEM.</p>	<p>Long-Term Outcome Metrics</p> <p>1. Percent of ITEST projects that report participant change in STEM career interest with significance.</p> <p>2. Percent of development-intensive projects in the ITEST program that employ appropriate evaluation methods and apply them with appropriate rigor.</p>	<p>1. Program evaluation data.</p> <p>2. Annual monitoring data.</p>	<p>Mixed and multiple method evaluation design including experimental or quasi-experimental studies comparing models for efficacy; descriptive case studies to determine effectiveness regarding increasing STEM career interest; assessment of quality and rigor of project level evaluations (contracted to SRI).</p> <p>Descriptive/Trend Analyses:</p> <p>Annual monitoring of project activities, outputs, evaluation designs and outcomes, including monitoring changes in the portfolio to reflect changes in solicitations (conducted by ITEST Learning Resource Center at the Education Development Center).</p>



DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Proposed Teacher Learning for the Future (TLF)</p>	<p>Teacher Learning for the Future (TLF) program will re-establish the visibility of the NSF in discovering, studying and promoting pathways for STEM teacher learning, both in pre-service preparation and in practice, a position that has decreased in recent years as the focus shifted from academic program development to individual student support and attention to in-service teacher development. Complementing the support of new tools for cyberlearning, the TLF program will focus the needs of the next generation of teachers as the structure of formal education changes and the boundaries between in school and out of school learning blur.</p>	<p>Reinvigorate the teaching of STEM in America’s classrooms by improving teacher knowledge and retaining teachers with STEM backgrounds</p>	<p>1. Percentage of projects and cylerlearning tools that contribute rigorous research findings on teacher learning.  2. Implementation of jointly developed coordination plan with Department of Education.</p>	<p>1. Annual Reports.  2, Expert review of portfolio.  3. Program evaluation data.  4. On-line monitoring system.</p>	<p>1. SOW for a comparative evaluation study of models and outcomes planned for FY 2014.  2. Baseline data will be collected from the on-line monitoring system.  3. A thematic evaluation across EHR programs that address teacher learning will be explored.</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Research on Learning in Formal and Informal Settings (DRL)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
Project and Program Evaluation (PPE)	Evaluation is utilized to inform the strategic directions of the directorate and to improve the design and implementation of programmatic investments. PPE provides support for performance monitoring/accountability systems and independent program evaluations, as well a support to the field to advance evaluation theory and practice in STEM education through the Promoting Research for Innovative Methods of Evaluation (PRIME) solicitation.	<ol style="list-style-type: none"> <li>1. Contribute to the educational knowledge base of successful practices and programs in STEM education and workforce development.</li> <li>2. Promote innovation in STEM education evaluation.</li> </ol>	<p>Annual Metric</p> <ol style="list-style-type: none"> <li>1. Number of PPE-supported program evaluations with comparative designs to address program impact.</li> </ol> <p>Long-Term Outcome Metric</p> <ol style="list-style-type: none"> <li>2. Number of noteworthy accomplishments of PPE funded evaluation projects designed to advance the field of evaluation of STEM education programs through support for new assessment tools, innovative evaluative frameworks/methods, or newly trained evaluators.</li> <li>3. Evidence of PPI-funded findings substantially informing program improvements.</li> </ol>	<ol style="list-style-type: none"> <li>1. Program evaluation proposals and study designs.</li> <li>2. Annual reports.</li> <li>3. Final program evaluation reports from PPE-funded projects.</li> </ol>	<ol style="list-style-type: none"> <li>1. Logic models for all PPE-related activities.</li> <li>2. Annual review of evaluation plans, products and findings.</li> <li>3. Expert review of PPE evaluation activities and portfolio.</li> </ol>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)</p> <p>(Component of the Broadening Participation at the Core framework. See Education and Human Resources tab.)</p>	<p>This program provides awards to enhance the quality of undergraduate science, technology, engineering, and mathematics (STEM) education and research at Historically Black Colleges and Universities (HBCUs) as a means to broaden participation in the Nation's STEM workforce. Support is available for Implementation Projects (including Achieving Competitive Excellence), Planning Grants, Education Research Projects, and Targeted Infusion Projects.</p>	<ol style="list-style-type: none"> <li>1. Develop and advance institutional capacity in undergraduate STEM education.</li> <li>2. Improve the quality and quantity of degrees in STEM fields at HBCUs.</li> <li>3. Increase the number of well-prepared HBCU graduates in the STEM workforce.</li> <li>4. Increase in knowledge base of successful STEM educational programs or activities and research on STEM educational issues in HBCU settings.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number of students in HBCU-UP programs who engage in quality undergraduate research experiences.</li> <li>2. Graduation rates: Number /percentage of HBCU students who graduate with STEM degrees.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>3. Number of new or enhanced STEM degree programs in HBCUs.</li> <li>4. Number and percent of HBCU STEM graduates who enter graduate school or the STEM workforce.</li> <li>5. Number of publications by awardees in peer-refereed journals, book chapters, proceedings, and books.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. Monitoring system data.</li> <li>4. External program evaluation report.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual Portfolio Review: By POs of Annual Reports, Site Visits and other documents related to program progress.</li> <li>2. Annual program monitoring system: tracking recruitment, progress, graduation data, participant activities (GoH).</li> <li>3. External Program Evaluation: Within- group comparative design: study of institutional improvements (STEM policies, practices/activities, graduation rates, etc.) and the identification of successful models via pre-post institutional change and analyses of differences across models (Urban Institute completed in 2010).</li> </ol>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Louis Stokes Alliances for Minority Participation (LSAMP)</p> <p>(Component of the Broadening Participation at the Core framework. See Education and Human Resources tab.)</p>	<p>Louis Stokes Alliances for Minority Participation (LSAMP) emphasizes development of broad-based regional and national alliances of academic institutions, school districts, state and local governments, and the private sector to increase the diversity and quality of the STEM workforce through quality undergraduate and graduate education.</p>	<ol style="list-style-type: none"> <li>Increase STEM undergraduate degree completion rates.</li> <li>Increase the number of qualified STEM graduates in the national workforce or transitioning to graduate programs in STEM.</li> <li>Contribute to educational knowledge base of successful practices in student recruitment, retention and completion of STEM degrees by students from historically underrepresented groups.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>Number of students participating in quality undergraduate research experiences or internships.</li> <li>Number/percentage of STEM student enrollment in STEM baccalaureate degree programs in LSAMP institutions.</li> <li>Undergraduate completion rates: Number/ percentage of individuals who complete a STEM undergraduate degree programs.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>Number and percent of STEM degree recipients who enter doctoral STEM programs.</li> <li>Number of publications by awardees in peer-refereed journals, book chapters, proceedings, and books related to broadening participation in STEM.</li> </ol>	<ol style="list-style-type: none"> <li>Annual reports</li> <li>Final reports</li> <li>Monitoring system data</li> <li>External program evaluation report</li> </ol>	<ol style="list-style-type: none"> <li>Annual Portfolio Review: By POs of Annual Reports, Site Visits and other documents of program progress.</li> <li>Annual program monitoring system: Annual program monitoring system tracking recruitment, progression and graduation data as well as participant activities (ICF MACRO).</li> <li>External Program Evaluation:                     <ol style="list-style-type: none"> <li>Quasi-experimental design: retrospective study of outcomes of LSAMP STEM graduates to those of STEM graduates nationally and to that of nationally representative samples of underrepresented minorities and White and Asian students who did not participate in LSAMP (Urban Institute, 2006, <a href="http://www.urban.org/url.cfm?ID=3112">http://www.urban.org/url.cfm?ID=3112</a>).</li> <li>Longitudinal study: tracking study of the progress and ultimate outcomes of both LSAMP Bridge to the Doctorate (BD) students and a matched sample of non-BD students, including three types of data-- baseline, progress, and follow-up (Urban Institute, in progress, due to be completed in 2012).</li> </ol> </li> </ol>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Tribal Colleges and Universities Program (TCUP)</p> <p>(Component of the Broadening Participation at the Core framework. See Education and Human Resources tab.)</p>	<p>The Tribal Colleges and Universities Program (TCUP) provides awards to enhance the quality of science, technology, engineering and mathematics (STEM) instructional and outreach programs at Tribal Colleges and Universities, Alaskan Native-serving Institutions and Native Hawaiian-serving institutions. Support is available for the implementation of comprehensive institutional approaches to strengthen STEM teaching and learning in ways that improve access to, retention within, and graduation from STEM programs. This program provides support to eligible institutions in their efforts to bridge the digital divide and prepare students for careers in information technology, science, mathematics and engineering fields.</p>	<ol style="list-style-type: none"> <li>1. Develop and advance institutional capacity in undergraduate STEM education in TCUs.</li> <li>2. Improve quality and quantity of degrees in STEM fields at TCUs.</li> <li>3. Increase number of well-prepared STEM graduates entering the STEM workforce from TCUs.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and percentage of students entering STEM degree programs at TCUs participating in TCUP.</li> <li>2. Number of students in TCUP projects who engage in quality undergraduate research experiences.</li> <li>3. Graduation rates: Number and percentage of degree-seeking students who graduate with STEM degrees.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Number of new or enhanced STEM curricula, courses and programs at TCUs participating in TCUP.</li> <li>5. Transfer rates: Number and percentage of students who transfer from a two-year to a four-year institution in a STEM program.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. Monitoring system data.</li> <li>4. External program evaluation report.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual Portfolio Review: By POs of Annual Reports, Site Visits and other documents of program progress.</li> <li>2. Annual program monitoring system: Annual program monitoring system tracking recruitment, progress and graduation data as well as participant activities (Kauffman).</li> <li>3. External Program Evaluation: Within-group comparative design: study of institutional improvements (STEM policies, practices/activities, graduation rates, etc.) and the identification of successful models via pre-post institutional change and analyses of differences across models (Kauffman, in progress).</li> </ol>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Research on Gender in Science and Engineering (GSE)</p>	<p>The Research on Gender in Science and Engineering (GSE) program supports efforts to understand and address gender-based differences in science, technology, engineering, and mathematics (STEM) education and workforce participation through research, the diffusion of research-based innovations, and extension services in education that will lead to a larger and more diverse domestic science and engineering workforce. Typical projects will contribute to the knowledge base addressing gender-related differences in learning and in the educational experiences that affect student interest, performance, and choice of careers; how pedagogical approaches and teaching styles, curriculum, student services, and institutional culture contribute to causing or closing gender gaps that persist in certain fields.</p>	<ol style="list-style-type: none"> <li>1. To broaden the participation of girls and young women in K-16 STEM education and the STEM workforce.</li> <li>2. Contribute to educational knowledge base of research on gender equity related to STEM in K-16 education and the STEM workforce.</li> <li>3. Increase awareness among practitioners of research-based strategies that work to increase the number of women and girls in STEM fields.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number of high-quality research studies using rigorous research designs.</li> <li>2. Number of practitioners involved in extension services and diffusion projects.</li> <li>3. Number of practitioners using research findings and strategies to change practice related to gender issues.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Number of publications in peer-refereed journals, book chapters, proceedings, and books.</li> <li>5. Adoption of gender-inclusive policies and practices in institutions / organizations that serve girls and young women in STEM education at all levels.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. External program evaluation.</li> </ol>	<p>SOW developed. Will be consolidated under REESE program evaluation.</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Research in Disabilities Education (RDE)</p>	<p>The RDE program seeks to broaden the participation and achievement of people with disabilities in all fields of science, technology, engineering, and mathematics (STEM) education and associated professional careers. Particular emphasis is placed on contributing to the knowledge base by addressing disability-related differences in secondary and post-secondary STEM learning and in the educational, social and pre-professional experiences that influence student interest, academic performance and retention in STEM degree programs, STEM degree completion, and career choices. Projects also investigate effective practices for transitioning students with disabilities across critical academic junctures, retaining students in undergraduate and graduate STEM degree programs, and graduating students with STEM associate, baccalaureate and graduate degrees.</p>	<ol style="list-style-type: none"> <li>1. Increase number of students with disabilities (SWD) completing STEM associates and bachelors degree programs.</li> <li>2. Increase number of SWD entering graduate STEM programs.</li> <li>3. Increase number of SWD undergraduates entering the STEM workforce.</li> <li>4. Contribute to educational knowledge base of research on STEM education of SWD at secondary and postsecondary levels.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and percentage of SWD entering STEM degree programs.</li> <li>2. Transfer rates: Number and percentage of SWD who transfer from a 2-year to a 4-year institution in a STEM program.</li> <li>3. Graduation rates: Number and percent of degree-seeking SWD who graduate.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Number of high-quality research studies using rigorous research designs</li> <li>5. Number of publications in peer-refereed journals, book chapters, proceedings, and books.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. Monitoring system data.</li> <li>4. External program evaluation reports.</li> </ol>	<p>SOW developed. Will be consolidated under REESE program evaluation.</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Alliances for Graduate Education and the Professoriate (AGEP)  (Priority Goal program)</p>	<p>Alliances For Graduate Education and the Professoriate further the graduate education of underrepresented STEM students through the doctorate level, preparing them for fulfilling opportunities and productive careers as STEM faculty and research professionals. AGEP also supports the transformation of institutional culture to attract and retain STEM doctoral students from underrepresented groups into the professoriate.</p>	<ol style="list-style-type: none"> <li>1. Transform institutional culture to attract and retain STEM doctoral students from underrepresented groups.</li> <li>2. Increase number of individuals from underrepresented groups who complete a STEM doctorate or postdoc.</li> <li>3. Increase the number of STEM doctorates who are successful in the professoriate in STEM fields.</li> <li>4. Improve education and training at graduate and postdoctoral level through evidence-based approaches that include collection and analysis of performance data, program evaluation, and other research.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number of students participating in STEM doctoral programs in STEM at AGEP institutions.</li> <li>2. Number/ percentage of individuals from underrepresented groups who complete STEM PhD programs.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>3. Number/ percentage of STEM graduates who complete STEM postdocs</li> <li>4. Number of STEM PhD graduates who enter careers in academia and are successful (e.g. attain tenure if in a tenure-track position)</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. External program evaluation data.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual Portfolio Review: By POs of Annual Reports, Site Visits and other document of program progress.</li> <li>2. Annual program monitoring system (in pilot phase): Annual program monitoring system tracking recruitment, progression and completion data as well as participant activities.</li> <li>3. External Program Evaluation: Quasi-experimental design and case study: comparison of AGEP institutional STEM outcomes to outcomes of non-AGEP institutions; case studies of AGEP models (American Institutes for Research, in progress).</li> </ol>



DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
Centers of Research Excellence in Science and Technology (CREST)	Centers of Research Excellence in Science and Technology (CREST) program makes resources available to enhance the research capabilities of minority-serving institutions (MSI) through the establishment of centers that effectively integrate education and research. CREST promotes the development of new knowledge, enhancements of the research productivity of individual faculty, and an expanded presence of students historically underrepresented in STEM disciplines.	<ol style="list-style-type: none"> <li>1. Develop and advance institutional capacity of MSIs to integrate science and engineering education and research.</li> <li>2. Contribute to the education knowledge base regarding the effective integration of science and engineering education and research.</li> <li>3. Improve research quality and productivity of individual faculty in MSIs.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number of refereed publications and presentations, and patents from faculty and graduate students.</li> <li>2. Number/ percentage of individuals from underrepresented groups who participate in CREST research activities.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>3. Improvement of coursework, research experiences, classroom pedagogy, mentoring, and other STEM educational activities that integrate education and research.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual reports.</li> <li>2. Final reports.</li> <li>3. Annual program monitoring system data.</li> <li>4. External program evaluation reports.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual Portfolio Review: By POs of Annual Reports, Site Visits and other documents of program progress.</li> <li>2. Annual program monitoring system: Annual program monitoring system of project research and training activities and participants outcomes (ICF Macro).</li> <li>3. External Program Evaluation: Quasi-experimental design: study of matched peer institutions to determine program impact in the areas of Ph.D. production in STEM and research productivity (Global Evaluation &amp; Applied Research Solutions, in progress).</li> </ol>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Human Resource Development (HRD)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE)</p>	<p>The goal of the ADVANCE Program (Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers) is to develop systemic approaches to increase the representation and advancement of women in academic STEM careers, thereby contributing to the development of a more diverse science and engineering workforce.</p> <p>ADVANCE is an NSF-wide program.</p>	<p>1. Promote institutional transformation to recruit, support, and advance women in STEM academic careers.</p> <p>2. Increase representation and advancement of women in academic STEM careers.</p>	<p>Annual Metrics</p> <p>1. Number of women in STEM academic careers at ADVANCE institutions.</p> <p>2. Retention: Number and percentage of women in STEM academic positions who persist at the institution.</p> <p>Long-Term Outcome Metrics</p> <p>3. Promotion: Number and percentage of women in STEM academic positions who are promoted and tenured to senior faculty ranks and/or administrative positions.</p> <p>4. (Institutional transformation): number of new or revised policies developed/implemented that promote advancement of women faculty; rates of uses of family-friendly policies by male/female faculty.</p>	<p>1. Annual reports.</p> <p>2. Final reports.</p> <p>3. Annual expert review of Annual Reports.</p> <p>4. External program evaluation.</p>	<p>1. Annual Portfolio Review: By POs of Annual Reports, Site Visits and other documents of program progress.</p> <p>2. Annual program monitoring Yearly review of annual reports by independent evaluation expert</p> <p>3. External Program Evaluation: (a) Quasi-experimental design and case study: comparison of ADVANCE awardee institutions to a comparable sample of non-awardee institutions (Westat, ongoing); (b) Case studies of how ADVANCE models operate and are effective in different settings (Urban Institute, ongoing)</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Graduate Education (DGE)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Graduate Research Fellowship Program (GRFP)  (Priority Goal program)</p>	<p>The Graduate Research Fellowship Program (GRFP) provides fellowships to individuals selected early in their graduate careers based on their demonstrated potential for significant achievements in science and engineering. Three years of support is provided by the program for graduate study that is in a field within NSF's mission and leads to a research based master's or doctoral degree.</p>	<p>GRFP is a critical program in NSF's overall strategy in developing the globally-engaged workforce necessary to ensure the Nation's leadership in advancing science and engineering research and innovation. A high priority for NSF and GRFP is increasing the diversity of the science and engineering workforce, including geographic distribution and the participation of women, underrepresented minorities, and persons with disabilities and supporting U.S. citizens and permanent residents.</p>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and/or percentage of graduate fellowship recipients who complete a STEM graduate program.</li> <li>2. Number and/or percentage of program completers (MA and Ph.D.) who are employed in a STEM or STEM-related field.</li> <li>3. Number of contributions by fellows to the research enterprise, i.e. innovations, inventions, and peer reviewed published articles.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Increase in STEM inventions/discoveries (e.g. patents, peer-reviewed articles) by fellows.</li> <li>5. Improved international opportunities as reported in annual Activity Reports.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual activities reports of fellows.</li> <li>2. Program evaluation data, including survey of fellowship applicants, employers, and institutional visits.</li> </ol>	<p>Program Evaluation: Quasi-experimental design: a follow-up study to assess GRF award recipients in comparison to other GRF applicants and non-GRF graduate students, comparing graduate school experiences and measuring differences in career outcomes (National Opinion Resource Center, ongoing).</p> <p>Descriptive/Trend Analyses: Annual reporting of fellows' activities and progression to completing Ph.D. study; review of activity reports by independent evaluation expert.</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Graduate Education (DGE)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Integrative Graduate Education and Research Traineeships Program (IGERT)  (Priority Goal program)</p>	<p>IGERT has been developed to meet the challenges of educating U.S. Ph.D. scientists and engineers who will pursue careers in research and education, with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become, in their own careers, leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education and research that transcends traditional disciplinary boundaries. It is also intended to facilitate diversity in student participation and preparation, and contributing to a world-class, broadly inclusive, and globally engaged science and engineering workforce.</p>	<p>Build the U.S. STEM workforce by preparing U.S. citizens and permanent residents for the challenges that face the nation today and demand the creative teamwork of people from multiple disciplines and backgrounds. The IGERT program is positioned to produce the leading scientists and engineers of the future by jump-starting transformative interdisciplinary research and using it as the foundation for imaginative graduate education. Prepared for the careers of the 21st century, IGERT graduates enter the workforce ready to make America more competitive in our global economy.</p>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and/or percentage of graduate traineeship recipients who complete a STEM graduate program.</li> <li>2. Number and/or percentage of program completers who are employed in a STEM or STEM-related field.</li> <li>3) Number of contributions by IGERT trainees and graduates to the research enterprise i.e. innovations, inventions, and peer reviewed published articles.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4) Number of new interdisciplinary graduate education degree programs.</li> <li>5) Number of new leaders in STEM with interdisciplinary backgrounds.</li> </ol>	<p>Annual Monitoring Data:</p> <p>Evaluation survey data on IGERT graduates Ph.D. completion by field, place of employment and time to degree as well as data on impact on institution.</p>	<p>Program Evaluation: Quasi-experimental design: a follow-up survey of former IGERT trainees and their non-IGERT corresponding cohorts to demonstrate the impact of the IGERT traineeship experience compared to a single STEM discipline doctoral degree experience (ABT Associates, completed in 2010 and summary to be available on Abt web site: <a href="http://www.abtassociates.com">www.abtassociates.com</a>).</p> <p>Descriptive/Trend Analyses: Annual monitoring of IGERT activities, participant demographics, and outputs/outcomes including patents, inventions, and articles (ICF MACRO).</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Graduate Education (DGE)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Graduate STEM Fellows in K-12 Education Program (GK-12)</p> <p>(Priority Goal program)</p> <p>(Proposed for termination)</p>	<p>The Graduate STEM Fellows in K-12 Education (GK-12) program provides funding for graduate students in NSF-supported STEM disciplines to bring their leading research practice and findings into K-12 learning settings. The GK-12 program provides an opportunity for graduate students to acquire value-added skills, such as communicating STEM subjects to technical and non-technical audiences, leadership, team building, and teaching while enriching STEM learning and instruction in K-12 settings.</p>	<p>Foster the graduate preparation of a U.S. STEM workforce prepared to meet the scientific, economic and societal challenges of the future by providing funding for highly qualified U.S. graduate students in NSF-supported STEM disciplines to bring their scientific and engineering research into K-12 education and at the same time enhance their communication skills with a broad audience including teachers and K-12 students.</p>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and/or percentage of graduate fellowship recipients who complete a STEM graduate program.</li> <li>2. Number and/or percentage of program completers who are employed in a STEM or STEM-related field.</li> <li>3. Number of contributions to the research enterprise, reflective of value-added skills acquired in traineeship experiences.</li> </ol> <p>Long-Term Outcome Metric</p> <ol style="list-style-type: none"> <li>4. Increased number of fellows integrating research and education with sustained involvement of K-12 communities.</li> </ol>	<ol style="list-style-type: none"> <li>1. Annual monitoring data.</li> <li>2. Program evaluation data.</li> </ol>	<p>Program Evaluation: completed in 2010, synopsis of report available on Abt web site. Quasi-experimental design: a follow-up survey study of former GK-12 Fellows and non-GK-12 Fellows to demonstrate the impact of the GK-12 experience compared to traditional graduate training; mixed-methods design, drawing upon existing data sources as well as new data collected to assess the outcomes of the GK-12 experience for GK-12 participants (Fellows, Teachers) and impact on the participating institution (ABT Associates: <a href="http://www.abtassociates.com">www.abtassociates.com</a>)</p> <p>Descriptive/Trend Analyses: Survey data collected by Abt Associates provides Annual monitoring of GK-12 activities, participant demographics and outputs/outcomes (ICF MACRO)</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Graduate Education (DGE)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
<p>Science Masters Program (SMP)  (Priority Goal program)</p>	<p>The goal of the Science Master’s Program (SMP) program is to prepare U.S. master's students with a strong foundation in STEM science and/or engineering who are exceptionally well-prepared for careers in the corporate, non-profit and government sectors.</p>	<p>Build the US STEM workforce by preparing Master’s level 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.</p>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and/or percentage of science master’s fellowship recipients who complete a STEM graduate program.</li> <li>2. Number and/or percentage of program completers who are employed in a STEM or STEM-related field.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>3. Number of students supported by SMP: 220, and number of students earning Master's degrees: 200</li> <li>4. Provide program results to NSF and community to inform future innovation and entrepreneurial training.</li> </ol>	<p>NSF will collect data of student enrollment, completion and placement in careers from PI's twice annually.</p>	<p>Program Evaluation (Technology Management Training Group, Inc.) Portfolio analysis to identify new models of innovation and entrepreneurial training; tracking of scholarship recipients; evaluative study of effectiveness of various aspects of the new SMP, including number of students from underrepresented groups, time to completion, distribution of earned SMP masters across STEM fields, and distribution of employed SMP graduates across employment sectors.</p>

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES - Division of Graduate Education (DGE)

Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
Advanced Technological Education Program (ATE)	<p>With an emphasis on two-year colleges, the Advanced Technological Education (ATE) program focuses on the education of technicians for the advanced technology fields that drive our Nation's economy. The program involves partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians at the undergraduate and secondary school levels. The ATE program supports curriculum development; professional development of college faculty and secondary school teachers; career pathways to two-year colleges from secondary schools and from two-year colleges to four-year institutions; and other activities. A secondary goal is articulation between two-year and four-year programs for K-12 prospective teachers that focus on technological education. The program also invites proposals focusing on applied research relating to</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation:</p> <p>1. Increase number of qualified technicians for advanced technological fields in STEM.</p> <p>2. Increase number of technicians with degrees and/or certification prepared to enter the STEM workforce or pursue advanced degrees in STEM.</p> <p>3. Advance knowledge at the frontiers of research in technician education and workforce development in advanced technological fields in STEM.</p> <p>Develop and advance institutional capacity for advancing American innovation:</p> <p>4. Develop and advance institutional capacity in technician education in advanced technological fields in STEM.</p>	<p>Annual Metrics</p> <p>1. Number and percentage of degree or certification seeking students who graduate or earn certification in advanced technological fields in STEM.</p> <p>2. Number and percentage of students in advanced technological education programs in STEM who transfer from a two-year institution to a four-year program in STEM.</p> <p>3. Number of ATE-supported courses that integrate the use of instruments, methods, and/or procedures that are commonly used in industry in advanced technological fields in STEM.</p> <p>Long-Term Outcome Metrics</p> <p>4. Increased capacity of community colleges and faculty/staff to respond to emerging STEM areas and develop new programs in advanced technology fields in STEM.</p> <p>5. Increased capacity of community colleges and faculty/staff to respond to changing requirements for expertise to be globally competitive in technological fields in STEM via trends in technician majors and technician certification.</p> <p>6. Number of publications in peer-refereed journals, book chapters, proceedings, books, and research reports by PIs with funding</p>	<p>Project reports</p> <p>Annual monitoring data</p> <p>Program evaluation data</p>	<p>Program Evaluation Retrospective study: PI survey of institutional accomplishments and results based on capacity building and human capital in emerging technical fields (Western Michigan University, completed: <a href="http://www.wmich.edu/evalctr/ate/ate.html">http://www.wmich.edu/evalctr/ate/ate.html</a>); case studies of partnership results</p> <p>On-going planning and development for a mixed and multiple method program evaluation to include portfolio analysis, secondary data analysis, comparative workforce study using within-group comparative and rigorous qualitative designs to assess the efficacy and effectiveness of program activities to meet the needs of emerging areas in STEM that require qualified technician in advanced technological fields in STEM. Follow-up study of program graduates (SOW in FY 2010,</p>

*Additional Performance Information*

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Program	Description (Program Goals)	National Long-term Performance Goals	Metric/s	Data source/s	Evaluation Design/Plan
	technician education.		from the ATE research track.  7. Increased capacity of institutes of higher education and faculty/staff to respond to emerging STEM areas and develop new instructional resources.		contract in FY 2011)  Descriptive/Trend Analysis: Annual survey of project activities, accomplishments, and results (Western Michigan University).



DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES – Division of Undergraduate Education (DUE)

Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics Program (TUES)</p> <p>(formerly the Course, Curriculum, and Laboratory Improvement Program (CCLI))</p>	<p>Transforming Undergraduate Education in STEM (TUES) seeks to improve the quality of STEM education for all undergraduate students. It especially welcomes proposals that have the potential to transform undergraduate STEM education for all students. The program supports efforts to create, adapt, and disseminate new learning materials and teaching strategies to reflect advances both in STEM disciplines and in what is known about teaching and learning. It funds projects that develop faculty expertise, implement educational innovations, assess learning and evaluate innovations, prepare K-12 teachers, or conduct research on STEM teaching and learning. It also supports projects that further the work of the program itself, for example, synthesis and dissemination of findings across the program.</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation through developing learning and assessment resources for undergraduate STEM students.</p> <p>Develop institutional capacity for advancing American innovation through transforming undergraduate STEM education.</p> <p>Promote general STEM literacy by educating the Next Generation with 21<sup>st</sup> Century knowledge and skills through developing learning and assessment resources for undergraduate students in disciplines other than STEM.</p>	<p>Annual Metrics</p> <p>1. Number of students who enroll in and successfully complete TUES-supported STEM courses.</p> <p>2. Number of TUES-supported STEM faculty who engage in the development of learning and assessment resources to transform the teaching and learning of STEM subjects.</p> <p>3. Number of TUES resources created or improved to transform undergraduate education in STEM for STEM and non-STEM students.</p> <p>4. Number of faculty who have participated in TUES supported faculty development activities.</p> <p>Long-Term Outcome Metrics</p> <p>5. Number of TUES adapted and adopted learning and assessment resources.</p> <p>6. Courses, materials, and pedagogies that have been studied rigorously in TUES projects to determine the impact on student learning.</p>	<p>1. Project reports.</p> <p>2. Program monitoring data.</p> <p>3. Program evaluation data.</p>	<p>Program Evaluation: Portfolio review of rigorous evaluation designs employed and identification of efficacy studies with findings based on rigorous designs (SRI International, completed, report)</p> <p>On-going planning and development of SOW for program evaluation to include portfolio analysis, data-mining, and assessment of the quality and use of resources developed (SOW in FY 2010, contract in FY 2011)</p> <p>Descriptive/Trend Analyses: Annual data collection to monitor participation, resources developed, and the adoption and adaptation of learning and assessment resources</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
Climate Change Education Program (CCE)	<p>The Climate Change Education (CCE) program catalyzes activity at the national level in four strands of education: public understanding and engagement; resources for learning; local and national STEM education policy; and preparation of a climate science professional workforce. The program draws in scientists and engineers from all of the fields that NSF supports, and ensures especially the involvement of climate scientists, learning scientists, researchers in STEM education, K-12 teachers, and STEM faculty.</p> <p>Program launched in FY 2009.</p>	<p>1. Increase awareness, interest, engagement and understanding of STEM concepts and processes</p> <p>2. Encourage and support of STEM professional collaborations, networks, etc.</p>	<p>Annual Metric</p> <p>1. Number of CCE projects that emphasize public awareness, knowledge, understanding of STEM concepts, processes or careers.</p> <p>Long-Term Outcome Metrics</p> <p>2. Number of CCE-supported STEM faculty and other professionals who engage in the development and/or implementation of curricular materials, instructional strategies, assessment tools, education research, faculty development, and public outreach.</p> <p>3. Research-based evidence made available for CCE professional collaborations and networks.</p>	<p>1. Project reports.</p> <p>2. Program monitoring data.</p> <p>3. Program evaluation data.</p>	<p>Program Evaluation: Planning for two-phase evaluation. Phase 1 to include descriptive focus on models and types of outreach activities. Phase 2 to include comparative studies of improved public awareness of policy issues and high quality resources (SOW and contract in FY 2011).</p> <p>Descriptive/Trend Analyses: Cross-project monitoring system (SOW and contract in FY 2011).</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Excellence Awards in Science and Engineering (EASE)</p> <p>Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST)</p>	<p>The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) is the highest recognition that a kindergarten through 12th-grade mathematics or science teacher may receive for outstanding teaching in the United States. Teachers are recognized for their contributions to teaching and learning and their ability to help students make progress in mathematics and science. In addition to honoring individual achievement, the goal of the award program is to exemplify the highest standards of mathematics and science teaching. Awardees serve as models for their colleagues, inspiration to their communities, and leaders in the improvement of mathematics and science education.</p>	<p>Reinvigorate the teaching of STEM in America’s classrooms by honoring exemplary K-12 teachers.</p>	<p>Annual Metric</p> <p>1. Number and diversity of high quality nominees and finalists who are recognized as national models for K-12 STEM teaching.</p> <p>Long-Term Outcome Metric</p> <p>2. Recognition of outstanding STEM teachers honored for exemplary teaching in K-12 STEM.</p>	<p>1. Project reports.</p> <p>2. Program monitoring data.</p>	<p>Presidential recognition awards are overseen by the Office of Science and Technology Policy. Joint planning for assessing program impact underway in FY11.</p> <p>Program monitoring (ICF Macro)</p>
<p>Excellence Awards in Science and Engineering (EASE)</p> <p>Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM)</p>	<p>The Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring PAESMEM honors individuals and institutions that have enhanced the participation of underrepresented groups—such as women, African Americans, Latinos, Native Americans, Pacific Islanders, and people with disabilities—in science, mathematics and engineering at all levels. All are highly regarded mentors and have pioneered innovative and resourceful programs to broaden opportunities in STEM for underrepresented students.</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation by honoring exemplary practice and commitment.</p>	<p>Annual Metric</p> <p>1. Number and diversity of nominees and finalists (individuals and/or organizations) who are recognized as national models for mentoring.</p> <p>Long-Term Outcome Metric</p> <p>2. Recognition of outstanding mentors honored for exemplary practices and commitment to enhancing participation of groups underrepresented in STEM.</p>	<p>Project reports.</p>	<p>Presidential recognition awards are overseen by the Office of Science and Technology Policy. Joint planning for assessing program impact underway in FY11.</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
Math and Science Partnership Program (MSP)	The Math and Science Partnership (MSP) program is a major research and development effort that supports innovative partnerships to improve K-12 student achievement in mathematics and science. MSP projects are expected to raise the achievement levels of all students and significantly reduce achievement gaps in the mathematics and science performance of diverse student populations. In order to improve the mathematics and science achievement of the Nation's students, MSP projects contribute to what is known in mathematics and science education and serve as models that have a sufficiently strong evidence/research base to improve the mathematics and science education outcomes for all students.	<p>Reinvigorate the teaching of STEM in America's classrooms by improving teacher knowledge and retaining teachers with STEM backgrounds.</p> <p>Develop institutional capacity for advancing American innovation:</p> <ol style="list-style-type: none"> <li>1. Develop and advance capacity for advancing innovation in STEM teaching.</li> <li>2. Advance knowledge at the frontiers of research in mathematics and science education.</li> <li>3. Improve K-12 student outcomes in mathematics and science.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number of institutions of higher education and K-12 institutions that comprise MSP partnerships.</li> <li>2. Number of higher education STEM and science/mathematics education faculty implementing MSP-supported activities.</li> <li>3. Number of teachers engaged in professional development.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Number and percentage of MSP partnerships (Targeted, Institute, Phase II partnerships) with improved student outcomes (e.g., reducing the K-12 student achievement gap, achievement scores, advanced course taking).</li> <li>5. Number of publications in peer-refereed journals, book chapters, proceedings, books, and research reports.</li> </ol>	<ol style="list-style-type: none"> <li>1. Project reports.</li> <li>2. Program monitoring/Management Information System data.</li> <li>3. Program evaluation data.</li> </ol>	<p>Program Evaluation: Quasi-experimental and case study designs: Studies of student achievement over time, comparing the results for participating and non-participating schools (COSMOS); cross-project case study of partnership models, outcomes and contributions to the knowledge base (COSMOS).</p> <p>Descriptive/Trend Analyses: Annual program monitoring system tracking the five program features (Westat).</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Robert Noyce Teacher Scholarship Program (NOYCE)</p> <p>(Noyce Teaching and Master Teaching Fellows, a subcomponent of NOYCE, is a Priority Goal program)</p>	<p>The Robert Noyce Teacher Scholarship Program (NOYCE) program seeks to encourage talented science, technology, engineering, and mathematics majors and professionals to become K-12 mathematics and science teachers. The program provides funds to institutions of higher education to support scholarships, stipends, and academic programs for undergraduate STEM majors and post-baccalaureate students holding STEM degrees who commit to teaching in high-need K-12 school districts. A new component of the program supports STEM professionals who enroll as NSF Teaching Fellows in master's degree programs leading to teacher certification by providing academic courses, professional development, and salary supplements while they are fulfilling a four-year teaching commitment in a high need school district. This new component also supports the development of NSF Master Teaching Fellows by providing professional development and salary supplements for exemplary math and science teachers to become Master Teachers in high need school districts.</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation:</p> <ol style="list-style-type: none"> <li>1. Increase number of qualified STEM K-12 teachers who teach in high need K-12 school districts.</li> </ol> <p>Reinvigorate the teaching of STEM in America's classrooms by improving teacher knowledge and recruiting and retaining teachers with STEM backgrounds in high need K-12 school districts.</p>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and percentage of unique pre-service teachers (degree seeking STEM students and STEM professionals) and teacher participants (Master Teachers) who receive Noyce program support.</li> <li>2. Number and percent of Noyce recipients disaggregated by race, ethnicity, gender, disability, certification, and STEM discipline.</li> <li>3. Quality of Noyce Number and percentage of participants as measured by STEM background, GPA, performance on teacher assessments.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Number and percentage of recipients (pre-service STEM majors, STEM professionals, Master Teachers) who are teaching in high-need K-12 school districts during their service requirement.</li> <li>5. Number and percentage of Noyce recipients who are teaching in high-need K-12 school districts after completing their service requirement.</li> </ol>	<ol style="list-style-type: none"> <li>1. Project reports.</li> <li>2. Program monitoring data.</li> <li>3. Program evaluation data.</li> </ol>	<p>Program Evaluation: Mixed method descriptive study of Noyce pre-service teachers (University of Minnesota, completed in FY 2010, <a href="http://www.cehd.umn.edu/EdPsych/NOYCE/">www.cehd.umn.edu/EdPsych/NOYCE/</a>).</p> <p>On-going mixed-method program evaluation that includes longitudinal, quasi-experimental (well-matched comparative studies), and case studies. (Contract awarded to Abt Associates, 2009).</p> <p>Longitudinal studies: Grants to Phase II awardees to track Noyce Scholars. Descriptive/Trend Analysis: Annual monitoring of participants and project outcomes, including demographics, recruitment and graduation rates, program completion, certification, teaching record, and retention in teacher workforce (ICF Macro).</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Federal Cyber Service: Scholarship for Service (SfS) Program (SFS)  (Priority Goal program)</p>	<p>The Federal Cyber Service: Scholarship for Service (SfS) program seeks to increase the number of qualified students entering the fields of information assurance and computer security and to increase the capacity of the United States higher education enterprise to continue to produce professionals in these fields to meet the needs of our increasingly technological society.</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation:</p> <ol style="list-style-type: none"> <li>1. Increase number of graduates in STEM associate, bachelors, and graduate degree programs.</li> <li>2. Increase number of STEM graduates prepared to enter the STEM workforce.</li> </ol> <p>Develop and advance institutional capacity for advancing American innovation:</p> <ol style="list-style-type: none"> <li>3. Develop and advance institutional capacity to increase the number of degree seeking students to graduate in information assurance or computer security.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Recruitment and Selection. Number and percentage of students who enroll in information assurance or computer security programs.</li> <li>2. Completion Rates: Number and percentage of students who graduate with a bachelors' or graduate degree in information assurance or computer security programs.</li> <li>3. Workforce Development Infrastructure: Number of SfS-supported courses that integrate the use of instruments, methods, and/or procedures that are commonly used in information assurance and computer security.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Workforce Development: Number and percentage of recipients who are prepared to enter the information assurance or computer security workforce.</li> <li>5. Workforce Placement: Number and percentage of SfS supported professionals employed in information assurance or computer security positions in the federal government upon graduation to meet service requirement.</li> </ol>	<ol style="list-style-type: none"> <li>1. Project reports.</li> <li>2. Program monitoring data.</li> <li>3. Program evaluation data.</li> </ol>	<p>Program Evaluation: Longitudinal and mixed-method study to track institutional capacity-building and career development and progress of scholarship recipients (Office of Personnel Management, completed January 2008)</p> <p>Descriptive Measurement/Trend Analyses: Annual data collection to monitor the completion of scholarship requirements and compliance. (Office of Personnel Management)</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM)</p>	<p>Supported by H1-B visa funds, the Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) makes grants to institutions of higher education to support scholarships for academically talented, financially needy students, enabling them to enter the workforce following completion of an associate, baccalaureate, or graduate-level degree in science and engineering disciplines. Grantee institutions are responsible for selecting scholarship recipients, reporting demographic information about student scholars, and managing the S-STEM project at the institution.</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation:</p> <ol style="list-style-type: none"> <li>1. Increase number of graduates in STEM associate, bachelors, and graduate degree programs.</li> <li>2. Increase number of STEM graduates prepared to enter the STEM workforce.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Number and percentage of degree-seeking financially needy and academically talented S-STEM recipients who graduate in STEM.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>2. Number and percentage of financially needy and talented S-STEM recipients who are prepared to enter the STEM workforce.</li> <li>3. At the institutional level, the number of new or enhanced student support services to support completion of STEM degree for STEM students, particularly for those who are financially needy and academically talented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Project reports.</li> <li>2. Program monitoring data.</li> <li>3. Program evaluation data.</li> </ol>	<p>Program Evaluation: On-going planning and development of mixed and multiple method evaluation design to include longitudinal, well-matched comparison group, or quasi-experimental study with post-hoc exploratory data analyses of S-STEM scholarship recipients (SOW prepared for FY 10 for contract in FY2011).</p> <p>Descriptive/Trend analyses: Annual project monitoring system tracking for tracking (ICF MACRO).</p>

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Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Science, Technology, Engineering and Mathematics Program (STEP)</p>	<p>Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) seeks to increase the number of students (U.S. citizens or permanent residents) receiving associate or baccalaureate degrees in established or emerging fields within science, technology, engineering, and mathematics (STEM). Type 1 proposals are solicited that provide for full implementation efforts at academic institutions. Type 2 proposals are solicited that support educational research projects on associate or baccalaureate degree attainment in STEM.</p>	<p>Develop the human capital needed for careers in STEM and for advancing American innovation:</p> <ol style="list-style-type: none"> <li>1. Increase number of graduates in STEM associate and bachelor degrees.</li> <li>2. Increase number of STEM graduates prepared to enter the STEM workforce or pursue advanced degrees in STEM.</li> <li>3. Advance knowledge at the frontiers of research on the attainment of post-secondary credentials in STEM by all students and/or students traditionally underrepresented in STEM.</li> </ol> <p>Develop and advance institutional capacity for advancing American innovation:</p> <ol style="list-style-type: none"> <li>4. Develop and advance institutional capacity to increase the number of degree seeking students to graduate with STEM degrees.</li> </ol>	<p>Annual Metrics</p> <ol style="list-style-type: none"> <li>1. Recruitment: Number of degree-seeking students who enroll in STEM associate or baccalaureate programs.</li> <li>2. Completion Rates: Number and percentage of degree-seeking students who graduate in STEM.</li> <li>3. Transfer Rates: Number and percentage of STEM students who transfer from a two-year institution to a four-year program in STEM.</li> </ol> <p>Long-Term Outcome Metrics</p> <ol style="list-style-type: none"> <li>4. Workforce Development: Number and percentage of STEM graduates who are prepared to enter the STEM workforce or pursue advanced degrees in STEM.</li> <li>5. Effective Interventions: Number of projects that reach their goal of increasing the number of degree seeking STEM students who meet the</li> </ol>	<ol style="list-style-type: none"> <li>1. Project reports.</li> <li>2. Program monitoring data.</li> <li>3. Program evaluation data</li> <li>4. 3<sup>rd</sup> Year Reviews.</li> </ol>	<p>Program Evaluation 3<sup>rd</sup> Year Expert Review of projects' progress and accomplishments</p> <p>On-going planning and development of SOW for a mixed and multiple method program evaluation to include portfolio analysis, data mining, and targeted studies using within-group comparative and rigorous qualitative designs of institutional improvements and change (STEM policies, promising practices of interest, graduation rates) to assess their efficacy and effectiveness for what types of student and under what conditions. Expert review of STEP 2 research portfolio against standards of high quality research and citations (SOW in FY 2011, contract in FY 2011)</p> <p>Descriptive/Trend Analyses: Annual project monitoring system for tracking students in STEM, students who complete a STEM undergraduate degree program, STEM transfer students, implementation of best practices, and changes in institutional policies.</p>



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			requirements for graduating in a STEM discipline.  6. Contribution to Knowledge: Number of publications in peer-refereed journals, book chapters, proceedings, books, and research reports by PIs with STEP 2 funding.  7. Effective coordination with undergraduate programs for broadening participation in EHR.		
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DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES – Division of Undergraduate Education (DUE)

Program	Description	National Goals	Metric/s	Data source/s	Evaluation Design/Status
<p>Research Experiences for Undergraduates Program– Sites and Supplements (REU)</p>	<p>The Research Experiences for Undergraduates (REU) program supports active research participation by undergraduate students in any of the areas of research supported by NSF. REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program.</p> <p>This is an NSF-wide program.</p>	<p>Develop and advance institutional capacity for advancing American innovation:</p> <p>Develop and advance institutional capacity to increase the number of degree seeking students in STEM who participate in STEM research</p>	<p>Number of REU students who engage in cutting edge research in an academic, industry, government, or nonprofit laboratory and present posters at REU research colloquia.</p>	<p>1. Project reports.</p> <p>2. Program evaluation data.</p>	<p>Program Evaluation:                      Previous evaluation study conducted by SRI International (<a href="http://www.sri.com/policy/csted/reports/university/index.html#urosynthesis">http://www.sri.com/policy/csted/reports/university/index.html#urosynthesis</a>) to document and assess the demographic and academic characteristics of undergraduate students who participate in undergraduate research opportunities nationwide; to examine the effectiveness of types of experiences with types of students; and to assess the benefits of the experience.</p> <p>On-going portfolio analysis for evidence of impact of experience (SOW and contract for FY 2010).</p> <p>Descriptive/Trend analyses: Annual data about research activities and accomplishments are collected through annual and final reports submitted via FastLane.</p>