

## Research on Gender in Science and Engineering (GSE)

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### PROGRAM SOLICITATION NSF 10-516

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### REPLACES DOCUMENT(S): NSF 09-511

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National Science Foundation  
Directorate for Education & Human Resources  
Division of Human Resource Development

Letter of Intent Due Date(s) (**required**) (due by 5 p.m. proposer's local time):

February 10, 2010

Required Research Letter of Intent

September 07, 2010

First Tuesday in September, Annually Thereafter

Required Extension Service Letter of Intent

February 09, 2011

Required Research Letter of Intent

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

March 23, 2010

Research Full Proposals

April 07, 2010

Innovation through Institutional Integration

October 14, 2010

Second Thursday in October, Annually Thereafter

Extension Service Proposals (accepted only after submission of a required Letter of Intent)

October 14, 2010

Second Thursday in October, Annually Thereafter

Diffusion of Research-based Innovation Proposals

March 22, 2011

Research Full Proposals

February 08, 2012

Research Full Proposals

### IMPORTANT INFORMATION AND REVISION NOTES

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Please note a Letter of Intent for the FY2012 Research Track is no longer required. The February 8, 2012 deadline will now be for Full Proposals submissions to the Research Track. There is no longer a March 27, 2012 deadline for full proposals. This solicitation will be retired after the FY2012 competition.

#### Important Reminders

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), [NSF 11-1](#), was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in [NSF 11-1](#) apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 18, 2011, must also follow the guidelines contained in [NSF 11-1](#).

**Cost Sharing:** The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The

description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG) Chapter II.C.2.g(xi)* for further information about the implementation of these recommendations.

**Data Management Plan:** The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

**Postdoctoral Researcher Mentoring Plan:** As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

Revision Summary:

Research

There are no substantial changes to the Research track, but edits to the narrative have been made. Proposers are encouraged to read the language carefully.

Diffusion of Research-based Innovation

Broadening Participation Partnerships have been eliminated; however, collaborative proposals are encouraged.

The Track now has three types of proposals: Pilot, Scale Up, and Dissemination. Proposers are encouraged to read the language for these three types carefully to ascertain where ideas might fit.

Extension Service Track

There are no substantial changes to the Extension Service track, but edits to the narrative have been made. Proposers are encouraged to read the language carefully.

Innovation Through Institutional Integration (I<sup>3</sup>)

A track for Innovation through Institutional Integration (I<sup>3</sup>) is included. I<sup>3</sup> challenges faculty, administrators, and others in institutions to think strategically about the creative integration of NSF-funded awards and is itself an integrative, cross-cutting effort within the Directorate for Education and Human Resources (EHR). For Fiscal Year 2010, proposals are being solicited in nine EHR programs that advance I<sup>3</sup> goals:

Centers for Research Excellence in Science and Technology (CREST)  
Research on Gender in Science and Engineering (GSE)  
Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)  
Innovative Technology Experiences for Students and Teachers (ITEST)  
Alliances for Broadening Participation in STEM: Louis Stokes Alliances for Minority Participation (LSAMP)  
Math and Science Partnership (MSP)  
Robert Noyce Teacher Scholarship Program  
Research in Disabilities Education (RDE)  
Tribal Colleges and Universities Program (TCUP)

All proposals submitted to I<sup>3</sup> through these programs have a common due date and will be reviewed in competition with one another. Eligibility is limited to institutions of higher education (including two- and four-year colleges). If the proposal is exclusively for I<sup>3</sup> STEM educational or related research, then all categories of proposers identified in the NSF Grant Proposal Guide are eligible to submit. Given the focus on institutional integration, an institution may submit only one proposal to this competition.

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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Program Title:

Research on Gender in Science and Engineering FY 2010 (GSE)

Synopsis of Program:

The Research on Gender in Science and Engineering 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. Projects will communicate and apply findings, evaluation results, and proven good practices and products to a wider community.

The Research on Gender in Science and Engineering program has been funding these objectives since 1993,

under the prior names "Program for Women and Girls" (PWG), "Program for Gender Equity in Science, Mathematics, Engineering and Technology" (PGE), and "Gender Diversity in STEM Education" (GDSE). The program continues to seek to broaden the participation of girls and women in all fields of STEM education, but also considers gender more broadly to include research and diffusion activities focused on men and boys who are underrepresented in STEM fields.

The program does not currently fund intervention or education projects that directly serve students as their primary purpose, or that focus solely on evaluating a student intervention. Research projects may involve an intervention with students as subjects only if the intervention is an integral part of creating a context for gathering data and if the findings from the intervention would substantially answer the research questions posed within the context of theory, concepts or frameworks of interest. There should be meaningful control or comparison groups also included in the design when appropriate. Those wishing to undertake direct intervention or education service projects or evaluations are encouraged to search the NSF web site and other publications for appropriate funding programs. Please see section IX below for suggested programs to consult.

**Innovation through Institutional Integration (I<sup>3</sup>)** projects enable faculty, administrators, and others in institutions to think and act strategically about the creative integration of NSF-funded awards, with particular emphasis on awards managed through programs in the Directorate for Education and Human Resources (EHR), but not limited to those awards. For Fiscal Year 2010, proposals are being solicited in nine EHR programs that advance I<sup>3</sup> goals: CREST, GSE, HBCU-UP, ITEST, LSAMP, MSP, Noyce, RDE, and TCUP.

Cognizant Program Officer(s):

*Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.*

- Jolene Jesse, Program Director, 815 N, telephone: (703) 292-7303, fax: (703) 292-9018, email: [jjesse@nsf.gov](mailto:jjesse@nsf.gov)
- Nicole Godwin, Program Assistant, telephone: (703) 292-8378, email: [ngodwin@nsf.gov](mailto:ngodwin@nsf.gov)

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.076 --- Education and Human Resources

## Award Information

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Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 15 to 22 GSE grants per year; a mix of Research Awards, Diffusion of Research-based Innovations Awards (of all types), and Extension Services Awards. Research grants may be up to 3 years. Diffusion of Research-based Innovations grants may be from 1-5 years depending on the type (Pilot, Scale Up or Dissemination). Pilot projects may be from 1-3 years. Scale Up projects may be from 3-5 years. Dissemination projects may be from 1-3 years. Extension Services grants are for five years, with years 4 and 5 depending on performance. Up to 10 continuing awards will be made in this Innovation through Institutional Integration (I<sup>3</sup>) competition, pending availability of funds.

Anticipated Funding Amount: \$5,000,000 for new grants in all GSE tracks, pending availability of funds. \$5,500,000 for Innovation through Institutional Integration (I<sup>3</sup>) projects across multiple EHR programs, pending the availability of funds

## Eligibility Information

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Organization Limit:

Proposals may only be submitted by the following:

- No limits specified for GSE proposals

Eligibility for Innovation through Institutional Integration (I<sup>3</sup>) is limited to institutions of higher education (including two- and four-year colleges) accredited in, and having a campus located in the US. If the proposal is exclusively for I<sup>3</sup> STEM educational or related research, then all categories of proposers identified in the NSF Grant Proposal Guide are eligible to submit.

PI Limit:

None specified for GSE.

The Principal Investigator for an Innovation through Institutional Integration (I<sup>3</sup>) proposal must be the university provost or equivalent chief academic officer or president, unless the proposal is exclusively for I<sup>3</sup> STEM educational or related research.

Limit on Number of Proposals per Organization:

No limit for GSE.

For Fiscal Year 2010, proposals are being solicited in nine EHR programs that advance the goals of Innovation through Institutional Integration (I<sup>3</sup>): CREST, GSE, HBCU-UP, ITEST, LSAMP, MSP, Noyce, RDE, and TCUP. Given the focus on institutional integration, an institution may submit only one proposal to the I<sup>3</sup> competition for each deadline.

Limit on Number of Proposals per PI:

None Specified

## Proposal Preparation and Submission Instructions

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### A. Proposal Preparation Instructions

- Letters of Intent: Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- Preliminary Proposal Submission: Not Applicable
- Full Proposals:
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide))

### B. Budgetary Information

- Cost Sharing Requirements: Inclusion of voluntary committed cost sharing is prohibited.
- Indirect Cost (F&A) Limitations: Not Applicable
- Other Budgetary Limitations: Other budgetary limitations apply. Please see the full text of this solicitation for further information.

### C. Due Dates

- Letter of Intent Due Date(s) (**required**) (due by 5 p.m. proposer's local time):
  - February 10, 2010  
Required Research Letter of Intent
  - September 07, 2010  
First Tuesday in September, Annually Thereafter  
Required Extension Service Letter of Intent
  - February 09, 2011  
Required Research Letter of Intent
- Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):
  - March 23, 2010  
Research Full Proposals
  - April 07, 2010  
Innovation through Institutional Integration
  - October 14, 2010  
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Extension Service Proposals (accepted only after submission of a required Letter of Intent)
  - October 14, 2010  
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Diffusion of Research-based Innovation Proposals
  - March 22, 2011  
Research Full Proposals
  - February 08, 2012  
Research Full Proposals

## Proposal Review Information Criteria

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Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

## Award Administration Information

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Award Conditions: Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements: Standard NSF reporting requirements apply.

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## I. INTRODUCTION

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One of the National Science Foundation's (NSF) key strategic goals is to cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens. Investments are directed through programs that strengthen scientific and engineering (S&E) research potential and education efforts at all levels. These outcomes are essential to the U.S. as we progress toward an increasingly technological job market and a scientifically complex society.

The Division of Human Resource Development (HRD) manages a portfolio of programs that supports efforts to broaden the participation of traditionally underrepresented groups in science, technology, engineering and mathematics (STEM) learning and in the STEM workforce. Programs are in place to address the learning, interest and participation of women, underrepresented minorities (African Americans, Alaska Natives, American Indians, Hispanics, Native Hawaiians and other Pacific Islanders), and people with disabilities, at all academic and professional levels.

The program for Research on Gender in Science and Engineering (GSE) seeks to build resources—developing the nation's knowledge capital, social capital, and human capital—toward the goal of broadening the participation of girls and young women in STEM education from kindergarten through undergraduate education, with particular attention paid to transition points in educational trajectories. The program also considers gender more broadly to include research and diffusion activities focused on men and boys who are underrepresented in STEM fields.

- Research projects: investigate gender-based factors that impact learning and choice in STEM education and the workforce; or study societal, formal and informal educational systems' interaction with individuals that encourage or discourage interest and persistence in study or careers in certain STEM fields along gender lines.
- Diffusion of Research-Based Innovation projects: provide a mechanism for engaging a wider audience of practitioners (e.g., teachers, faculty, guidance counselors, parents, etc.) with research findings and strategies for changing educational practice relative to gender issues. There are three types of Diffusion awards (described below): Pilot, Scale Up and Dissemination.
- Extension Services: create a cadre of extension service agents through training and consulting services to inform educators and other practitioners about and enable them to adopt and embed proven gender-inclusive policies and practices in pedagogy, the design of curriculum materials, student support programs, and educator and faculty development. Extension services employ a "train-the-trainer" model and are based on a "comprehensive program of change" that includes research-based and evaluated educational practices.

The program does not currently fund intervention or education projects that directly serve students as their primary purpose, or that focus solely on evaluating a student intervention. Research projects may involve an intervention with students as subjects only if the intervention is an integral part of creating a context for gathering data and if the findings from the intervention would substantially answer the research questions posed within the context of theory, concepts or frameworks of interest. There should be meaningful control or comparison groups also included in the design when appropriate. Those wishing to undertake direct intervention or education service projects or evaluations are encouraged to search the NSF web site and other publications for appropriate funding programs. Please see section IX below for suggested programs to consult.

In addition, proposals submitted to the Innovation through Institutional Integration (I<sup>3</sup>) track would request support for projects that enable faculty, administrators, and others in institutions to think and act strategically about the creative integration of NSF-funded awards, with particular emphasis on awards managed through programs in the Directorate for Education and Human Resources (EHR), but not limited to those awards. For Fiscal Year 2010, proposals are being solicited in nine EHR programs that advance I<sup>3</sup> goals: CREST, GSE, HBCU-UP, ITEST, LSAMP, MSP, Noyce, RDE, and TCUP.

## II. PROGRAM DESCRIPTION

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### A. BACKGROUND

The issues underlying the need for the Research on Gender in Science and Engineering Program include:

- Our society—as experienced in education through parents, the media, K-12 educators, post-secondary faculty and others—tends to reinforce traditional assumptions about the capabilities, interests, and career options for girls and women, steering them away from STEM classes, majors and careers. (See Ceci & Williams, 2007 and 2009; Jacobs et. al., 2005; Steinke, 1997; Tiedemann, 2002; Valian, 1998; Etzkowitz et. al., 2000; Clewell & Campbell, 2002).
- At the same time, the demand for science and technology literacy on the part of all citizens has never been higher, and the demand for domestic workforce capacity in engineering and computer fields is projected to exceed supply. (See National Science Board, 2003; Congressional Commission on the Advancement of Women and Minorities in Science Engineering and Technology Development, 2000; National Academy of Sciences, 2007, CEOSE 2009).
- The history of S&E design suggests that optimal performance of S&E in the service of society is enhanced when informed by diverse points of view and diverse research questions. If significant populations are not represented, the results may range from being simply inadequate to potentially dangerous to some subpopulations. Margolis and Fisher (2002) outline many of the design problems that stemmed from all (or predominately) male design teams, including voice recognition systems that could not "hear" women's voices, video conferencing systems that ignored women for the same lack of "hearing," automotive airbags designed for male-sized humans that injured and even killed many women, and artificial heart valves sized for the male heart.
- Gender biases are still evident in gender gaps at many stages of the STEM educational continuum. While both boys and girls now enroll in elective and advanced high school courses to prepare for college at about the same frequency, and the gender gap in mathematics scores has disappeared, girls are still less likely to report liking mathematics or science. In some fields, such as computer science, boys accounted for 83 percent of those taking the Advanced Placement exam in 2008, and received higher average scores than their female counterparts. (Freeman 2004, CollegeBoard 2009, Hyde et al, 2008)
- While young women are attending college at higher rates than ever before and make up over half of the undergraduate populations at many colleges and universities, differential course taking and the preference for non-STEM fields in high school is related to significant differences between men and women in terms of education and career aspirations and outcomes. College-age women are less likely to express interest in STEM majors at the undergraduate level, and the retention of female students in some STEM fields during undergraduate and graduate study is significantly lower than male students. This has led to fewer women graduating with degrees in the fields of the greatest national need (e.g., science and engineering fields), and those women who make it through the education system with STEM degrees leave the science and engineering workforce at one-and-a-half to two times the rate of their male counterparts (Preston, 2004; Clewell & Campbell, 2002; Freeman, 2004, Watt & Eccles, 2008).
- Socially projected stereotypes about who should be scientists and engineers impose artificial limits on the participation of talented students. Gender is only one of the characteristics that shape personal and group identity. Other characteristics such as race, ethnicity, economic status, religion, and disability also bear on whether students are encouraged, neglected, or discouraged from developing certain skills and ambitions. Our educational systems must seek to develop talent and interest in science, mathematics, and technology in all children.

Statistical profiles of STEM participation, with analyses, are documented in *Trends in Educational Equity of Girls and Women* (Catherine E. Freeman, National Center for Education Statistics, U. S. Department of Education, NCES 2005-016) and the publication *Women, Minorities, and Persons with Disabilities in Science and Engineering, 2009* among others.

### B. GOALS

The goal of the GSE program is to support efforts to understand and address gender-based differences in 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. Ultimately, the program hopes to advance efforts to support the participation of women and girls in STEM fields where they continue to be underrepresented, but also considers gender more broadly to include research and diffusion activities focused on men and boys who are underrepresented in STEM fields. In the context of that overarching goal, the GSE program supports activities that address the following types of objectives.

#### Research

- To discover and describe gender-based differences and preferences in learning science, technology, engineering and mathematics (STEM) at the K-16 levels and factors that affect interest, performance, and choice of STEM study and careers in fields where there are significant gender gaps;
- To discover and describe how experiences and interactions in informal and formal educational settings inhibit or encourage interest and performance of learners based on gender;
- To increase the knowledge about organizational models that lead to STEM educational environments that are more equitable and inviting relative to gender at the K-16 levels;
- To increase the knowledge of the process of institutional change required to achieve more equitable and inviting STEM educational environments at the K-16 levels.

#### Diffusion of Research-Based Innovation

- To engage significant audiences with research-based and demonstrated strategies and practices related to gender to

increase participation in STEM education and workforce. These audiences may include educational practitioners, other significant practitioner communities, parents, administrators, faculty and others who have a significant influence on students' education and career plans.

- Diffusion of Research-based Innovation includes three distinct types of GSE awards: Pilot projects are designed to provide funds for small-scale development of materials and piloting of promising practices; or offer proof-of-concept data for future GSE Extension Service projects. Scale Up projects represent collaborative efforts to reach broader regional or national audiences once proof of concept is established (i.e., there is evidence of effectiveness). Dissemination of GSE Outcomes projects communicate the findings from GSE research, Diffusion or Extension Service projects, to broader, and especially practitioner audiences.

#### Extension Services

- To integrate various findings about gender in science and engineering into a comprehensive program of change or to facilitate the interpretation of research knowledge into practice;
- To provide training and consulting services that will develop a cadre of extension service agents that will reach significant practitioner communities in a train-the-trainer model. These extension service agents will be able to explain in clear language the practical meaning and benefits of adopting programs, tools, or approaches that enhance the interest and persistence of female students in STEM studies.
- To show educators, from kindergarten through the undergraduate level, how to adapt exemplary projects, research-based learning tools, pedagogical approaches, and service or support programs.
- To communicate to researchers the problems that practicing educators find most urgent or troublesome in adopting the new methods or tools. (cf. Wilson & Daviss, 1994, pp. 17-20)

The program does not currently fund intervention or education projects that directly serve students as their primary purpose, or that focus solely on evaluating a student intervention. Research projects may involve an intervention with students as subjects only if the intervention is an integral part of creating a context for gathering data and if the findings from the intervention would substantially answer the research questions posed within the context of theory, concepts or frameworks of interest. There should be meaningful control or comparison groups also included in the design when appropriate. Those wishing to undertake direct intervention or education service projects or evaluations are encouraged to search the NSF web site and other publications for appropriate funding programs. Please see section IX below for suggested programs to consult.

#### C. DESCRIPTION - RESEARCH PROPOSALS

Proposals in the Research area may seek to enhance the multidisciplinary understanding of STEM learning to the extent that differences are evident based on gender. Gender should be the major variable in the analysis. Behavioral, cognitive, affective, learning, and social differences may be investigated using methods of sociology, psychology, anthropology, economics, statistics, and other social and behavioral science and education disciplines.

Successful proposals will incorporate relevant advances in research methodologies and theoretical models or conceptual frameworks. They should capitalize on the development of new instrumental, computational, or statistical methods, models, or tools of observation and analysis.

According to the National Research Council report, *Scientific Research in Education*, educational research projects should:

1. pose significant questions that can be investigated empirically;
2. link relevant research to theory;
3. use methods that permit direct investigation of the questions posed;
4. provide a coherent and explicit chain of reasoning;
5. replicate and generalize across studies; and
6. disclose research to encourage professional scrutiny and critique. (National Research Council, 2002)

All research proposals should, therefore, be located in a body of literature to which a contribution would be made. They should identify the disciplinary (or interdisciplinary) and conceptual framework for the study. They should include a discussion of the theory or theories grounding the research or the concepts or framework of interest. They should include an outline of research questions and/or testable hypotheses that reflect the current state of knowledge in the area and the theory or conceptual framework being used, along with the types of data to be collected and methods for data collection. The proposal should discuss in detail the methods used to answer research questions and/or test the hypotheses, and if a population sample is used, this should be described along with the rationale for sample selection, and the project's access to the sample population. The proposal should address whether the design is premised on special needs and interests due to educational level, race, ethnicity, economic status, or disability, in addition to gender, and to what extent data will be disaggregated for multiple characteristics. The results should be expected to be of sufficient significance to merit peer-review and publication.

The program will allow for descriptive studies of phenomena that could lead to the development of a model or that contribute to theory. Such proposals should make a good argument for the rigor of the data collection, sample selection and analysis. They should also be located within a body of literature to which the study would make a contribution. The concepts of interest or general framework should be well-defined.

All GSE research projects should provide a research foundation for educational approaches, curriculum, and technological tools that are already developed or can be developed in the future, bridging research and educational practice in such settings as classrooms, informal learning sites, and technological learning environments. The research foundation is assumed to provide a strong base of support for sustained improvement in STEM educational practice. Strong research designs will produce rigorous, cumulative, reproducible, and usable findings.

Suggested areas of research may include but are not limited to:

- Investigations of whether students have gender-based learning differences that are not accommodated by traditional approaches to STEM teaching. For example, studies could examine possible gender-related differences in conceptual strengths and weaknesses in learning certain mathematics skills, retention patterns, preferences among computer interface features, interests in social interaction while learning, and interests in the social relevance and application of science experiments.
- Explorations of whether social and psychological behavior patterns of females and/or males in our society affect learning in STEM fields.
- Explorations of the socialization of males and females in our society that might preclude or inhibit access, encouragement, support, or acceptance for interest in STEM topics. For example, studies could address assumptions or gender schema about appropriate careers, assumptions about the use of tools and technology, or assumptions about the difficulties of

embarking on or succeeding in a science or technology career.

**Outreach and Communication:** Research proposals should address communicating findings to a national audience, particularly to education practitioners. Since the goal of the program is to contribute to a national knowledge base, it is important to show that the investigator is aware of appropriate channels—specific peer-reviewed journals, publications, web sites, professional association conferences—and is committed (including allocating resources) to insure that the investment in the project leads to this contribution and that peers in the community will benefit. Proposers should make a coherent argument that their strategy will be effective at reaching the targeted audiences.

**Project Evaluation:** All GSE proposals must include in the proposal a plan for using benchmarks, indicators, logic models, roadmaps or other evaluative methods to document progress toward goals, objectives and outcomes defined in the proposal—including both intellectual merit and broader impact goals. The evaluation of the proposed effort is separate from the research and outreach activities and so proposers are strongly encouraged to consult with an external evaluator about the kinds of data and data analysis appropriate for assessing the intellectual merit and broader impacts of the project. All projects are expected to track and report in detail their accomplishment of proposed targets for broader impacts and intellectual merit. The budget should include resources for evaluation and assessment. Formative and summative evaluation plans should be appropriate for the scope of the project.

Examples of evaluation data may include, but are not limited to (this is not an exhaustive list):

- Following the progress of data collection and analysis and tracking discrepancies from the original proposal;
- Identifying changes in the project plan that might be necessary as project activities develop;
- Assessing the project team's gains in knowledge or acquisition of new skills;
- Measuring the outcomes of training and development of undergraduate or graduate students included on the research team;
- Tracking the development of any collaborative efforts included in the proposal;
- Following the progress of publishing and developing materials for the outreach and communication of project findings;
- Identifying the potential for the development of strategies or interventions based on the findings;
- Assessing the potential for future research directions;
- Measuring the impact of the research on the field, including other researchers, development of educational products, etc.;
- Assessing the use of research results;
- Developing tracking mechanisms for knowledge transfer across and within STEM fields;
- Documenting the impact of the research on theory-building in the field.

#### D. DESCRIPTION - DIFFUSION OF RESEARCH-BASED INNOVATION PROPOSALS

Diffusion of Research-Based Innovation projects provide a mechanism for engaging a wider audience of practitioners (e.g., teachers, faculty, guidance counselors, parents, policy makers) with research findings and strategies for changing educational practice to address gender-related issues. Diffusion proposals must justify an investment to reach a significant practitioner audience, regional or national attention. The purpose of the proposals submitted to the Diffusion track is to facilitate the use of GSE and other gender-related research findings by audiences that have the potential to impact the choices of targeted learners (e.g., girls, boys, men and/or women). The program places a premium on proposals that are collaborative in nature (e.g., involve more than one institution or organization) and that focus on populations underrepresented across STEM fields (especially underrepresented minority, first generation, or disability communities). Proposals that involve partnerships with minority-serving institutions, community colleges, or K-12 school districts are encouraged.

Diffusion of Research-based Innovation includes three distinct types of GSE awards:

- Pilot projects are designed to provide funds for small-scale development of materials and/or piloting of promising practices; or offer proof-of-concept data for future GSE Extension Service projects. Proposals should include assessment activities to show effectiveness.
- Scale Up projects involve significant collaborations to engage broader national audiences once proof-of-concept evidence is established (i.e., there is evidence of effectiveness) for materials, programs, and strategies related to GSE goals. Proposals should include participants from a variety of institutions/organizations (not a single institution). Collaborative proposals are especially encouraged. These projects are expected to include a comprehensive research or evaluation design, along with documentation of the adaptation and customization of proven gender equity strategies as they are adopted or implemented by diverse institutions on a national scale.
- Dissemination of GSE Outcomes projects communicate the findings from currently- or previously-funded GSE Research, Diffusion or Extension Service projects, to practitioner audiences.

Suggested Pilot projects may include but are not limited to:

- Develop and evaluate resources or technologies designed to be used by STEM practitioners that provide information and instruction on promising strategies related to gender equity in K-16 education, and pilot their use.
- Organize and evaluate training sessions around a particular gender equity practice or strategy related to male or female students in K-16 STEM at a specific educational level or transition point. Workshops on recruitment and retention in undergraduate engineering departments, or symposia on strategies for strengthening recruitment of students into computer science are examples. Training would target education practitioners and other adult populations.
- Develop and evaluate a media presentation (e.g., radio, TV, video, cyberlearning platforms) or materials that support an existing media product, that educate practitioner communities and/or the public about girls' and/or boys' education in STEM and factors contributing to interest, performance, or choice of careers.
- Develop and evaluate a train-the-trainer model for a comprehensive program of change around gender-equity knowledge and strategies and that may serve as evidence of proof-of-concept in a GSE Extension Service proposal. Emphasis should be placed on gathering evaluation data assessing the materials and strategies as well as on the viability of the GSE Extension Service train-the-trainer model for the target community of practitioners.

Suggested Scale Up projects may include but are not limited to:

- Develop, implement, and evaluate a series of training sessions or workshops that use proven materials and strategies (evidence of the promise of particular practices must be included in the proposal) to reach wide practitioner audiences (regional or, preferably national) with promising practices related to gender equity in K-16 education. The project should follow workshop or training session participants to evaluate and document the adaptation and customization of the materials and strategies as they are adopted by practitioners over time.
- Design, implement and evaluate a widespread diffusion campaign that makes materials and resources (with evidence of effectiveness) available to a national audience of practitioners and provides guidance and consulting services about implementation. The project should also document the adaptation and customization of proven gender equity strategies as they are adopted or implemented by diverse institutions on a national scale.

Suggested Dissemination of GSE Outcomes projects may include but are not limited to:

- Use cyberlearning or internet diffusion systems, public media networks, or other innovative digital and print publications to provide information about GSE research findings and strategies related to gender to increase participation in STEM education.
- Translate GSE research findings into strategies that work to mitigate gender-based differences in STEM education or workforce participation and create materials that engage appropriate practitioner and public audiences.
- Engage organizations or other audiences that have access to particular practitioner communities (e.g., professional associations or teacher organizations) with strategies and materials based on GSE research, diffusion, or extension service project results and provide strategies for reaching their members or other audiences with the resources.

**Outreach and Communication:** Diffusion of Research-Based Innovation proposals should contain information about how the process and outcomes of the project will be communicated to others in a manner that is accessible and promotes utilization of the innovation(s). This may be through the popular press, professional meeting presentations, workshops, or publication in peer-reviewed journals or professional society newsletters, among other outlets.

**Project Evaluation:** All GSE proposals must include in the project a plan for using benchmarks, indicators, logic models, roadmaps or other evaluative methods to document progress toward goals, objectives and outcomes defined in the proposal. All proposals should include an external evaluator and a plan for the kinds of data and data analysis appropriate for assessing the intellectual merit and broader impacts of the project. All projects are expected to track and report in detail their accomplishment of proposed targets for broader impacts and intellectual merit. The budget should include resources for evaluation and assessment. Evaluation plans should be appropriate for the scope of the project.

Process, impact and outcome measures should be defined by the project and should rely on an appropriate mix of qualitative and quantitative measures. Project evaluation should focus on the strategic impacts of project activities. Strategic impacts are lasting outcomes attributable to the project. Anticipated strategic impacts should be specific, realistic, measurable, and achievable through the project's research, educational activities and products.

Examples of such impacts include:

- Gains in knowledge or acquisition of new skills (e.g., target or treatment group has increased comprehension of specific concepts);
- Changes in behavior (e.g., adoption of new institutional policies and practices related to gender and diversity);
- Changes in attitude or affect (e.g., survey results indicating greater interest in gender equitable teaching practices);
- Development and testing of new information products to further advance training and communication in gender equitable practices.
- Increased participation over time by girls and young women in STEM.

Evaluation plans should be appropriate for the scope of the project. Only when appropriate and affordable, projects are encouraged to use experimental and quasi-experimental designs that may include control, treatment or comparison groups. The use of external evaluators is expected. All evaluations should be conducted by an evaluator with some independence from the project. Proposals should include a plan to communicate information about the project, including aspects that are found to be effective and ineffective.

The following references may be helpful in designing an evaluation plan:

- The 2002 User-Friendly Handbook for Project Evaluation (NSF 02-057) (<http://www.nsf.gov/pubs/2002/nsf02057/start.htm>).
- FOOTPRINTS: Strategies for Non-Traditional Program Evaluation (NSF 94-51) (<http://nsf.gov/pubs/1995/nsf9541/index.jsp>).
- Online Evaluation Resource Library (<http://oerl.sri.com/>).
- Field-tested Learning Assessment Guide (FLAG) (<http://www.wcer.wisc.edu/nise/CL1/flag>).
- Evaluation Handbook, W.K. Kellogg Foundation (<http://www.wkcf.org/Pubs/Tools/Evaluation/Pub770.pdf>).
- The American Evaluation Association (AEA) (<http://www.eval.org/>).

## E. DESCRIPTION - EXTENSION SERVICES PROPOSALS

Extension Services projects will develop a cadre of extension service agents through the offering of proactive training, consulting, implementation assistance, and reporting on experience in the field. They will be a conduit for understanding research findings and for adoption of research-based approaches that will increase participation of women and girls in STEM. Extension services should use a train-the-trainer model and incorporate a comprehensive program of change based in evidenced-based practices.

Previous GSE Extension Service grantees are eligible to submit proposals in this funding track. However, proposals must include evidence of significant outcomes from the initial award and should include substantially different activities and/or reach additional audiences. Proposals from previous Extension Service grantees should also include a plan for longitudinal assessment of the impacts of extension service activities on the various cohorts of Extension Service Agents and representatives from practitioner communities.

The major participants in an extension service project include:

- Expert Project Team – representatives of the organization(s) that are the implementers of the project. The team develops the comprehensive program of change and educates and trains a cadre of Extension Service Agents.
- Extension Service Agents – practitioners chosen by the Expert Project Team to be trained and then to train others in the practices identified in the comprehensive program of change.
- Practitioner Community – practitioners who receive training and information from the Extension Service Agents in the practices identified in the comprehensive program of change. The target community may be a mix of teachers, counselors, parents, community leaders, administrators, faculty, and others.
- Research Community – researchers who inform the Expert Project Team and the Extension Service Agents of research- and evidence-based practices and learn from the implementation of the project.

Successful extension service proposals will identify all of the major players and describe their roles in the project. Most important is the development of feedback loops among the different actors that inform the formative and summative evaluation of the project and lead to further research and intervention development.

The Expert Project Team organizing the extension services will integrate various research findings into a comprehensive program that will effect change. The Expert Project Team will then engage a group of educators or other practitioners within a specified region or within a specific community of practice with the mechanisms in the comprehensive program of change. These Extension Service Agents will then engage with and provide training to a wider circle of practitioners in the field. The word "Center" is intentionally not used. The project must meet the business standards of effective customer services: that is, it must be proactive, responsive, timely, customized for educators in the region or community, of high quality, and informed by feedback. (See Wilson & Daviss, 1994, pp. 17-20)

- “Proactive” means that there is an explicit, communicated, ambitious plan for leading change. The plan should be developed following proven business practices and have some “proof of concept” for the methods and techniques proposed.
- “Responsive” means those providing the services understand educators and methods of effective professional development of educators.
- “Customized” means that the services are in touch with the culture of the regional or practitioner community and take advantage of opportunities and other resources unique to the community.
- The “quality” aspect means that the services will show sophistication and credibility in advancing “a comprehensive program of change.” They will utilize the latest peer-reviewed research and draw on the knowledge of researchers who have produced the knowledge base.
- “Informed by feedback” means the services are evaluated and improved continuously.

The Extension Service proposal may include, but is not limited to, some of the following elements:

- Create a coherent and credible comprehensive program of change drawing on tested gender-related approaches with a specialized theme—for example, informal educational programs for middle school, or recruitment or retention techniques for undergraduate students, or K-12 teacher professional development—or designing change around specific STEM content such as gender-related knowledge about engineering, information technology, science, or mathematics learning. The comprehensive program of change should be identified before the proposal is submitted and should have some “proof of concept” evidence of effectiveness.
- Initiate training seminars, workshops, online courses, tutorials or other curricula and approaches to introduce the Extension Service Agents to the wealth of research and research-based resources. The project should use a “train-the-trainer” model.
- Promote a regional or common-interest-based learning community of Extension Service Agents and Practitioners with web-based support to change organizational commitment, policy, and action. Tie the learning to actions and action research.
- Visit implementation projects as consulting partners and allies, to assist with parts of the promoted program.
- Communicate with researchers about implementation outcomes and future research directions.

Since the aim of the services is to change educational practices, direct services to students are not in scope. The target community and the mechanisms to ensure their engagement should be described, especially if the design of the services is premised on special needs and interests based on educational level, race, ethnicity, economic status, and disability, in addition to gender. The target community may be comprised of members of educational institutions or departments having common characteristics. The Expert Project Team should be recognized as experts by the target community and evidence of this should be provided.

Outreach and Communication. The Extension Services have a strong mandate to communicate information to a community. In addition, there should be some plans to network with other educational improvement efforts, education researchers and professional associations to communicate the process and outcomes of the project.

Project Evaluation: All GSE proposals must include in the project a plan for using benchmarks, indicators, logic models, roadmaps or other evaluative methods to document progress toward goals, objectives and outcomes defined in the proposal. All proposals should include an external evaluator and a plan for the kinds of data and data analysis appropriate for assessing the intellectual merit and broader impacts of the project. All projects are expected to track and report in detail their accomplishment of proposed targets for broader impacts and intellectual merit. The budget should include resources for evaluation and assessment. Evaluation plans should be appropriate for the scope of the project.

Process, impact and outcome measures should be defined by the project and should rely on an appropriate mix of qualitative and quantitative measures. Project evaluation should focus on the strategic impacts of project activities. Strategic impacts are lasting outcomes attributable to the project. Anticipated strategic impacts should be specific, realistic, measurable, and achievable through the project’s research, educational activities and products.

Examples of such impacts include:

- Gains in knowledge or acquisition of new skills (e.g., target or treatment group has increased comprehension of specific concepts);
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- Changes in attitude or affect (e.g., survey results indicating greater interest in gender equitable teaching practices);
- Development and testing of new information products to further advance training and communication in gender equitable practices.
- Increased participation over time by girls and young women in STEM.

Evaluation plans should be appropriate for the scope of the project. Only when appropriate and affordable, projects are encouraged to use experimental and quasi-experimental designs that may include control, treatment or comparison groups. The use of external evaluators is expected. All evaluations should be conducted by an external evaluator with some independence from the project. Proposals should include a plan to communicate information about the project, including aspects that are found to be effective and ineffective.

The following references may be helpful in designing an evaluation plan:

- The 2002 User-Friendly Handbook for Project Evaluation (NSF 02-057) (<http://www.nsf.gov/pubs/2002/nsf02057/start.htm>).
- FOOTPRINTS: Strategies for Non-Traditional Program Evaluation (NSF 94-51) (<http://nsf.gov/pubs/1995/nsf9541/index.jsp>).
- Online Evaluation Resource Library (<http://oerl.sri.com/>).
- Field-tested Learning Assessment Guide (FLAG) (<http://www.wcer.wisc.edu/nise/CL1/flag>).
- Evaluation Handbook, W.K. Kellogg Foundation (<http://www.wkcf.org/Pubs/Tools/Evaluation/Pub770.pdf>).
- The American Evaluation Association (AEA) (<http://www.eval.org/>).

Summary of Key Characteristics. Extension Services are characteristically different from the other tracks in the following ways:

- The scope of services is clear and specific; there is a “comprehensive program for change” developed from the latest knowledge and including evidence of “proof of concept” effectiveness.
- The services employ a “train-the-trainer” model to develop a cadre of Extension Service Agents that will reach and communicate gender equitable practices to practitioner communities.
- The marketing of promising practices is based on rigorous and explicit criteria for defining a “promising” practice, and awareness and leveraging of related efforts to define and identify “promising” practices.
- The project takes advantage of dozens of products, guides, handbooks, tutorials, videos, and curricula already developed and with some evidence of “proof of concept” effectiveness. These should already be identified—i.e., first year activities should not involve researching promising practices or developing guides or materials.
- The selected models or approaches that are promoted are based on evidence of effectiveness or success (especially for

- female students) and the evidence is cited.
- The Expert Project Team has credibility for providing the best information available in education and social science research. The target community recognizes the expertise of the service providers.
- The team includes experts (researchers and education practitioners) in gender in STEM on the staff as well as through a network or partnerships. The expert credentials for peer-reviewed research and experience with programs, materials, or approaches are clear and relevant.
- The proposal indicates awareness of the community and/or the region to be reached, its unique characteristics, and special opportunities for cooperation and leverage. The Extension Service is integrated into the geographic- or practitioner-based community to be served. Potential Extension Service Agents are identifiable as a group or sub-group of the target community.
- The Expert Project Team includes expertise in consulting and customer service, and shows awareness of business standards for excellence.
- If there is a specialization or theme to the Extension Services, the rationale and resources are described.
- The scale of potential impact is proportional to the funding level.

#### F. DESCRIPTION - INNOVATION THROUGH INSTITUTIONAL INTEGRATION (I<sup>3</sup>)

Creativity, connectivity, integration, and synergy are keys to innovation and to developing human and institutional capacity to full potential. In both research and education, it is the forging of new links between ideas or methodologies that were previously disparate that frequently paves the way for innovation. When institutions optimize the benefits to be derived from the creative integration of intellectual perspectives or related domains of work, they create important opportunities for making progress on some of the most important scientific, technological, and educational challenges of our time. On individual campuses across the nation, for example, significant synergistic potential can be ignited when scholars and educators in related disciplines work together. Similarly, NSF awardees can harness new synergies by working together with other NSF-funded projects on their own campus or in close geographic proximity. When the results of these synergies are both compatible with and beneficial for the institution(s) involved, successful innovation can be created [i]. Past efforts at integration have shown that opportunities for synergy can be created most successfully when collaborative projects include:

- Clear support from senior administrators;
- A cogent plan of action that includes expectations and staff development;
- Open cross-institutional dialogue that is supported and encouraged;
- A common campus-wide vision and value system that stresses the importance of synergistic efforts;
- The formation of a campus network with a set of individuals who take ownership and provide leadership for the initiative [ii].

The campus network is an important aspect of successful collaboration at every stage of development and is critical to the sustainability and enhancement of created partnerships as well as the institutionalization of new innovations. This network can (a) foster communication across the campus to encourage the formation and dissemination of new ideas, values, and learning; (b) serve as a source of leadership to promote and carry out integrative activities; and (c) develop and sustain existing connections while continually expanding collaborative efforts [iii].

*Innovation through Institutional Integration (I<sup>3</sup>)* challenges faculty, administrators, and others in institutions to think strategically about the creative integration of NSF-funded awards towards a whole that exceeds the sum of its parts. Although there is particular emphasis in I<sup>3</sup> on awards managed by programs in the Directorate for Education and Human Resources (EHR), institutional integration is not limited only to EHR awards but can include other NSF awards with a STEM educational focus. Two or more institutions in geographic proximity might, for example, partner to bridge existing NSF-funded awards on their campuses (e.g., RDE, IGERT, LSAMP, ATE, CREST, REU) to broaden participation in STEM fields and enhance undergraduate research opportunities. Additional connections might be made internationally with faculty or students outside the United States who would add their considerable intellectual and cultural perspectives. As another example, an institution might implement new policies, procedures, or mechanisms that encourage and value synergistic efforts among existing NSF-funded awards (e.g., GK-12, MSP, Noyce, REESE, DRK-12) and with other institutional units to better understand and enhance seamlessness across critical educational junctures, perhaps infusing innovative approaches to cyber-learning.

This effort has the following interrelated goals:

- Increase synergy and collaboration across NSF-funded projects and within/between institutions, towards an educational environment where artificial boundaries are significantly reduced and the student experience is more fully integrated;
- Expand and deepen the impact of NSF-funded projects and enhance their sustainability;
- Provide additional avenues to broaden participation through workforce development, especially for those underrepresented in STEM research and education; attend to seamless transitions across critical educational junctures; and/or provide more effectively for a globally engaged workforce;
- Promote innovative programming, policies, and practices to encourage the integration of STEM research and education; and
- Encourage STEM educational or related research in domains that hold promise for promoting intra- or inter-institutional integration and broader impacts.

Proposals that facilitate either (a) inter-institutional or (b) intra-institutional efforts are encouraged. Proposals may be submitted by (a) a single institution to address intra-institutional goals only or (b) an institution acting on behalf of an institutional partnership to address inter-institutional goals.

Proposals are expected to incorporate a depth and quality of creative, coherent, and strategic actions that extend beyond commonplace approaches to normal institutional operations. Proposals may also be submitted for research on institutional integration or other closely related themes articulated in the goals above.

I<sup>3</sup> is a cross-divisional effort in the Directorate for Education and Human Resources (EHR). For Fiscal Year 2010, proposals are being solicited in nine EHR programs that advance I<sup>3</sup> goals: CREST, GSE, HBCU-UP, ITEST, LSAMP, MSP, Noyce, RDE, and TCUP. All proposals submitted to I<sup>3</sup> through these programs have a common due date and will be reviewed in competition with one another.

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[i] Levine, A. (1980). *Why Innovation Fails*. New York: State University of New York Press. Pg. 160.

[ii] Kezar, A. (2003). *Enhancing Innovative Partnerships: Creating a Change Model for Academic and Student Affairs Collaboration*. *Innovative Higher Education* 28(2): 137-156.

[iii] Kezar, A. (2005). *Redesigning for Collaboration within Higher Education Institutions: An Exploration into the Developmental Process*. *Research in Higher Education* 46(7): 831-860.

## G. PROGRAM EVALUATION

Individual projects funded through the GSE program are expected to cooperate with third-party program evaluation and respond to inquiries, interviews and other approaches for collecting evaluation data across individual grants. All projects should respond to and provide process and outcome data elements that may be summarized across projects.

## H. REVIEWING FOR THE GSE PROGRAM

The GSE program is always looking to expand our reviewer pool. If you are on a GSE proposal submitted this year, then you cannot be a panelist this year. If you did not submit a GSE proposal this year in response to this solicitation, you may volunteer to be a panelist. If you would like to volunteer, notify the program officer or science assistant. Include a URL or a biosketch and a brief description of your research expertise in your e-mail. The program officer will contact you if your area of expertise is relevant and we need panelists in that area. Please send the information to [jjesse@nsf.gov](mailto:jjesse@nsf.gov).

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## J. INFORMATION ABOUT PREVIOUS AWARDS

NSF's web site provides links to abstracts for and other information about awards made by this program under prior names [See the NSF web site](#), or use the [Abstracts of Recent Awards Made Through This Program](#) link at the bottom of the [GSE Homepage](#). Historically, the program has been called "Program for Women and Girls" (PWG), "Program for Gender Equity in Science, Mathematics, Engineering, and Technology" (PGE), and "Gender Diversity in STEM Education" (GDSE).

NSF's web site provides the ability to search awards using custom queries:

- Element Code: 1544 (this will give you all GSE-funded abstracts)

To find more specific awards, it is possible to narrow the search by, for example, using:

- Element Code: 1544 and Keyword: mentoring
- Element Code: 1544 and Keyword: "learning community"
- Element Code: 1544 and Keyword: AZ
- Element Code: 1544 and Keyword: "middle school"

Two compendia of profiles of projects funded by the program, with a comprehensive index, are available in print, CD-ROM, and as an online PDF file using one of the publication numbers. [See NSF online document system](#). In addition, *New Tools*, a catalogue of products available for order from program PIs, is also available. All documents are available at [www.nsf.gov/newformulas](http://www.nsf.gov/newformulas) as well.

National Science Foundation (2003). *New Formulas for America's Workforce: Girls in Science and Engineering*. Arlington, VA, 2003 (NSF 03-207 printed book, NSF 03-208 brochure+CD).

National Science Foundation (2006). *New Formulas for America's Workforce 2: Girls in Science and Engineering*. Arlington, VA, 2006 (NSF 06-60 printed book, NSF 07-9 brochure+CD).

National Science Foundation (2006). *New Tools for America's Workforce*. Arlington, VA, 2006 (NSF 06-59 printed book, NSF 07-9 brochure+CD).

### III. AWARD INFORMATION

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Anticipated funding for new grants in GSE tracks in FY 2010 is \$5,000,000 pending the availability of funds.

Research proposals may request a total budget of \$525,000 for up to three years (average \$175,000 per year, including direct and indirect costs), pending availability of funds.

Diffusion of Research-Based Innovation budgets may request the follow amounts, depending on the type of proposal (Pilot, Scale Up, or Dissemination) and duration: Pilot projects may request \$125,000 per year for 1 to 3 years (including both direct and indirect costs), pending availability of funds. For example, a two year Pilot project could request \$125,000 per year for a total budget of \$250,000. Maximum award size is \$375,000 for three years. Scale Up projects may request \$200,000 per year for 3 to 5 years (including both direct and indirect costs), pending availability of funds. For example, a three year Pilot project could request \$200,000 per year for a total budget of \$600,000. Maximum award size is \$1 million for 5 years. Dissemination of GSE Outcomes projects may request \$125,000 per year for 1 to 3 years (including both direct and indirect costs), pending availability of funds. For example, a two year Dissemination project could request \$125,000 per year for a total budget of \$250,000. Maximum award size is \$375,000 for three years.

Extension Services proposals may request a total budget of \$2.5 million for an average of \$500,000 each year for five years, pending availability of funds. Continued funding in years four and five are contingent on satisfactory performance and availability of funds. Continued funding may be reduced or eliminated if performance is not satisfactory.

GSE expects to fund 7-10 Research proposals, 7-10 Diffusion of Research-Based Innovation proposals of various types, and 1-2 Extension Services proposals, depending on the quality of the submissions and availability of funds. The proposed start dates should be at least seven months from the full proposal deadline. Funds should be budgeted for the principal investigator to attend a two-day grantees' meeting in the Washington, D.C. area, each award year (June time frame).

A limited equipment request (<10% of total budget) may be allowed for projects intensive in educational technology. Funds for office equipment for project staff (including laptops or office computer equipment) are not allowed.

Research proposals and Research projects are eligible for REU (Research Experiences for Undergraduates) supplements, which expressly support the participation of undergraduate students on the project research team, if funds are available. Please see the REU solicitation (09-598) for complete parameters and the method for making a request for an REU supplement. Proposers should consult the Program Director in advance of a request for REU supplements.

Awards for Innovation through Institutional Integration (I3) projects will be made for durations of up to five years, with years four and five dependent on performance, in amounts of up to \$250,000 per year, for a total of up to \$1.25 million over 5 years. I3 awards will be made as continuing grants.

### IV. ELIGIBILITY INFORMATION

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Organization Limit:

Proposals may only be submitted by the following:

- No limits specified for GSE proposals

Eligibility for Innovation through Institutional Integration (I<sup>3</sup>) is limited to institutions of higher education (including two- and four-year colleges) accredited in, and having a campus located in the US. If the proposal is exclusively for I<sup>3</sup> STEM educational or related research, then all categories of proposers

identified in the NSF Grant Proposal Guide are eligible to submit.

PI Limit:

None specified for GSE.

The Principal Investigator for an Innovation through Institutional Integration (I<sup>3</sup>) proposal must be the university provost or equivalent chief academic officer or president, unless the proposal is exclusively for I<sup>3</sup> STEM educational or related research.

Limit on Number of Proposals per Organization:

No limit for GSE.

For Fiscal Year 2010, proposals are being solicited in nine EHR programs that advance the goals of Innovation through Institutional Integration (I<sup>3</sup>): CREST, GSE, HBCU-UP, ITEST, LSAMP, MSP, Noyce, RDE, and TCUP. Given the focus on institutional integration, an institution may submit only one proposal to the I<sup>3</sup> competition for each deadline.

Limit on Number of Proposals per PI:

None Specified

Additional Eligibility Info:

None specified for GSE.

Eligibility for Innovation through Institutional Integration (I<sup>3</sup>) is limited to institutions of higher education (including two- and four-year colleges) accredited in, and with a campus located in the US. If the proposal is exclusively for I<sup>3</sup> STEM educational or related research, then all categories of proposers identified in the NSF Grant Proposal Guide are eligible to submit. An institution may not receive more than one I<sup>3</sup> award.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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Letters of Intent(**required**):

A letter of intent is required for Research and Extension Services proposals prior to the submission of a full proposal. Letters of intent must be submitted via the NSF FastLane system, using the Letter of Intent module. The intended proposal type (research or extension service) must be specified in the first sentence of the Letter of Intent. Letters will be reviewed by NSF staff for purposes of assembling the most appropriate review panel(s) for the full proposals. No feedback will be provided to submitters unless a Letter suggests an inappropriate project for GSE funding. No Letter of Intent is required for Diffusion of Research-Based Innovation proposals. Submission of multiple Letters of Intent is not allowed.

The LETTER OF INTENT is limited to one page and should include basic information about:

- Identify proposal type and name the proposed activity.
- For research proposals: briefly identify the theory, concepts or framework; research questions and hypotheses; target research subjects; and data gathering and analysis techniques.
- For extension service proposals: briefly identify the scope of the service; project participants (expert project team, extension service agents, target practitioner community); and the comprehensive program of change elements.
- Identify any organizations involved;

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Sponsored Projects Office (SPO) Submission is not required when submitting Letters of Intent
- A Minimum of 0 and Maximum of 4 Other Senior Project Personnel are allowed
- A Minimum of 0 and Maximum of 5 Other Participating Organizations are allowed
- Submission of multiple Letters of Intent is not allowed

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov). Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on

the Grants.gov website and on the NSF website at: ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

On the COVER SHEET select the program name "Research on Gender in Science and Engineering" in the Education and Human Resources Directorate, Human Resource Development.

The TITLE should be prefaced with an abbreviation identifying the GSE goal supported by the proposal:

- GSE/RES - for Research proposals
- GSE/DIF - for Diffusion of Research-Based Innovation proposals
- GSE/EXT - for Extension Service proposals

The PROJECT SUMMARY should:

- Name and describe the proposed activity.
- For research proposals: briefly identify the theory, concepts or framework; research question(s) and hypotheses; target research subjects; and data analysis techniques.
- For extension service proposals: briefly identify the scope of the service; project participants (expert project team, extension service agents, target practitioner community); and the comprehensive program of change elements.
- For diffusion of research-based innovation proposals: briefly identify the type of proposal being submitted (Pilot, Scale Up or Dissemination); the scope of the effort; the research-based innovation being diffused; and the target audience.
- State any organizations involved.
- Especially highlight the contribution to knowledge, social, and/or human capital.
- Address each NSF review criterion under separate headings: INTELLECTUAL MERIT and BROADER IMPACTS

The Research PROJECT DESCRIPTION should address:

- Address each NSF review criterion under separate headings: INTELLECTUAL MERIT and BROADER IMPACTS
- Situate the proposed effort within the literature. How is the study connected to related work in the field? Reference prior related work and explain the value added and the national benefit of the proposed work.
- What is the theoretical basis, basic concepts or framework that ground the research?
- What are the major research questions? Do they reflect the current state of knowledge in the literature as well as the theory or conceptual framework?
- What are the hypotheses to be tested?
- Who is the study population and what is the justification for choosing that sample/site? What is the plan to reach that population? What sample size is needed and how is that determined?
- What kinds of data will be gathered and how? What methods will be used to analyze the data and why are these best for this project? How do the data collection and analysis methods tie back to your research question/hypotheses and framework? How will reliability and validity of the data be tested and strengthened?
- Identify key team members, consultants, and advisors. Relate their qualifications and skills to specific components of the proposed work.
- Outline a project timeline and management plan.
- Describe plans for broad outreach and communication of findings.
- Describe and evaluation plan. How will the project be assessed and evaluated in terms of goals, objectives and outcomes of the project (including both broader impacts and intellectual merit)? What data will be gathered to evaluate goals, objectives and outcomes?
- For prior grantees, include a discussion of the results of prior work and how the current project relates to that prior work (**required**).

Common weaknesses in research proposals (according to Dietz, et al, 2002) are:

1. Poor formulation of research questions
2. Poor articulation of research design, theory, hypotheses or methods
3. Failure to recognize multiple studies have been conceived as a single study
4. Failure to situate the study or its potential findings within prior work and literature
5. Failure to situate the study or its potential findings within a framework or theory
6. Weak links between research goals and proposed methodology

The Diffusion of Research-Based Innovation PROJECT DESCRIPTION should address:

- Identify the type of Diffusion of Research-Based Innovation proposal being submitted: Pilot, Scale-up or Dissemination.
- Address each NSF review criterion under separate headings: INTELLECTUAL MERIT and BROADER IMPACTS
- What research-based innovation(s) will be diffused? For Scale-up projects include evidence of effectiveness for the innovations.
- What is the goal of the diffusion effort, and what is the justification for it?
- What audience will be reached, how, and what is the desired impact on the audience?
- What is the context of the diffusion effort; what other projects, events, or products exist and how does this project contribute national benefits?
- Describe the management plan and timeline.
- Describe the qualifications of key team members and suitability for their role in the project.
- Provide a list of advisory committee members and description of their level of involvement, if an advisory committee is proposed.
- Describe plans for broad outreach and communication of findings and/or activities.
- Describe an evaluation plan. How will the project be assessed and evaluated in terms of goals, objectives and outcomes of the project (including both broader impacts and intellectual merit)? What data will be gathered to evaluate goals, objectives

- and outcomes? Who will do the evaluation?
- For prior grantees, a discussion of the results of prior NSF-funded work and how that work might be related to the current proposal. (**required**).

The Extension Services PROJECT DESCRIPTION should address:

- Address each NSF review criterion under separate headings: INTELLECTUAL MERIT and BROADER IMPACTS
- What is the scope of the service, in terms of geography, community, and/or intellectual specialization? What is the rationale for this scope? (Why this scope? What are the advantages, benefits, strengths?)
- Describe a comprehensive program of change to be extended. How have promising practices, products, or curricula been chosen as part of the program? What is the evidence ("proof of concept") for the effectiveness of the selected models, approaches or materials?
- Describe the materials to be used in the extension service efforts. Are the materials already developed and available? If not, will they be before the start of the extension services effort?
- Identify the Expert Project Team and Researchers involved and their roles. What expertise related to the project is possessed by the Expert Project Team members? What is the relationship between the Expert Project Team and the community to be served?
- Identify the target population of Extension Service Agents and Practitioners and describe the methods for extension --What is the train-the-trainer model to be employed? How will Extension Service Agents and Practitioners be reached? What activities and products are planned for this community?
- Describe the business practices for providing good extension services to the community. Outline a project timeline and management plan.
- What kinds of feedback loops will be created? How will each group involved give and get feedback about how the project is working? Describe how the services will be networked with other educational improvement efforts or professional associations.
- Describe a plan for project evaluation including measures of goals, objectives and outcomes. How will the goals, objectives and outcomes of the project (including both broader impacts and intellectual merit) be measured?
- What is the potential impact of this particular service over 3-5 years?
- Describe plans for broad outreach and communication of findings.
- For prior grantees, a discussion of the results of prior work (**required**).
- For previous GSE Extension Service grantees, discuss outcomes from the first extension service award; make explicit how this proposal is different or similar to previous activities; and include a plan for longitudinal assessment of outcomes from both extension service projects.

REFERENCES CITED: All references cited in the Project Summary and Project Description should be listed in this section

BIOSKETCHES: Biosketches for the PI, Co-PI(s) and senior project personnel are required. Biosketches MUST follow the NSF guidelines outlined in the NSF Grant Proposal Guide or NSF Grants.gov Application Guide and may not be longer than 2 pages.

BUDGET AND BUDGET JUSTIFICATION: Budgets should be in NSF format and include up to three pages of budget justification. The budget justification should be in narrative form and include detailed explanations for each line item with budget resources listed in the budget. Information about what may or may not be included in the budget or budget justification is outlined in the NSF Grant Proposal Guide and NSF Grants.gov Application Guide. If a subaward is indicated in the budget, a subaward budget must also be submitted.

FACILITIES AND EQUIPMENT: A list of current facilities and equipment to be used in the implementation of the project activities should be included in this section. Further information is available in the NSF Grant Proposal Guide or NSF Grants.gov Application Guide.

SUPPLEMENTARY DOCUMENTS: Only those supplementary documents listed in the Grant Proposal Guide or NSF Grants.gov Application Guide are allowed to be appended in the Supplementary Document section. Additional project description, examples of survey or interview protocols, past PI efforts, or other project-related materials are NOT ALLOWED. The inclusion of Letters of Support from participating organizations is strongly encouraged. Any biosketches included in the Supplementary Document section must conform to NSF guidelines and may be only 2 pages in length.

#### INNOVATION THROUGH INSTITUTIONAL INTEGRATION (I<sup>3</sup>) PROPOSALS

The proposal should articulate the project's vision, goals, and anticipated outcomes and describe how the project will achieve them. The proposal should draw on the existing, relevant base of literature and articulate how the plan of work is so informed. It is expected that implementation of the plan of work will impact participating NSF awards, as well as other relevant parts of the institution(s). The proposal should, therefore, address how the goals of the overall project are compatible with the goals of the individual integrated components, as well as how the project is both compatible with and beneficial for the host institution(s). The proposal should include a management/governance plan that describes who is responsible for what, a timeline, and an evaluation plan. All proposals must clearly demonstrate that the submitting team has the capability to manage the project, organize the work, and meet deadlines.

Each proposed implementation project in Innovation through Institutional Integration (I<sup>3</sup>) should have an evaluation plan to assess progress and success in meeting project goals and objectives. An independent, external project-level evaluation is to be conducted to inform the institution and others of the progress and findings of the grant activities, especially those that address the project's synergistic activity (i.e., the value added by I<sup>3</sup>). I<sup>3</sup> projects are expected to have baseline data, establish measurable targets, and collect evidence to determine annual progress and long-term outcomes. If applicable, it is highly desirable to establish a systematic plan to track student participants beyond their involvement in the project. Project-level evaluation should be designed to offer feedback for strengthening implementation over the course of the project, provide credible evidence to justify continued investment in the project, and report results (and describe models/paradigms) of institutional and/or disciplinary changes associated with the investment strategy.

Each I<sup>3</sup> project, as part of a national effort, is expected to cooperate in the monitoring and independent portfolio evaluation efforts conducted by NSF's contracted evaluators. While each project will propose its own types of specific qualitative and quantitative measures, some later standardization of performance monitoring is anticipated so that NSF can conduct a summative/impact evaluation. The I<sup>3</sup> portfolio (summative/impact) evaluation will be designed to determine how effectively I<sup>3</sup> is contributing to the knowledge base, building a community of innovators, strengthening/advancing the higher education STEM infrastructure, and promoting collaborations that advance the goals of I<sup>3</sup>.

Proposals for research must address one or more I<sup>3</sup> goals and discuss the current state of knowledge relevant to the project. This brief literature review should clearly inform the proposed research. The project description should identify the methods the project will

use and explain why those methods are appropriate to the questions that the proposal addresses. Methodologies must be matched with strategic research questions, and the logic among research question, method, analysis, inference, and evidence should be well articulated.

The results of prior, relevant NSF investment(s), **especially projects on which the proposed institutional integration is based**, are to be described and supported by data, along with a discussion of both successes and failures. The proposal should also clearly indicate how the intended work differs from, builds on, or is otherwise informed by prior efforts.

## B. Budgetary Information

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Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Research proposals may request a total budget of \$525,000 for up to three years (average \$175,000 per year, including direct and indirect costs), pending availability of funds.

Diffusion of Research-Based Innovation budgets may request the follow amounts, depending on the type of proposal (Pilot, Scale Up, or Dissemination) and duration: Pilot projects may request \$125,000 per year for 1 to 3 years (including both direct and indirect costs), pending availability of funds. For example, a two year Pilot project could request \$125,000 per year for a total budget of \$250,000. Maximum award size is \$375,000 for three years. Scale Up projects may request \$200,000 per year for 3 to 5 years (including both direct and indirect costs), pending availability of funds. For example, a three year Pilot project could request \$200,000 per year for a total budget of \$600,000. Maximum award size is \$1 million for 5 years. Dissemination of GSE Outcomes projects may request \$125,000 per year for 1 to 3 years (including both direct and indirect costs), pending availability of funds. For example, a two year Dissemination project could request \$125,000 per year for a total budget of \$250,000. Maximum award size is \$375,000 for three years.

Extension Services budgets may be for a total of \$2,500,000 (average approximately \$500,000 per year) for five years, with years four and five dependent upon performance.

Funds should be budgeted for the principal investigator or a project member to attend a two-day grantees' meeting in the Washington, D.C. area, each award year, in June.

A limited equipment request (<10% of total budget) may be allowed for projects intensive in educational technology. Office equipment for project staff (including laptops and computer equipment) are expected to come from other sources. (See Section III)

Awards for Innovation through Institutional Integration projects will be made for durations of up to five years, with years four and five dependent on performance, in amounts of up to \$250,000 per year, for a total of up to \$1.25 million over 5 years. Innovation through Institutional Integration awards will be made as continuing grants.

## C. Due Dates

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- Letter of Intent Due Date(s) (**required**) (due by 5 p.m. proposer's local time):

February 10, 2010

Required Research Letter of Intent

September 07, 2010

First Tuesday in September, Annually Thereafter

Required Extension Service Letter of Intent

February 09, 2011

Required Research Letter of Intent

- Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

March 23, 2010

Research Full Proposals

April 07, 2010

Innovation through Institutional Integration

October 14, 2010

Second Thursday in October, Annually Thereafter

Extension Service Proposals (accepted only after submission of a required Letter of Intent)

October 14, 2010

Second Thursday in October, Annually Thereafter

Diffusion of Research-based Innovation Proposals

March 22, 2011

Research Full Proposals

## D. FastLane/Grants.gov Requirements

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- For Proposals Submitted Via FastLane:

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

**Submission of Electronically Signed Cover Sheets.** The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage:

[http://www07.grants.gov/applicants/app\\_help\\_reso.jsp](http://www07.grants.gov/applicants/app_help_reso.jsp). In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: [support@grants.gov](mailto:support@grants.gov). The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

**Submitting the Proposal:** Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

### A. NSF Merit Review Criteria

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All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

## Additional Solicitation Specific Review Criteria

In addition to the two NSF criteria for Intellectual Merit and Broader Impacts, special review criteria for Innovation through Institutional Integration (I<sup>3</sup>) implementation projects are:

- The extent to which the proposed project addresses the interrelated goals for institutional integration and adds value to existing NSF awards.
- The extent to which there is a demonstrated track record of success for the existing NSF awards on which the proposed institutional integration is based.
- The degree of innovation in the proposed project as evidenced by a depth and quality of creative, coherent, and strategic actions that extend beyond commonplace approaches to normal institutional operations.
- The extent to which the proposed project addresses programming, policies, and practices commensurate with the sustained institutional change needed to seed and nurture appropriate, synergistic relationships among discrete NSF awards.

NSF staff also will give careful consideration to the following in making funding decisions:

### ***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

### ***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

## **B. Review and Selection Process**

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Proposals submitted in response to this program solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

## **VII. AWARD ADMINISTRATION INFORMATION**

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### **A. Notification of the Award**

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Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

### **B. Award Conditions**

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An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); \* or Research Terms and Conditions \* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF

Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

\*These documents may be accessed electronically on NSF's Website at [http://www.nsf.gov/awards/managing/award\\_conditions.jsp?org=NSF](http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

Special Award Conditions:

Extension Services awards will be made for up to five years. Funding for years four and five is contingent on performance and availability of funds, as evaluated from annual reports and site visit reports. If performance is not satisfactory, then continued funding will be reduced.

## C. Reporting Requirements

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For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational), publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

## VIII. AGENCY CONTACTS

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*Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.*

General inquiries regarding this program should be made to:

- Jolene Jesse, Program Director, 815 N, telephone: (703) 292-7303, fax: (703) 292-9018, email: [jjesse@nsf.gov](mailto:jjesse@nsf.gov)
- Nicole Godwin, Program Assistant, telephone: (703) 292-8378, email: [ngodwin@nsf.gov](mailto:ngodwin@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).
- Victoria A. Smoot, Financial Operation Specialist, 815 N, telephone: (703) 292-4677, fax: (703) 292-9018, email: [vsmoot@nsf.gov](mailto:vsmoot@nsf.gov)
- Nicole Godwin, Program Assistant, telephone: (703) 292-8378, email: [ngodwin@nsf.gov](mailto:ngodwin@nsf.gov)

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: [support@grants.gov](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

The program does not currently fund intervention or education projects that directly serve students as their primary purpose. Those wishing to undertake direct intervention or education service projects are encouraged to search the

NSF web site and other publications for appropriate funding programs. Some potential programs to consult include the following, although there may also be other programs not on this list:

- Discovery Research K-12 (DR-K12) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=500047&org=DRL&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=500047&org=DRL&from=home);
- Advanced Learning Technologies (ALT) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12834&org=DRL&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12834&org=DRL&from=home);
- Advanced Technological Education (ATE) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5464&org=DRL&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464&org=DRL&from=home);
- Informal Science Education (ISE) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5361&org=DRL&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5361&org=DRL&from=home);
- Information Technology Experiences for Students and Teachers (ITEST) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5467&org=DRL&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5467&org=DRL&from=home);
- Research and Evaluation on Education in Science and Engineering (REESE) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13667&org=DRL&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13667&org=DRL&from=home);
- Course, Curriculum and Laboratory Improvement (CCLI) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5741&org=DUE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5741&org=DUE&from=home);
- Science, Technology, Engineering and Mathematics Talent Expansion Program (STEP) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5488&org=DUE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5488&org=DUE&from=home);
- Broadening Participation in Computing (BPC) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13510&org=CNS](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13510&org=CNS);
- Engineering Education Programs (EEP) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13374&org=EEC](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13374&org=EEC);
- Research Experiences for Undergraduates (REU) - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5517&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&from=fund).

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