

Instrument Development for Biological Research (IDBR)

PROGRAM SOLICITATION

NSF 13-561

REPLACES DOCUMENT(S):

NSF 10-563



National Science Foundation

Directorate for Biological
Sciences

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

July 31, 2013

July 25, 2014

Last Friday in July, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

Revision Summary

There have been clarifications and updates to the 2010 solicitation as follows:

1. The program will accept two types of proposals:

TYPE A - Innovation: Proposals for the development of novel instrumentation that provides new research capabilities or, where appropriate, that significantly improves current technologies by at least an order of magnitude in fundamental aspects such as accuracy, precision, resolution, throughput, flexibility, portability, breadth of application, costs of construction or operation, or user-friendliness.

TYPE B - Bridging: Proposals for transforming, 'one of a kind' prototypes or high-end instruments into devices that are broadly available and utilizable without loss of capacity.

2. The overview section in the project summary must start with the following sentences:

This is a TYPE [specify A or B] proposal to develop a _____ (device/instrument) whose purpose is to _____ . The proposed research will benefit the following biological research community: _____ .

3. A strong dissemination plan is required and must discuss user access. For proposals of Type A - Innovation, the dissemination plan must discuss strategies to communicate the development and utility of the instrument/technology to an identified biological research user community, and plans for broad distribution of the technology once it is developed. For proposals of Type B - Bridging the plan must identify specific mechanisms for distribution of the technology to the user community. If appropriate, PIs should include plans to seek Small Business Innovation Research & Small Business Technology Transfer (SBIR/STTR) Program http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13371&from=fund or similar support after the duration of the IDBR award.

Also, if appropriate, industrial participation during the IDBR-supported program, e.g., via a Grant Opportunities for Academic Liaison with Industry (GOALI)-like mechanism is encouraged; see: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504699.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPP) (NSF 16-1), which is effective for proposals submitted, or due, on or after January 25, 2016.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Instrument Development for Biological Research (IDBR)

Synopsis of Program:

The Instrument Development for Biological Research (IDBR) Program supports the development, production, and distribution of novel instrumentation that addresses demonstrated needs in biological research in areas supported by NSF Biology programs (see <http://www.nsf.gov/bio>). These systems would benefit a broad user community through mass distribution of the technology. Interdisciplinary collaborations are strongly encouraged, as are partnerships with U.S. industries that can facilitate knowledge transfer, commercialization and broad utilization in the research community. The program accepts two types of proposals:

Type A - Innovation: Proposals for the development of novel instrumentation that provides new research capabilities or, where appropriate, that significantly improves current technologies by at least an order of magnitude in fundamental aspects such as accuracy, precision, resolution, throughput, flexibility, breadth of application, costs of construction or operation, or user-friendliness.

Type B - Bridging: Proposals for transforming 'one of a kind' prototypes or high-end instruments into devices that are broadly available and utilizable without loss of capacity. If appropriate, PIs should seek [SBIR/STTR](#) Program, or similar support mechanism for implementation of broad distribution following an IDBR award.

The IDBR program does not support access to an individual instrument in a user facility, or to data collected thereby; such proposals should be submitted to other relevant programs or agencies. Projects focused on enhancing research capabilities in a specific research lab, institution, center or consortium are not eligible for IDBR support. Similarly not eligible are projects for the development of methods, assays, or software for instrument operation, data acquisition or analysis, except as a component of the instrument development and testing.

In addition to NSF's standard merit review criteria (http://www.nsf.gov/bfa/dias/policy/merit_review/) the following additional criteria will be considered in proposal evaluation:

Type A - Innovation: Need and potential impact on biological research; novelty of the device or clear demonstration of at least an order of magnitude improvement over available technologies; feasibility of the technical plan; novelty of the dissemination plan; and inclusion of the biological user community.

Type B - Bridging: The magnitude of the potential biological user community and demonstrated strength of need; feasibility of the technical plan; and quality of the dissemination plan to make the technology broadly available to the community.

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.

- Christopher Sanford, 615, telephone: (703) 292-8470, email: csanford@nsf.gov
- Robert D. Fleischmann, 615, telephone: (703) 292-7191, email: rfleisch@nsf.gov

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

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 12 to 17

10 to 12 for Type A; 2 to 5 for Type B.

Anticipated Funding Amount: \$4,000,000 (approximately) will be available for new IDBR awards in FY 2014, pending availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Consortia of only the eligible organizations listed here. Separately submitted collaborative proposals from the eligible organizations will also be accepted. Organizations ineligible to submit to this program solicitation may not receive subawards.

Who May Serve as PI:

None specified

Limit on Number of Proposals per Organization:

None specified

Limit on Number of Proposals per PI or Co-PI:

There is no limit on the number of proposals that may be submitted by an investigator or institution. However, in the interest of diversifying the number of PIs, gender, geography, etc., in each competition it is unlikely that multiple awards to a single PI or institution will be made.

Also note per GPG Chapter I.G.2. Submission Instructions:

The same work/proposal cannot be funded twice. If the proposer envisions review by multiple programs, more than one program may be designated on the Cover Sheet. The submission of duplicate or substantially similar proposals concurrently for review by more than one program without prior NSF approval may result in the return of the redundant proposals. (See GPG Chapter IV.B for further information.)

Research proposals to the Biological Sciences Directorate ONLY (not proposals for conferences or workshops) cannot be duplicates of proposals to any other Federal agency for simultaneous consideration. The only exceptions to this rule are: (1) when the proposers and program officers at relevant Federal agencies have previously agreed to joint review and possible joint funding of the proposal; or (2) proposals for PIs who are beginning investigators (individuals who have not been a principal investigator (PI) or co-principal investigator (co-PI) on a Federally funded award with the exception of doctoral dissertation, postdoctoral fellowship or research planning grants). For proposers who qualify under this latter exception, the box for "Beginning Investigator" must be checked on the Cover Sheet.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **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.
 - 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)

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

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
 - July 31, 2013
 - July 25, 2014
 - Last Friday in July, Annually Thereafter

Proposal Review Information Criteria

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

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

Advances in the biological sciences are increasingly dependent upon the development of novel instrumentation for collection of new data. For over 20 years, the Directorate for Biological Sciences (BIO) has supported the development and major improvement of instrumentation necessary to advance the biological sciences through awards made by its Instrument Development for Biological Research (IDBR) program. These projects must integrate biological sciences through the development and testing phases, and have broad, demonstrable benefit to the biological sciences community.

The anticipated uses of the instrumentation to be developed or improved should include areas of research and education that fall within the scope of the Directorate for Biological Sciences for improved understanding of fundamental biological phenomena (see <http://www.nsf.gov/bio>) at any level of biological organization, from molecules to ecosystems.

Examples of recent IDBR awards can be found at: <http://www.nsf.gov/awardsearch/advancedSearchResult?ProgEleCode=1108&BooleanElement=ANY&BooleanRef=ANY&ActiveAwards=true&>

Applicants should note, however, that the program seeks to diversify the range of available instrumentation and may therefore support development in areas not previously funded.

II. PROGRAM DESCRIPTION

The program will accept two types of proposals:

Type A - Innovation: For the development of novel instrumentation that provides new research capabilities or, where appropriate, that significantly improves current technologies by at least an order of magnitude in fundamental aspects such as accuracy, precision, resolution, throughput, flexibility, breadth of application, costs of construction or operation, or user-friendliness. These proposals should have the capacity to transform or enhance biological studies.

Type B - Bridging: For transforming 'one of a kind' prototypes or high-end instruments into devices that are broadly available and utilizable without loss of capacity. These proposals should significantly broaden access to complex and/or expensive 'one of a kind' research tools.

This program does not support access to an individual instrument in a user facility, or to data collected thereby; such proposals should be submitted to other relevant programs or agencies. Projects focused on enhancing research capabilities in a specific research lab, institution, center or consortium are not eligible for IDBR support. Similarly not eligible are projects for the development of methods, assays, or software for instrument operation, data acquisition or analysis, except as a component of the instrument development and testing.

Impact on Research: Proposals must clearly demonstrate that the instrumentation addresses a need in an area of fundamental biological research as supported by the BIO directorate, and that extends beyond a particular group or a small number of researchers. The proposal should provide evidence that the instrument development will address the unique needs of biological research. Inclusion of specific examples of research projects that would be enabled by the proposed instrumentation is strongly encouraged, although it should be emphasized that the IDBR program supports only system testing and validation, and not specific applications (which should be supported elsewhere).

Impact on Education and Outreach: The development of new instrumentation provides an ideal opportunity for student training across multiple disciplines. The IDBR program expects that all projects will include a provision for the training or education of undergraduate, graduate, and/or postdoctoral students. Activities which increase participation of colleagues at smaller institutions, minority-serving institutions, community colleges, and K-12 students and teachers are also encouraged. Interdisciplinary training is strongly encouraged. Education and outreach activities must be integrated with the research focus.

Dissemination: The program encourages partnerships with U.S. industries to facilitate knowledge transfer, commercialization and broad utilization in the research community, including mechanisms such as Grant Opportunities for Academic Liaison with Industry (GOALI). To promote interactions between the instrument development community and identified communities of biological researchers, activities such as workshops and the development of virtual organization frameworks should be detailed.

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 12 to 17 total: 10 to 12 for Type A; 2 to 5 for Type B.

Anticipated Funding Amount: \$4,000,000 (approximately) will be available for new IDBR awards in FY 2014, pending availability of funds.

There are no specific limits on the amount of funds that may be requested however requested funds and support duration should be commensurate with the proposed activities. The period of support requested for Type A - Innovation proposals should not exceed 36 months. Type B - Bridging proposals, whose focus is transformation of currently available high-end devices, are limited to 24 months.

The budget justification, which must not exceed three pages, should itemize, justify and explain all project costs.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Consortia of only the eligible organizations listed here. Separately submitted collaborative proposals from the eligible organizations will also be accepted. Organizations ineligible to submit to this program solicitation may not receive subawards.

Who May Serve as PI:

None specified

Limit on Number of Proposals per Organization:

None specified

Limit on Number of Proposals per PI or Co-PI:

There is no limit on the number of proposals that may be submitted by an investigator or institution. However, in the interest of diversifying the number of PIs, gender, geography, etc., in each competition it is unlikely that multiple awards to a single PI or institution will be made.

Also note per GPG Chapter I.G.2. Submission Instructions:

The same work/proposal cannot be funded twice. If the proposer envisions review by multiple programs, more than one program may be designated on the Cover Sheet. The submission of duplicate or substantially similar proposals concurrently for review by more than one program without prior NSF approval may result in the return of the redundant proposals. (See GPG Chapter IV.B for further information.)

Research proposals to the Biological Sciences Directorate ONLY (not proposals for conferences or workshops) cannot be duplicates of proposals to any other Federal agency for simultaneous consideration. The only exceptions to this rule are: (1) when the proposers and program officers at relevant Federal agencies have previously agreed to joint review and possible joint funding of the proposal; or (2) proposals for PIs who are beginning investigators (individuals who have not been a principal investigator (PI) or co-principal investigator (co-PI) on a Federally funded award with the exception of doctoral dissertation, postdoctoral fellowship or research planning grants). For proposers who qualify under this latter exception, the box for "Beginning Investigator" must be checked on the Cover Sheet.

Additional Eligibility Info:

Projects aimed at instrumentation whose primary use will be in studies of the etiology, diagnosis or treatment of physical or mental disease, abnormality, or malfunction in human beings or animals are not supported by IDBR. Similarly, the development or testing of drugs or of instruments whose primary application is in pharmaceutical chemistry are not eligible for support. Such projects should be addressed to an appropriate program in another NSF Directorate or to another agency.

Projects in which the main portion of the instrument development activity will be subcontracted to a Federally Funded Research and Development Center (FFRDC) or a commercial (for profit) organization are not eligible for support by IDBR, and should be addressed to another appropriate NSF program or to another agency.

Projects in which the goal of the instrument development is enhancing research capabilities in a specific research lab, institution, center or consortium are not eligible for support and should be addressed to another appropriate NSF program or to another agency.

The IDBR program closely coordinates efforts with other related NSF programs and PIs are encouraged to contact the relevant program officers to determine which program fits their proposal best. For example:

- Chemical Measurement and Imaging (CMI) in the Division of Chemistry http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503413&org=CHE&from=home;
- Major Research Instrumentation (MRI) Program: Instrument Acquisition or Development, in the Office of International and Integrative Activities (OIIA) http://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=5260&ods_key=nsf13517.%20%20;
- Multiple programs in the Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET) in the Directorate for Engineering <http://www.nsf.gov/div/index.jsp?div=CBET>.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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. 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. 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). 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.

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.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

See Chapter II.C.2 of the [GPG](#) for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

The following additions or modifications apply to proposals submitted to this Program:

A. Cover Sheet:

FastLane Users: Indicate the number of this program solicitation in the appropriate box. In the box labeled "For consideration by NSF organizational unit," select "INSTRUMENTAT & INSTRUMENT DEVT" from the drop-down list. **Grants.gov Users:** The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page. Grants.gov users should refer to Section VI.1.2. of the NSF Grants.gov Application Guide for specific instructions on how to designate the NSF Unit of Consideration.

B. Title of Proposal:

The proposal title should begin with "IDBR: TYPE A" or "IDBR: TYPE B" and be descriptive of the development activity to be pursued. If vertebrate animals or human subjects will be used, check the appropriate box, and provide the date of IRB or IACUC approval. If approval has not been obtained at the time of submission, indicate "pending" or "planned" instead of a date. If needed, such approval may be obtained after proposal review, but approval must be obtained before an award can be made.

C. Project Summary:

This section may not exceed 1 page in length. The overview must start with the following sentences:

This is a TYPE [specify A or B] proposal to develop a _____ (device/instrument) whose purpose is to _____. The proposed research will benefit the following biological research community: _____.

As required of all NSF proposals, the project summary must also clearly address in separate statements:

- (1) **Intellectual Merit of the proposed activity:** This section should include a brief description of the relevant need in biological studies, the proposed instrument, the type of the development (Type A or Type B), and the nature of the improvement (collecting previously inaccessible data, improving on a capability of current instruments, broadening accessibility, etc.).
- (2) **Broader Impacts resulting from the proposed activity:** As defined by the GPG, including the potential impact of the device of the research community, education and outreach plans, and the instrument dissemination plans.

The summary should be understandable to a scientifically literate reader that is not necessarily an expert in the field. It should not contain unexplained abbreviations or technical terms specific to a narrow field.

Proposals that do not contain the Project Summary, including an overview and separate statements on intellectual merit and broader impacts, will not be accepted by FastLane or will be returned without review.

D. Project Description:

This section may not exceed 15 pages and must include the following sections:

- (1) **Needs Assessment, value of the instrument for biological research, and potential user community:** The proposal must demonstrate that the instrument addresses a general need in fundamental biological research and clearly define the research gaps that the new instrumentation will address. Enhancing research capabilities in a specific lab, institution, center or consortia is not eligible for support by IDBR.

- The proposal must explain why no existing instrumentation can adequately fill the expected role of the proposed system, including a comparison of performance criteria to currently available technologies. Providing explicit examples of studies that would be enabled by the device is encouraged (although it should be noted that the research component supported by the project must be for testing or 'proof of concept' only).

(2) *Development Plan*: Describe the development program to be undertaken, including the design of the proposed instrument, performance metrics, the biological research motivations for performance criteria and how the design plan derives from these motivations. Provide in detail sufficient to allow assessment of the feasibility of the instrument and the potential success of the project. Included in this section should be details of a timeline for assessing instrument development objectives.

(3) *Management Plan*: A detailed task analysis must be provided to justify the personnel funding required for the duration of the proposed project. Included in this section should be details on project management.

(4) *Dissemination Plan*: To facilitate access to instrumentation developed through the IDBR program by the biological research community, a dissemination plan must be included. Where appropriate, PIs should include explicit plans to apply for GOALI, SBIR, STTR or other such support mechanisms at the end of the IDBR award.

- For proposals of Type A - Innovation, the dissemination plan must discuss strategies to communicate the development and utility of the instrument/technology to an identified biological research user community, and plans for broad distribution of the technology once it is developed. Innovative strategies that go beyond publications or presentations in conferences are especially encouraged. Plans for future mass-distribution and/or production of the device/technology, technology once it is developed must also be discussed.
- For proposals of Type B - Bridging, the dissemination plan must identify specific mechanisms for distribution of the technology to the user community. The plan must be feasible (e.g. many biologists would not be able to build their own multi-photon detector based on plans posted on the web), and include plans for sustainability beyond the duration of the award. Partnerships with U.S. industries are strongly encouraged to facilitate knowledge transfer, commercialization and broad utilization.

(5) *Education and Outreach*: The development of new instrumentation provides an ideal opportunity for student training across multiple disciplines. The IDBR program expects that all projects will include a provision for the training or education of undergraduate, graduate, and/or postdoctoral students. Activities which increase participation of colleagues at smaller institutions, minority-serving institutions, community colleges, and K-12 students and teachers are also encouraged. Interdisciplinary training is strongly encouraged. Education and outreach activities must be integrated with the research focus.

(6) *Results from Prior NSF Support (not more than 5 pages in length)*: Describe the results of any relevant NSF award received by the PI or co-PIs in the last five years. Only describe projects related to the proposed project, if any. This description should discuss the broader impacts of the previous support.

(7) *Other Notes*: In the case of resubmitted proposals, reviewers are not given access to a proposal's history. PIs may choose to include a section within the project description that outlines the previously received critiques and the manner in which the current submission addresses them.

E. Budget:

There are no specific limits on the amount of funds that may be requested however requested funds and support duration should be commensurate with the proposed activities. The period of support requested for Type A - Innovation proposals should not exceed 36 months. Type B - Bridging proposals, whose focus is transformation of currently available high-end devices, are limited to 24 months.

F. Special Information and Supplementary Documents:

Support or endorsement letters are not acceptable and will be cause for return without review.

Provide information such as statements of collaboration and other allowed items as noted in the current issuance of the GPG. All proposed activities must be documented in the Project Description. Statements from individuals whose role is discussed in the Project Description as providing assistance or collaboration to the project (but are not included in the budget, refer to GPG Section II.C.2.d.iv Unfunded Collaborations) must verify their participation with a document in the following format. Proposals including more extensive letters from such participants may be returned without review.

To: IDBR Program Director(s),

By signing below, I acknowledge that I will provide the assistance or collaborate as indicated in the proposal, entitled "_____ " with _____ as the Principal Investigator. I agree to undertake the tasks assigned to me, as described in the proposal, and I commit to provide or make available the resources therein designated to me.

Signed: _____ Print Name: _____

Date: _____ Institution: _____

G. Single-Copy Documents:

Include correspondence to the program not intended to be sent to reviewers. These should include:

(1) *Conflict of Interest document*: should be provided in the form of a single alphabetized table, consisting of the full name (last, first, MI) of all people having a conflict of interest with any senior personnel and others whose biographical sketches are included in the proposal. Conflicts to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months including postdoctoral mentors and mentees, and (3) any other individuals or institutions with which the senior personnel has financial ties.

(2) *List of Suggested Reviewers (optional)*: Proposers may include a list of suggested reviewers whom they believe are well qualified to review the proposal. Proposers may also include a list of individuals who they would prefer not review the proposal. The form for this purpose is provided under Single Copy Documents.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Standard project duration should be 24-36 months as outlined in Sections III and V of this solicitation.

C. Due Dates

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

July 31, 2013

July 25, 2014

Last Friday in July, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions 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. 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.

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://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical 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. 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.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. 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 either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with 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. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the [GPG](#) as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in [Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018](#). These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to NSF's standard merit review criteria (http://www.nsf.gov/bfa/dias/policy/merit_review/) the following additional criteria will be considered in proposal evaluation:

Type A - Innovation: Need and potential impact on biological research; novelty of the device or clear demonstration of at least an order of magnitude improvement over available technologies; feasibility of the technical plan; novelty of the dissemination plan; and inclusion of the biological user community.

Type B - Bridging: The magnitude of the potential biological user community and demonstrated strength of need; feasibility of the technical plan; and quality of the dissemination plan to make the technology broadly available to the community.

B. Review and Selection Process

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

Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel.

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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

An NSF award consists of: (1) the award notice, 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 notice; (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 notice. 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. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from 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.

C. Reporting Requirements

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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following 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 all identified PIs and co-PIs on a given award. 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 Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also 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.

More comprehensive information on NSF Reporting Requirements 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.

VIII. AGENCY CONTACTS

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:

- Christopher Sanford, 615, telephone: (703) 292-8470, email: csanford@nsf.gov
- Robert D. Fleischmann, 615, telephone: (703) 292-7191, email: rfleisch@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@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.

IX. OTHER INFORMATION

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, "NSF Update" is an information-delivery system 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 [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

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

Related Programs:

The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations. Such activities should build a firm foundation for a lifetime of leadership in integrating education and research. NSF encourages submission of CAREER proposals from junior faculty members at all CAREER-eligible organizations and especially encourages women, members of underrepresented minority groups, and persons with disabilities to apply. For additional information, please see the [CAREER Program webpage](#).

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
Send an e-mail to: nsfpubs@nsf.gov
or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Arlington, VA 22230

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