Instrument Development for Biological Research (IDBR)

PROGRAM SOLICITATION
NSF 10-563

REPLACES DOCUMENT(S):
NSF 08-566

National Science Foundation

Directorate for Biological Sciences

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

August 27, 2010

July 29, 2011

Last Friday in July, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

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.govbfa/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

There have been clarifications and updates to the 2008 solicitation as follows:

1. Proposal submission date designation has been changed from 'target' to 'deadline'. Proposals received after the posted date will be returned without review.

2. The program will accept two types of proposals:

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

(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.

3. A clear dissemination plan is required. For proposals of type (A) the dissemination plan must include advertising the development to the biological research user community about the development and plans for broad distribution of the technology once it is developed if it proves viable. Proposals of type (B) must provide a specific mechanism for distribution of the technology to the user community. If appropriate, it should include plans to seek SBIR, STTR or similar support after the duration of the IDBR award.

4. The program closely coordinates efforts with other related programs (such as Chemical Measurement and Imaging, at http://www.nsf.govfunding/pgm_summ.jsp?pims_id=503413&org=CHE&from=home or MRI-Development at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5260). PIs are encouraged to contact the relevant program officers to determine which program fits their proposal best. Also, if appropriate, industrial participation during the IDBR-supported program (e.g., via a GOALI-like mechanism; see [http://www.nsf.gov/pubs/2009/nsf09516/nsf09516.htm]) is encouraged.

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 of instrumentation that addresses demonstrated needs in biological research, in areas supported by NSF Biology programs (see http://www.nsf.gov/bio). The program accepts two types of proposals:

(A) Innovation Proposals: Proposals for the development of innovative instrumentation that permits new kinds of measurements, or instruments that significantly improve current technologies by at least an order of magnitude in fundamental aspects (such as accuracy, precision, resolution, throughput, flexibility, breadth of application, cost of construction or operation, or user-friendliness).

(B) Bridging Proposals: 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 or similar support mechanism for implementation of broad distribution following an IDBR award.

The goal is to produce systems that would benefit a broad user community through mass distribution of the technology. 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. 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.

In addition to NSF's standard merit review criteria (see below) the following points will be considered in proposal evaluation:

Innovation Proposals: 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, and feasibility of the technical plan.

Bridging Proposals: The magnitude of the potential user community and demonstrated strength of need, technical plan, and the dissemination plan for making the technology 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.

- Joyce Fernandes, 615, telephone: 703 292 8470, email: jfernand@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: 10 to 12 of type (A) and 2 to 5 of type (B).

Anticipated Funding Amount: $3,000,000 (approximately) will be available for new IDBR awards in FY 2011, pending availability of funds.

Eligibility Information

Organization Limit:

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.

PI Limit:

None specified

Limit on Number of Proposals per Organization:

None specified

Limit on Number of Proposals per PI:

There is no limit on the number of proposals that may be submitted by an investigator or institution. However, multiple submissions (including submissions to the CMI program) must be distinct. Moreover, the program seeks to diversify numbers of PI, gender, geography, etc. in each competition, so it is unlikely that multiple awards to a single PI or institution would be made.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **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.
  - 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. proposer's local time):

  August 27, 2010

  July 29, 2011

  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/funding/pgm_summ.jsp?pims_id=9187; Applicants should note, however, that the program's goal is to diversify the range of available instrumentation, and it may therefore support development in areas not previously funded.

II. PROGRAM DESCRIPTION

The program will accept two types of proposals:

(A) Innovation proposals for the development of novel instrumentation that provides new research capabilities, or 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, cost of construction, operation costs, or user-friendliness);

(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.

The program does not support the development of methods, assays, or software for instrument operation, data acquisition or analysis, except as a component of the instrument development and testing.

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. Proposals of type (A) should have the capacity to transform or enhance biological studies. Proposals of Type (B) should significantly broaden access to complex and/or expensive ‘one of a kind' research tools.

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).

The development of new instrumentation provides an ideal opportunity for student training across multiple disciplines. The IDBR program expects that most 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 collaborations are strongly encouraged, as are partnerships with U.S. industries to facilitate knowledge transfer, commercialization and broad utilization in the research community, including through mechanisms such as Grant Opportunities for Academic Liaison with Industry (GOALI). Also encouraged are activities such as workshops and the development of virtual organization frameworks to promote interactions between the instrument development community and biological researchers.

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 10 to 12 of type (A) and 2-5 of type (B).

Anticipated Funding Amount: $3,000,000 (approximately) will be available for new IDBR awards in FY 2011, pending availability of funds.

The requested funds and award duration should be commensurate with the proposed activities. There are no specific limits on the amount of funds that may be requested; however, the requested period of support should not exceed 36 months, except proposals whose focus is transformation of currently available high-end devices, which are limited to 24 months. Funding is available beginning the April following proposal submission. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

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.

PI Limit:

None specified

Limit on Number of Proposals per Organization:

None specified

Limit on Number of Proposals per PI:

There is no limit on the number of proposals that may be submitted by an investigator or institution. However, multiple submissions (including submissions to the CMI program) must be distinct. Moreover, the program seeks to diversify numbers of PI, gender, geography, etc. in each competition, so it is unlikely that multiple awards to a single PI or institution would be made.

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, is 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.

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

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

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 DEVELOPMENT" 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.

The project title should begin with "IDBR:" 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.

Project Summary (not more than 1 page in length):

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

(1) the intellectual merit of the proposal 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) the 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 (e.g. AFM) or technical terms specific to a narrow field.

Project Description:

Provide a description of the instrument development activity to be pursued. This section may not exceed 15 pages in length.

Note: 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.

The section **must** cover the following points:

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.

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)

Development Plan: Describe the development program to be undertaken, including the design of the proposed instrument and performance metrics, as well as the biological research motivations for performance criteria and how the design plan derives from these motivations, 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.

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.

Dissemination Plan: To facilitate access of the research community to instrumentation developed through the IDBR program, a dissemination plan must be included.

In proposals of Type (A) for the development of innovative or greatly enhanced instruments, the dissemination plan must include (a) methods for advertising the development to the user, biological research community. Innovative strategies that go beyond publications or presentations in conferences are especially encouraged, (b) plans for future mass-distribution and/or production of the device.

Proposals of type (B) for transforming specialty /one-of-a-kind instruments into broadly available and utilizable systems must provide an explicit dissemination plan for mass distribution or production of the technology. 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. 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.

Education and outreach: Biological Instrumentation contributes to our understanding of biology at all levels and provides a fertile transdisciplinary platform for potentially transformative research. Clearly identify any anticipated benefits of the instrument to research, education and outreach activities. Education and training of students, post-doctoral investigators, and biological researchers should be incorporated. Outreach to both the broader community and K-12 classrooms is encouraged, either through existing programs or through the development of new initiatives.

Note: The Project Description (including Results from Prior NSF Support, which is limited to five pages) **may not exceed 15 pages**. PIs are cautioned that the Project Description must be self-contained and that URLs that provide information related to the proposal should not be used because 1) the information could circumvent page limitations, 2) the reviewers are under no obligation to view the sites, and 3) the sites could be altered or abolished between the time of submission and the time of review.

References Cited:

Provide references as specified in the *GPG* or *NSF Grants.gov Application Guide.*

Biographical Sketches:

Provide biographical sketches for each of the senior personnel, professional staff, and any named postdoctoral students in the format specified in the *GPG* or *NSF Grants.gov Application Guide*. Each biographical sketch is limited to two pages in length.

Budget:

Provide a budget as specified in the *GPG* or *NSF Grants.gov Application Guide*. Among other items, funds for personnel, shop costs, and indirect costs may be requested. Note that as a general policy, NSF limits salary compensation for senior project personnel to no more than two months of their regular salary in any one year. This limit includes salary compensation received **from all NSF-funded grants**. The period of support requested should not exceed 36 months, except proposals whose focus is transformation of currently available high-end devices, which are limited to 24 months. The budget justification, which must not exceed three pages, should itemize, justify and explain all project costs.

Current and Pending Support:

Provide information on all current and pending support for all senior personnel and for any other personnel for whom a biosketch is included.

Facilities, Equipment and Other Resources:

Provide a facilities statement as described in the *GPG* or *NSF Grants.gov Application Guide*.

Single-Copy Documents:

1. A conflict of interest document: Prepare a list, 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.

Supplementary Documents:

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

When applicable, include documentation of collaborative arrangements discussed in the proposal. PIs should make sure that these letters clearly state their collaborative nature, to prevent confusion with support or endorsement ones. However, these letters cannot provide essential information for the proposed development as a means to circumvent the 15 page limit. Also, PIs are strongly encouraged to summarize the content of such letters in the proposal.

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. proposer's local time):

  August 27, 2010

  July 29, 2011

  Last Friday in July, Annually Thereafter

D. FastLane/Grants.gov Requirements

- **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. 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. 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. 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

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

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 judgments.

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, reviewers will be asked to evaluate the suitability of the proposal to the IDBR goals, as stated above

In addition, proposals of type (A) would be evaluated on the level of innovation and potential improvement over current technologies, and the adequacy of the dissemination plan in reaching the potential user community.

Proposals of Type (B) would be evaluated on the potential impact and the strength of the dissemination plan to develop and broadly produce the instrumentation.

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

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, Internal NSF Review, Site Visit Review, or Reverse Site Review.

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

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

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 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. 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 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.

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:

- Joyce Fernandes, 615, telephone: 703 292 8470, email: jfernand@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, 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 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:

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