Division of Integrative Organismal Systems   Core Programs

PROGRAM SOLICITATION
NSF 11-572

REPLACES DOCUMENT(S):
PD 07-7472, PD 07-1111, PD 07-5500, PD 07-1141

National Science Foundation

Directorate for Biological Sciences
Division of Integrative Organismal Systems

Preliminary Proposal Due Date(s) *(required)* (due by 5 p.m. proposer's local time):

January 12, 2012

January 12, Annually Thereafter

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

August 02, 2012

August 2, Annually Thereafter

By Invitation Only

IMPORTANT INFORMATION AND REVISION NOTES

The Division of Integrative Organismal Systems is instituting an annual cycle of preliminary and full proposals. Preliminary proposals will be accepted in January and a binding decision will be made to invite/not invite full proposals for submission in August. Full proposals received that were not invited will be returned without review (except as noted under Additional Funding Opportunities). A limit on the number of submissions of preliminary proposals accepted from each proposer each cycle is also described in this solicitation. After July 13, 2011, the Division will no longer accept full proposals without invitation to its core programs, except in the case of [1] proposals submitted in response to the CAREER, Research Coordination Network, Plant Genome Research Program, Basic Research to Enable Agricultural Development, or Doctoral Dissertation Improvement Grant solicitations; or [2] special proposals that are described in the Grant Proposal Guide, i.e. Grants for Rapid Response Research (RAPID), EArly Concept Grants for Exploratory research (EAGER), conference and workshop proposals, and requests for supplemental funding.

The Division will continue to encourage submissions from junior investigators, investigators at primarily undergraduate institutions (PUIs), investigators in Experimental Program to Stimulate Competitive Research (EPSCoR) states, and investigators who are underrepresented minorities.

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.

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* Chapter II.C.2.g(xi) for further information about the implementation of these recommendations.

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

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

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Division of Integrative Organismal Systems
Core Programs

Synopsis of Program:

The Division of Integrative Organismal Systems (IOS) supports research aimed at understanding why organisms are structured the way they are and function as they do. Proposals should focus on organisms as a fundamental unit of biological organization. PIs are encouraged to apply systems approaches that will lead to conceptual and theoretical insights and predictions about emergent organismal properties. Areas of inquiry include, but are not limited to, developmental biology and the evolution of developmental processes, nervous system development, structure, and function, physiological processes, functional morphology, symbioses, interactions of organisms with biotic and abiotic environments, and animal behavior.

Proposals are welcomed in all areas of science supported by the Division of Integrative Organismal Systems. However, effective July 13, 2011, all investigator-initiated proposals to the core programs in the Division of Integrative Organismal Systems will be invited/not invited via preliminary proposals. There will be a single window of submission limit of 2 preliminary proposals per investigator per year as PI/Co-PI/Lead Senior Investigator of a subaward in response to this Solicitation. **Unsolicited full research proposals will no longer be accepted into the IOS Core Programs.** This limit does not include proposals submitted in response to other NSF Solicitations.

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.

- Behavioral Systems Cluster, Program Directors, 685N, telephone: (703) 292-8423, email: IOSBSC@nsf.gov

- Developmental Systems Cluster, Program Directors, 685N, telephone: (703) 292-8417, email: IOSDSC@nsf.gov

- Neural Systems Cluster, Program Directors, 685N, telephone: (703) 292-8421, email: IOSNSC@nsf.gov

- Phys. & Struct. Systems Cluster, Program Directors, 685N, telephone: (703) 292-8413, email: IOSPSS@nsf.gov

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

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 200 Up to 200 awards per year, pending availability of funds

Anticipated Funding Amount: $55,000,000 $55,000,000 for new awards each year, pending availability of funds

Eligibility Information

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

In a given year, an individual may participate as a PI, co-PI, or lead senior investigator of a subaward on **no more than two** preliminary proposals submitted in response to this solicitation. Preliminary proposals in excess of the limit for any person may be returned without review in the reverse order received. "PI, co-PI, or lead senior investigator of a subaward" refer to the role an individual would play in a full proposal (including all parts of a collaborative proposal). **It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines.** Participating in a proposal as other senior personnel does not count in this limit. Changes in the team post-submission to meet the eligibility limits will not be allowed.

This limit does not include proposals to other solicitations (e.g., Research Coordination Networks, Doctoral Dissertation Improvement Grants, CAREER, Plant Genome Research Program, Basic Research to Enable Agricultural Development) or to core programs in other BIO Divisions (Molecular and Cellular Biosciences, Biological Infrastructure, Environmental Biology). However solicitations may have their own limit guidelines so be sure to review those carefully for details. Please consult the IOS website for answers to frequently asked questions.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable

- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.

- **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:** Not Applicable

C. Due Dates

- **Preliminary Proposal Due Date(s)** *(required)* (due by 5 p.m. proposer's local time):

    January 12, 2012

    January 12, Annually Thereafter

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

    August 02, 2012

    August 2, Annually Thereafter

        By Invitation Only

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria apply.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

The Division of Integrative Organismal Systems (IOS) supports research aimed at understanding why organisms are structured the way they are and function as they do. Proposals should focus on organisms as a fundamental unit of biological organization. PIs are encouraged to apply systems approaches that will lead to conceptual and theoretical insights and predictions about emergent organismal properties. Areas of inquiry can include, but are not limited to, developmental biology and the evolution of developmental processes, nervous system development, structure, and function, physiological processes, functional morphology, symbioses, interactions of organisms with biotic and abiotic environments, and animal behavior.

In the context of greater accessibility to ever-expanding and increasingly detailed biological information, the over-riding objective of IOS is to support research to understand the fundamental nature of life by understanding the emergent properties of organisms. Some of these properties include but are not restricted to: complexity (how interwoven organismal components or processes produce more than a sum of their parts), robustness (the degree to which an organism resists perturbation or stressful influences); communication (the processes that enable individual components in a system to instruct one another or alter one another's behavior); resilience (the ability to recover from perturbation or stress), adaptability (the capacity of organisms to change in response to perturbations in ways that maintain overall organismal integrity), and cooperation (behaviors of cells or organisms that benefit more than the individual). These emergent properties can be understood through studies of the evolution, development, behavior, regulatory processes and structural properties of all organisms. Therefore comparative studies and the use of a wide variety of organisms as models are encouraged.

Understanding these emergent systems properties of organisms requires integrative, interdisciplinary approaches.The Division encourages proposals that include analyses across multiple levels of biological organization, from molecular through ecological, and through theoretical as well as advanced computational approaches. Interdisciplinary collaborations involving scientists from all areas of biology, behavioral science, physical science, mathematics, engineering, and computer science and encouraged.

II. PROGRAM DESCRIPTION

Proposals are welcomed in all areas of science supported by the Division of Integrative Organismal Systems. For an overview of scientific areas supported by IOS, see http://nsf.gov/bio/ios/about.jsp. Please consult the IOS web page (http://www.nsf.gov/div/index.jsp?div=IOS) for information about Program Directors associated with each programmatic area.

BEHAVIORAL SYSTEMS

DEVELOPMENTAL SYSTEMS

> Plant, Fungal and Microbial Developmental Systems
> Animal Developmental Systems
> Evolution of Developmental Systems

NEURAL SYSTEMS

> Organization
> Activation
> Modulation

PHYSIOLOGICAL AND STRUCTURAL SYSTEMS

> Symbiosis, Defense and Self-recognition
> Processes, Structures and Integrity
> Organism-Environment Interactions

REVIEW PROCESS

A two-stage review process will be used by all IOS core programs starting in FY 2012:

Preliminary Proposals: All proposers must submit a preliminary proposal that outlines the major goals of the project including the components described below. Preliminary proposals will typically be reviewed by a panel of outside experts. The Program Directors will communicate the decision to Invite/Not Invite full proposals *via* FastLane and these decisions will be based on the panel recommendations and additional portfolio considerations. Invite/Do Not invite decisions are binding.

Full Proposals: Invited full proposals will receive both *ad hoc* and panel review at the discretion of the Program, as described in Section VI of this Solicitation. Full proposals that were not invited will be returned without review.

Additional Funding Opportunities

The core programs will accept **Research in Undergraduate Institution** (RUI) proposals. **RUI submissions must include a preliminary proposal** and be received by the deadlines listed in this IOS solicitation. Information on the scope of RUI projects and the format of these proposals can be found at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5518&org=NSF.

The core programs will accept **Research Coordination Network** (RCN) Proposals. Such proposals should be submitted at the full proposal deadline. Information on the scope of RCN projects and the format of these proposals can be found at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11691&0rg=BIO&from=home.

The guidelines in this solicitation do not apply to proposals submitted through other solicitations, such as CAREER. Proposals requesting support for efforts to increase the participation of individuals from underrepresented groups may be submitted through GPG as full proposals at any time.

This solicitation does not apply to conference and workshop proposals, requests for supplemental funding, and RAPID or EAGER applications,all of which should be submitted, following the standard guidelines, by selecting"In response to GPG" on the proposal coversheet and then selecting the appropriate cluster."

Supplemental Funding Requests

March 1 annually (or next business day if that is a weekend or holiday) is the target date for most IOS programs for REU, RET, RAHSS, and ROA supplement requests as well as proposals for Conferences, Symposia and Workshops (Meetings). Guidance for IOS PIs preparing supplemental requests is posted at: http://www.nsf.gov/bio/ios/suppopp.jsp .

Conferences, Workshops and Symposia

IOS supports conferences, symposia and workshops in areas of science supported by IOS that bring experts together to discuss current research, to expose other researchers or students to new research methods, and to discuss future directions. Conferences will be supported only if equivalent results cannot be obtained at regular meetings of professional societies or the established conference series. For Guidance on preparing Proposals for Conferences, Symposia and Workshops (Meetings) visit http://www.nsf.gov/bio/ios/confworkshopguidance.jsp . Proposers are encouraged to contact a Program Director about the suitability of the proposed activity for IOS support prior to submission.

EArly-concept Grants for Exploratory Research (EAGER)

The EAGER funding mechanism may be used to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches. This work may be considered especially "high risk-high payoff" in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives. These exploratory proposals may also be submitted directly to an NSF program at any time, but the EAGER mechanism should not be used for projects that are appropriate for submission as "regular" (i.e., non-EAGER) NSF proposals. PI(s) must contact the NSF program officer(s) whose expertise is most germane to the proposal topic prior to submission of an EAGER proposal. This will aid in determining the appropriateness of the work for consideration under the EAGER mechanism; this suitability must be assessed early in the process. For guidelines, see the most recent version of the NSF Grant Proposal Guide (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).

Grants for Rapid Response Research (RAPID)

The RAPID funding mechanism is used for proposals having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events. PI(s) must contact the NSF program officer(s) whose expertise is most germane to the proposal topic before submitting a RAPID proposal. This will facilitate determining whether the proposed work is appropriate for RAPID funding. For guidelines, see the most recent version of the NSF Grant Proposal Guide (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).

III. AWARD INFORMATION

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

IV. ELIGIBILITY INFORMATION

Organization Limit:

> None Specified

PI Limit:

> None Specified

Limit on Number of Proposals per Organization:

> None Specified

Limit on Number of Proposals per PI: 2

> In a given year, an individual may participate as a PI, co-PI, or lead senior investigator of a subaward on **no more than two** preliminary proposals submitted in response to this solicitation. Preliminary proposals in excess of the limit for any person may be returned without review in the reverse order received. "PI, co-PI, or lead senior investigator of a subaward" refer to the role an individual would play in a full proposal (including all parts of a collaborative proposal). **It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines.** Participating in a proposal as other senior personnel does not count in this limit. Changes in the team post-submission to meet the eligibility limits will not be allowed.

> This limit does not include proposals to other solicitations (e.g., Research Coordination Networks, Doctoral Dissertation Improvement Grants, CAREER, Plant Genome Research Program, Basic Research to Enable Agricultural Development) or to core programs in other BIO Divisions (Molecular and Cellular Biosciences, Biological Infrastructure, Environmental Biology). However solicitations may have their own limit guidelines so be sure to review those carefully for details. Please consult the IOS website for answers to frequently asked questions.

Additional Eligibility Info:

> Proposals may only be submitted by the following:

Academic institutions located in the US: US universities and colleges located in the US.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations in the US associated with educational or research activities
- Consortia of only the eligible organizations listed above.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals *(required):* Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

- 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 email from nsfpubs@nsf.gov.

The following exceptions and additions to the GPG guidelines apply to preliminary proposals submitted to this Program:

Submission of a Preliminary Proposal is required to be eligible for invitation for a Full Proposal. Proposals that are not compliant with the guidelines may be returned without review. It is the submitting organization's responsibility to ensure that the proposal is compliant with all applicable guidelines.

For collaborative projects, the preliminary proposal should be submitted by **ONLY** the lead institution. The collaborative partners should be indicated in the list of personnel in the project description (see below).

Preliminary proposals must contain the items listed below and adhere strictly to the specified page limitations. No additional information may be provided as an appendix or by links to Web pages. Figures and tables must be included within the applicable page limit. All elements of the proposal, including legends and tables, must meet the formatting requirements for font size, characters per inch, margins, etc. as specified in the GPG.

Preliminary proposals should contain an overview of the proposed research with sufficient detail to allow assessment of the major ideas and approaches to be used. Preliminary proposals must include the following components"

- **Cover Sheet:** Select the program solicitation number from the pull-down list. The IOS Programs will automatically appear. Check the box indicated for the preliminary proposal. Entries on the Cover Sheet are limited to the Principal Investigator and a maximum of four-co-principal investigators. 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) must check the box for "Beginning Investigator" on the proposal Cover Sheet. For more FastLane instructions, see section V.D. below.

- **Title of Proposed Project:** Title should begin with the prefix "IOS Preliminary Proposal:..." and additional acronyms for Accomplishment Based Renewal "ABR:", or Research in Undergraduate Institutions "RUI:",if applicable.

- **Project Summary (1 page):** Provide an overview of the proposed research, addressing separately the intellectual merit and broader impacts. The summary should be written in the third person, informative to those working in the same or related field(s), and understandable to a scientifically or technically literate reader. **Preliminary proposals that do not separately address both intellectual merit and broader impacts in the Project Summary will be returned without review**.

- **Project Description.** Maximum 5 pages total, containing the two following sections:

  I. Personnel (This section is limited to one page. Any remaining space should be left blank.) Provide a list of project personnel, including PI(s), co-PI(s), and senior personnel, whether from proposed collaborative (inter-institutional) or sub-awards, plus each person's institutional affiliation, title, status on the full proposal (i.e., PI, co-PI, subaward lead, other senior personnel), and **one sentence** describing that person's role(s) in the project.

  II. Project (This section is limited to four pages. We suggest the use of the sub-sections listed below, organized as appropriate.)

    1. "Conceptual Framework" or "Objectives" or "Specific Aims"
    2. "Rationale and Significance" or "Background"
    3. "Hypotheses" or "Research Question (s)"
    4. "Research Approach" or "Experimental Plan"
    5. "Broader Impacts"

- **References Cited** (maximum 3 pages) See GPG for format guidelines.

- **Biographical Sketches** (2-page limit for each) should be included for each person listed on the Personnel page. It should include the individual's expertise as related to the proposed research, professional preparation, professional appointments, five relevant publications, five additional publications, and up to five synergistic activities. Advisors, advisees, and collaborators should not be listed on this document, but in a separate table (see below).

- **No budget should be submitted**; however, please enter $2 in the Requested Amount box on the FastLane Cover Sheet (this entry allows correct FastLane processing).

- **Combined Conflict of Interest document**. In **Single-Copy Documents**, upload a single, alphabetized table identifying conflicts of interest for all persons listed on the first page of the project description. The table should list (by column): (A) full names (last, first), (B) institutional affiliations, (C) type of conflict, and (D) Name of PI/co-PI/senior personnel having the conflict. The table should be alphabetized on column (A). Conflicts to be identified are (1) Ph.D. dissertation advisors or advisees, (2) collaborators or co-authors, including postdoctoral researchers, for the past 48 months, (3) co-editors within

the past 24 months, (4) spouse or other relative, and (5) any other individuals with whom, or institutions with which, the senior personnel (PI, co-PIs, and any named personnel) have financial ties, including advisory committees (specify type), boards of directors, or prospective employees.

Applicants must include the above documents (prepared in accordance with standard NSF formatting guidelines). Other documents, including Facilities, Equipment and Other Resources; Budget and Budget Justification; data Management Plan; and Postdoctoral Mentoring Plan are not required of preliminary proposals and should not be included.

No appendices or supplementary documents are permitted for preliminary proposals.

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.

Please note:

- **Full proposals will be accepted only from PIs who have submitted preliminary proposals in the current review cycle and have been invited to submit a full proposal except as noted under Additional Funding Opportunities.**

- The full proposal should not deviate substantially from the preliminary proposal in the scope of the project or the list of personnel without prior written approval of the relevant Program Director.

- **Research Experience for Undergraduates.** Projects anticipating the inclusion of undergraduate research experiences are encouraged to include those as part of the research proposal itself rather than submit later supplemental funding requests.

- **A combined Conflict of Interest document**. In **Single-Copy Documents**, upload a single, alphabetized table identifying conflicts of interest for all persons listed on the first page of the project description. The table should list (by column): (A) full names (last, first), (B) institutional affiliations, (C) type of conflict, and (D) Name of PI/co-PI/senior personnel having the conflict. The table should be alphabetized on column (A). Conflicts to be identified are (1) Ph.D. dissertation advisors or advisees, (2) collaborators or co-authors, including postdoctoral researchers, for the past 48 months, (3) co-editors within the past 24 months, (4) spouse or other relative, and (5) any other individuals with whom, or institutions with which, the senior personnel (PI, co-PIs, and any named personnel) have financial ties, including advisory committees (specify type), boards of directors, or prospective employees.

- **Letters of Collaboration.** Supplementary Documents may include letters of collaboration from individuals or organizations that are integral parts of the proposed project but are not supported by subawards. Such involvement may include subsidiary involvement in some aspect of the project, cooperation on outreach efforts, or documentation of permission to access materials or data. Letters of collaboration should focus solely on affirming that the individual or organization is willing to collaborate on the project as specified in the project description. No additional text, especially elaboration of the nature of activities to be undertaken by the collaborator and endorsements of the potential value or significance of the project for the collaborator, may be included. The template that **must** be used for the preparation of letters of collaboration is provided below.

  Letters of collaboration should not be provided from any individual designated as a principal investigator or senior personnel, nor are letters of collaboration required from any organization that will be a subawardee in the proposal budget.

  Each letter of collaboration **must** be signed by the designated collaborator. Requests to collaborators for letters of collaboration should be made by the PI well in advance of the proposal submission deadline, because they **must** be included at the time of the proposal submission. **Letters deviating from this template will not be accepted and may be grounds for returning the proposal without review.**

  Template to be used for letters of collaboration

  To: NSF _____(Program Title)_____ Program
  From: _____
  (*Printed name of the individual collaborator or name of the organization and name and position of the official submitting this memo*)

  By signing below (or transmitting electronically), I acknowledge that I am listed as a collaborator on this proposal, entitled "_____(*proposal title*)_____," with _____(*PI name*)_____ as the Principal Investigator. I agree to undertake the tasks assigned to me or my organization, as described in the project description of the proposal, and I commit to provide or make available the resources specified therein.

  Signed: _____
  Organization: _____

Date: _____

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

C. Due Dates

- **Preliminary Proposal Due Date(s)** *(required)* (due by 5 p.m. proposer's local time):

  Preliminary Proposal Due Date(s) *(required)* (due by 5 p.m. proposer's local time):

    January 12, 2012

    January 12, Annually Thereafter

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

    August 02, 2012

    August 2, Annually Thereafter

      By Invitation Only

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 judgements.

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

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

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

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

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.

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.

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:

- Behavioral Systems Cluster, Program Directors, 685N, telephone: (703) 292-8423, email: IOSBSC@nsf.gov

- Developmental Systems Cluster, Program Directors, 685N, telephone: (703) 292-8417, email: IOSDSC@nsf.gov

- Neural Systems Cluster, Program Directors, 685N, telephone: (703) 292-8421, email: IOSNSC@nsf.gov

- Phys. & Struct. Systems Cluster, Program Directors, 685N, telephone: (703) 292-8413, email: IOSPSS@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.

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 40,000 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**   (703) 292-5111
  (NSF Information Center)**:**

- **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
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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