Division of Integrative Organismal Systems

Core Programs

PROGRAM SOLICITATION
NSF 13-600

REPLACES DOCUMENT(S):
NSF 13-506

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 17, 2014

Third Friday in January, Annually Thereafter

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

August 01, 2014

First Friday in August, Annually Thereafter

By Invitation Only

IMPORTANT INFORMATION AND REVISION NOTES

Program Name and Description Changes

Two of the programs in the Physiological and Structural Systems (PSS) Cluster have changed. The former Processes, Structures and Integrity Program (PSI) has been renamed the Physiological Mechanisms and Biomechanics Program (PMB). The Organism Environment Interactions (OEI) has been renamed the Integrative Ecological Physiology Program (IEP). The names and descriptions were updated to better reflect the program priorities.

Important Reminders

The Division of Integrative Organismal Systems has instituted an annual cycle of preliminary and full proposals. Preliminary proposals will be accepted in January and binding decisions will be made to invite or not invite full proposals for submission in August. The Division no longer accepts 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, e.g., Grants for Rapid Response Research (RAPID), EArly Concept Grants for Exploratory research (EAGER), conference and workshop proposals, and requests for supplemental funding. 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 per cycle is also described in this solicitation.

The Division will continue to provide opportunities outlined in NSF 12-093 (Dear Colleague Letter: Beyond the Genome) for mid-career researchers/scientists to acquire new skills to use genomics and bioinformatics tools and/or novel technologies to answer organismal questions. Especially encouraged are applications from investigators trained in whole organism physiology, 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. Applications for workshop support to provide training in the use of modern techniques and approaches, e.g. genomics and bioinformatics, for organismal research are also encouraged.

In FY 2014, IOS intends to provide support for workshops and research coordination network proposals that explore the opportunities and bottlenecks to increasing our understanding of the relationships between organismal genomes and the wide range of possible phenotypes and phenomes.

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

Applicants are expected to include anticipated support for Research Experiences for Undergraduates (REU) in the full proposal.

Post-award requests for supplemental funding should only be made for unanticipated opportunities that arise after an award is made.

IMPORTANT INFORMATION

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 15-1), which is effective for proposals submitted, or due, on or after December 26, 2014. The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

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. Principal Investigators (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. All investigator-initiated proposals to the core programs in the Division of Integrative Organismal Systems must now be invited based on merit review of preliminary proposals. There is a single submission deadline with a limit of 2 preliminary proposals per investigator per year as PI or Co-PI in response to this solicitation. Please see the GPG for definition of roles for PI and Co-PI. There are no limits on the number of proposals you can participate on as collaborator. The PI/Co-PI limits apply only to this solicitation and do not pertain to proposals submitted in response to other NSF solicitations.

Unsolicited full research proposals are no longer accepted into the IOS Core Programs.

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

Anticipated Funding Amount: $55,000,000 pending availability of funds

Eligibility Information

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 2

In a given year, an individual may participate as a PI or co-PI on **no more than two** preliminary proposals submitted in response to this IOS Core Program Solicitation. Preliminary proposals in excess of the limit for any person will be returned without review in the reverse order received.

"PI" and "co-PI" refer to the role an individual would play in a full proposal (including all parts of a Collaborative Research Proposal). See Exhibit II-7: Definitions of Categories of Personnel in the GPG for the definition of proposer roles. **It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines.** Participating in a proposal as a collaborator does not count towards this limit, including investigators who contribute services for a fee (e.g., sequencing) or are the PI on a subaward. Thus, the number of

proposals on which an investigator can be listed as collaborator is unlimited. Changes in the team post-submission to meet the eligibility limits will not be allowed.

This limit does not pertain to 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 (http://www.nsf.gov/div/index.jsp?div=IOS) for answers to frequently asked questions.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **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 17, 2014

  Third Friday in January, Annually Thereafter

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

  August 01, 2014

  First Friday in August, Annually Thereafter

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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

IOS supports research aimed at improving our understanding of organisms as integrated units of biological organization. The Division welcomes diverse approaches to research addressing organismal questions, and especially encourages integrative and interdisciplinary perspectives on complex problems in organismal biology. The goal is to predict why organisms are structured the way they are and function as they do. Projects that innovatively apply approaches that combine experimentation, computation, and modeling, and which lead to new conceptual and theoretical insights and testable predictions about integrated organismal properties, including the relationship between genotypes and phenotypes, or genomes and phenomes are particularly encouraged. Research that integrates data across spatial/temporal/biological scales, leads to transformative methods, tools and resources, and/or seeks breakthroughs in the areas of phenotypic plasticity and organismal resilience will be given high priority for funding throughout the division. ***However, research motivated by relevance to human health or addressing the mechanisms of human disease is not appropriate for the Division and will be returned without review.***

IOS continues to support projects that provide unique educational and training opportunities for the next generation of researchers, scientific educators and scientifically literate citizens. In order to address the Broader Impacts review criterion, proposals can contain the development of innovative educational, broadening participation, and outreach activities, or substantive participation in existing institutional infrastructure for education, training and outreach. Successful proposals often demonstrate close integration of the scientific and educational goals.

II. PROGRAM DESCRIPTION

Proposals are welcomed in all areas of science supported by the Division of Integrative Organismal Systems, including projects that cross traditional disciplinary boundaries. Please read the cluster descriptions below and then discuss any questions about the potential fit of a project to one of the clusters with the Program Director you believe is most closely associated to your field of interest.

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. This interaction can be a critical aspect for ensuring that your proposal is assigned to the most appropriate program for review.

The core scientific programs in IOS are organized into four Clusters:

Behavioral Systems Cluster

The Behavioral Systems Cluster consists of the Animal Behavior Program which supports research in the area of integrative animal behavior to understand how and why individuals and groups of animals do what they do in nature. Research in this area occurs in field, laboratory and captive environments and covers a wide range of scientific fields and levels of analysis to study the development, mechanisms, adaptive value, and evolutionary history of behavior. The Cluster encourages species specific and comparative studies as well as modeling and theoretical approaches that use animal systems to discover and explore overarching principles of the biology of behavior and to advance a fully integrated understanding of the behavioral phenotype from genes to ecosystems.

The Cluster supports these goals through the core program in Animal Behavior and the Doctoral Dissertation Improvement Grant program (DDIG).

Developmental Systems Cluster

The Developmental Systems Cluster supports research aimed at understanding how interacting developmental processes give rise to the emergent properties of organisms. Systems level approaches to understanding these processes at the molecular, cellular, and organismal levels of organization, combining the use of molecular, genetic, biochemical, and physiological techniques as well as techniques from outside biology are encouraged. The Developmental Systems Cluster is also particularly interested in understanding how emergent properties result in the development of complex phenotypes and lead to the evolution of developmental mechanisms.

Proposals should be submitted to one of the three programs below:

The Plant, Fungal and Microbial Developmental Mechanisms Program supports research that addresses developmental processes in plants from algae to angiosperms, microbes and fungi.

The Animal Developmental Mechanisms Program supports research that seeks to understand the processes that result in the complex phenotypes of animals. Because different organisms may be more amenable to certain approaches than others, analyses of development in a wide range of different species are encouraged. Proposals directed to study the development of the Nervous System should be submitted to the Organization Program of the Neural Systems Cluster (see below).

The Evolution of Developmental Mechanisms Program supports research to discover the developmental

processes that are shared by all organisms, and also those processes that produce diversity (phenotypic variation within a species and/or between species). For example, the program is interested in elucidating how gene networks are modified to generate different phenotypic outcomes. Understanding these processes will likely require inter-disciplinary and collaborative approaches using a wide range of organisms.

Neural Systems Cluster

The Neural Systems Cluster focuses on the basic functions of the nervous system and its interactions with the physical and social environments. The neuronal mechanisms underlying organismal responses and adaptation to an ever-changing biosphere are also of interest. The Cluster encourages the use of comparative species approaches to better understand how organisms perceive their environment, transduce that information in the nervous system and respond appropriately. Projects supported by the Neural Systems Cluster span multiple levels of analysis ranging from the molecular and cellular to the complex behavioral aspects of organisms functioning in their natural environments. The use of comparative and evolutionary studies, as well as the development of novel theoretical, computational, and transdisciplinary approaches to guide and instruct experimental design, are particularly encouraged. Interdisciplinary research in neuroscience at the interfaces of biology, physics, chemistry, mathematics, computer science and engineering is also supported.

Proposals should be submitted to one of the three programs below, each of which reflects one of three conceptual domains in neurobiology:

The **Organization Program** supports research focused on how the nervous system is organized along developmental, genetic, molecular and cellular lines; exploring developmental mechanisms and determining how experiential/environmental interactions affect the basic structural and functional characteristics of the nervous system.

The **Activation Program** supports research focused on how signals from the external environment activate the nervous system to produce motor responses; investigating how the internal state of the organism reaches a decision threshold, integrates sensorimotor responses, and triggers an action.

The **Modulation Program** supports research focused on how various factors modulate the nervous system to produce complex behavior, and how that complex behavior, in turn, feeds back to have an impact on the nervous system; examining basic neural mechanisms underlying neuroendocrine and neuroimmune function, learning and memory, biological rhythms, and other complex behavior.

Physiological and Structural Systems Cluster

The Physiological and Structural Systems (PSS) Cluster supports research to advance understanding of physiological mechanisms and functional morphology. PSS supports hypothesis- and discovery-based research encompassing a wide range of approaches at levels of organization from molecules to populations. The Cluster encourages submission of proposals aimed at identifying fundamental design principles of physiological and structural systems and at understanding why particular patterns of morphology and physiological mechanisms have evolved and how they are integrated at the level of the whole organism. The Cluster encourages modeling and theoretical approaches to augment experimental approaches. Multidisciplinary research at the interfaces of biology, physics, chemistry, mathematics, computer science and engineering is encouraged. Normally, the PSS Cluster will not consider projects that are primarily focused on environmental toxicology or endocrine disrupting chemicals.

Proposals should be directed to one of the three programs described below:

The Symbiosis, Defense and Self-recognition Program (SDS) supports research on processes mediating both antagonistic and beneficial symbiotic interactions, as well as mechanisms of self/non-self recognition within and between species. The program welcomes proposals on the dynamics of initiation, transmission, maintenance and dissolution of these complex associations, including studies of metabolic interactions, immune defenses (especially involving comparative studies, new systems or novel mechanisms), host-symbiont regulation, and recognition, signaling, communication, and reciprocal responses among interacting species. Integrative approaches and attention to emergent effects of symbiotic interactions are encouraged. All aspects of symbiosis are supported, including commensalism, mutualism, parasitism, host-pathogen interactions, and mechanisms of foreign organelle acquisition.

The Physiological Mechanisms and Biomechanics Program (PMB) supports research on the physiological and structural features that contribute to life processes in plants, animals, microbes, and other organisms. Broad thematic areas include, but are not limited to sensing and signaling mechanisms, transport, energetics and metabolism, growth and development, stress adaptation mechanisms, biomaterials, muscle physiology, endocrinology, biomechanics, functional morphology, coordination of reproductive processes, gas exchange, circulation and osmoregulation. Systems approaches that predict or reveal the nature of coordination among functional processes and/or structural components as a means to further the understanding of organismal integrity are particularly encouraged.

The Integrative Ecological Physiology Program (IEP) supports research on the structural and physiological traits of organisms that underlie their capacities to live in various ecological settings. A central focus of the program is research on physiological mechanisms underlying organism responses to biotic and abiotic components of their environments. The program seeks proposals framed in explicit ecological or evolutionary contexts, and therefore projects may address time scales ranging from the short-term to evolutionary. Projects focused on understanding how genetic, biochemical, morphological and physiological processes integratively result in the capacities of organisms to live in dynamic environments are encouraged. The IEP Program particularly encourages proposals focused on using physiological traits to improve predictive models of organismal responses to global change.

OTHER SOLICITATIONS THAT USE THE IOS CORE CLUSTER DEADLINES

Research in Undergraduate Institution (RUI) Proposals

The core programs will accept **Research in Undergraduate Institution** (RUI) proposals. **RUI submissions must start with a preliminary proposal** submission 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&from=fund.

Research Coordination Network (RCN) Proposals

The core programs will accept **Research Coordination Network** (RCN) Proposals. **RCN proposals do not start with a preliminary proposal and instead should be submitted at the full proposal deadline listed in this IOS solicitation.** 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.

REVIEW PROCESS

A two-stage review process is now in use for all IOS core programs, including RUI proposals:

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 *ad hoc* and/or panel review at the discretion of the Program, as described in Section VI of this Solicitation. Full proposals that were not invited (except as noted for RCN) will be returned without review.

ADDITIONAL FUNDING OPPORTUNITIES

This solicitation does not apply to conference and workshop proposals, requests for supplemental funding, RAPID or EAGER applications, all of which should be submitted following the standard guidelines outlined below by selecting "In response to GPG" on the proposal coversheet and then selecting the "RAPIDs, EAGERs, Workshops, Conferences, Other" Category from the pull-down menu. CAREER proposals are likewise not covered by this solicitation. Additional CAREER proposal information can be found here: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214

Supplemental Funding Requests

The target date for most IOS programs for Research Experiences for Undergraduates (REU), Research Experiences for Teachers (RET), Research Assistantships for High School Students (RAHSS), and Research Opportunity Award (ROA) supplement requests as well as proposals for Conferences, Symposia and Workshops (Meetings) is **March 1** annually (or next business day if that is a weekend or holiday). See http://www.nsf.gov/bio/supp.jsp and http://www.nsf.gov/div/index.jsp?div=IOS for guidance on preparation of requests for supplemental funding. **Please note that supplemental funding is intended for unanticipated opportunities only and should be justified on this basis**. Requests for support of planned REU, RET, RAHSS, and ROA activities should be included in the invited full proposal budget. See http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&org=IOS for additional guidance on budget preparation.

International Activities

Investigators may also include international components in new proposals submitted to any relevant NSF program, or request supplemental funding for projects already supported by NSF. Investigators should consult early in the application process with both the disciplinary program manager and the International Science and Engineering (ISE) country program manager. ISE works with all NSF areas to co-fund new awards and supplements that meet these criteria. Information about additional international funding opportunities and links to ISE country program manager contacts may be found at http://www.nsf.gov/od/iia/ise/index.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 Director(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 Director(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

Anticipated Type of Award: Continuing Grant or Standard Grant

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

Anticipated Funding Amount: $55,000,000 pending availability of funds

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

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 2

In a given year, an individual may participate as a PI or co-PI on **no more than two** preliminary proposals submitted in response to this IOS Core Program Solicitation. Preliminary proposals in excess of the limit for any person will be returned without review in the reverse order received.

"PI" and "co-PI" refer to the role an individual would play in a full proposal (including all parts of a Collaborative Research Proposal). See Exhibit II-7: Definitions of Categories of Personnel in the GPG for the definition of proposer roles. **It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines.** Participating in a proposal as a collaborator does not count towards this limit, including investigators who contribute services for a fee (e.g., sequencing) or are the PI on a subaward. Thus, the number of proposals on which an investigator can be listed as collaborator is unlimited. Changes in the team post-submission to meet the eligibility limits will not be allowed.

This limit does not pertain to 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 (http://www.nsf.gov/div/index.jsp?div=IOS) 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.

PRELIMINARY PROPOSAL PREPARATION INSTRUCTIONS

- 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. Preliminary proposals that are not compliant with the guidelines may be returned without review. It is the submitting organization's responsibility to ensure that the preliminary proposal is compliant with all applicable guidelines.

For projects with multiple PIs that would be submitted as Collaborative Research Proposals, the preliminary proposal should be submitted by **ONLY** the lead institution. The title should begin with the phrase "IOS Preliminary Proposal: Collaborative Research:" The collaborative partners should be indicated in the list of personnel on the first page of 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, font size, characters per inch, margins, etc. as specified in the GPG, Chapter 2, Sections A-B. In brief, proposals should have 1" margins all around the page, no more than 6 lines of text per inch, and use no smaller than 10 point font (except in figures when absolutely required). No adjustments to line spacing, kerning, margins, or other layout options can be used to circumvent the established page limitation. Preliminary proposals that fail to adhere to these formatting and page limitation requirements may be returned without review.

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, as well as the broader impacts of the proposed research. Preliminary proposals must include the

following components: Applicants must include the documents below (prepared in accordance with standard NSF formatting guidelines).

- **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. The box for "Beginning Investigator" on the proposal Cover Sheet must be checked if either the Principal Investigator [PI] or one of the co-Principal Investigators [co-PIs] is an individual who has not been a PI or co-PI on a Federally-funded award with the exception of doctoral dissertation, postdoctoral fellowship or research planning grants. The sum of $2 should be entered on the budget line to allow correct FastLane processing. For more FastLane instructions, see section V.D. below.

- **Title of Proposed Project:** Title should begin with the prefix "IOS Preliminary Proposal:..." followed by any additional acronyms (e.g. Accomplishment Based Renewal "ABR:", or Research in Undergraduate Institutions "RUI:",), if applicable.

- **Project Summary (1 page):** Project Summaries must include three sections: Overview, Statement on Intellectual Merit and Statement on 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 and explicitly address the overview and both intellectual merit and broader impacts in the Project Summary will not be accepted by FastLane or will be returned without review**.

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

  Section 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 other project personnel, whether from proposed collaborative research proposals (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 personnel), and **one sentence** describing that person's role(s) in the project.

  Section II. Project (This section is limited to four pages. The use of the sub-sections listed below is recommended, 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" or "Research Design"
  5. "Broader Impacts" (This section is now explicitly required in the GPG)

- **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 combined conflict of interest template described below.** Please Note: The requirement to omit advisors, advisees, etc. is a deviation from the normal GPG rules.

- **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**. The template found at http://www.nsf.gov/bio/ios/ioscoitemplate.xlsx, contains a total of five tabs. Please read the Instructions carefully and follow guidance. Using the template, compile an Excel Workbook that identifies conflicts of interest (COIs) for all persons listed on the Personnel page (i.e., Section I) of the Project Description. Conflicts to be identified are (1) Ph.D. dissertation advisors and 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 relatives, and (5) any other individuals with whom, or institutions with which, the senior personnel (PI(s), co-PI(s), and any named personnel) have financial ties, including advisory committees (specify type), boards of directors, or prospective employees. **Following the Instructions provided in the template, the completed Excel Workbook should be emailed to IOScoispreadsheet@nsf.gov immediately after you submit your proposal, but no later than the proposal deadline.** Do not use the temporary Fastlane ID or a Research.Gov ID to fill out the COI template. You must use only an assigned NSF Proposal ID, which should be 7 digits long and will start with the fiscal year numbers (e.g., for FY14, all the Proposal ID's will start with "14"). Do not send in the COI template until you have been assigned the official NSF Proposal ID at the time of submission. **Do not use the Division of Environmental Biology (DEB) COI template for IOS submissions because the formats are different and the spreadsheets are not interchangeable.**

Applicants must include the above documents (prepared in accordance with standard NSF formatting guidelines).

NOTE: Other documents except those included above are prohibited in preliminary proposals and should not be included.

Documents specifically EXCLUDED in a preliminary proposal are:

- **Current and Pending Support Statements,**
- **Facilities, Equipment and Other Resources,**
- **Budget and Budget Justification,**
- **Data Management Plan,**
- **Letters of Collaboration,**
- **Postdoctoral Mentoring Plan,**
- **RUI Impact Statement,**
- **Certification of RUI,**
- **Supplementary documents or appendices**

Mid-Career Investigator Awards in Integrative Organismal Biology (MCA-IOS) activities may be included in preliminary and invited full proposals submitted in response to this solicitation. The Mid-Career Investigator should be listed along with the other project personnel in Section I (Personnel) and the proposed activities should be described in Section II (Project). A "mid career" investigator is defined here as any researcher who is post-tenure and not retired. The MCA-IOS opportunity provides support for mid-career researchers/scientists to acquire new skills to use genomics and bioinformatics tools and/or novel technologies to answer

organismal questions. Especially encouraged are applications from investigators trained in whole organism physiology, 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 invited full proposal, requests for support may include research visits, for participation in training opportunities in other laboratories, and for the use of genome research facilities not available at the applicant's institution. If invited for a full proposal, support can be requested by an eligible investigator for his or her own activities or to host an eligible Mid-Career investigator and can include a request for salary support during periods of training. Investigators interested in the MCA-IOS are strongly encouraged to contact a Program Director for further guidance prior to submission of a preliminary proposal containing these activities.

Preliminary Proposal Checklist For Compliance

Prior to submission, please review your preliminary proposal against this checklist to ensure that it is fully compliant with the guidelines provided in this solicitation:

- On the **Cover Page**, $2 is entered into the Requested Amount box to allow correct FastLane Processing and the Beginning Investigator box is checked if applicable.
- The **Title** begins with the prefix "IOS Preliminary Proposal..." followed by any additional acronyms (e.g. RUI, ABR), if applicable.
- The **Project Summary** is limited to 1 page and includes an overview and separate statements on the Intellectual Merit and the Broader Impacts of the proposed activity.
- The **Project Description** is limited to 5 pages, the first page of which contains only a list of project personnel, including institution, title, planned status (e.g. PI, co-PI, subaward lead, other senior personnel), and one-sentence summary of role(s) in the project.
- The **References Cited** is limited to 3 pages and conforms to the GPG format.
- **Biographical Sketches** do not include information about advisors, advisees, and collaborators.
- A **Combined Conflict of Interest Document** prepared according to the provided template and emailed to ioscoispreadsheet@nsf.gov.
- Ensure that your final submitted pdf conforms to the typeface size limits (at least 10-11 pt depending on font), line spacing maximum (no more than six lines of text per vertical space of one inch) and margins (at least one inch on all sides of page) specified in the GPG.

Items that should *NOT* be included in a Preliminary Proposal:

Budget, Budget Justification, Facilities, Equipment and Other Resources, Current and Pending Support, Letters of Collaboration, Data Management Plan, Postdoctoral Mentoring Plan, RUI Impact Statement, Certification of RUI Eligibility, or any other Supplementary Documents.

FULL PROPOSAL PREPARATION INSTRUCTIONS

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

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

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

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

Please note the following additional guidance:

- **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. However, incorporating useful suggestions from reviews of the preliminary proposals is encouraged.

- **Research Experiences.** Projects anticipating the inclusion of REU, RET, RAHSS, or ROA activities should include those as part of the research proposal itself. See http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&org=IOS for additional information about preparation of REU budget requests. Please note that supplemental funding is intended only for unanticipated opportunities that arise during the course of the project.

  For REU activities, a Supplementary Document (limited to three pages) should be included that describes (1) the nature of each prospective student's involvement in the research project; (2) the experience of the PI (or other prospective research mentors); (3) the nature of the mentoring that the student(s) will receive; and (4) the process and criteria for selecting the students(s). If a student has been selected, the grounds for selection and a brief

biographical sketch of the student should be included. Please note that this section should not include a project description. See: http://www.nsf.gov/pubs/2013/nsf13542/nsf13542.pdf for additional guidance.

- **Combined Conflict of Interest document**. The template found at http://www.nsf.gov/bio/ios/ioscoitemplate.xlsx, contains a total of five tabs. Please read the Instructions carefully and follow guidance. Using the template, compile an Excel Workbook that identifies conflicts of interest (COIs) for all persons listed on the Proposal Cover Page, along with other senior personnel and/or collaborators and subaward lead(s). Conflicts to be identified are (1) Ph.D. dissertation advisors and 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(s), and (5) any other individuals with whom, or institutions with which, the senior personnel (PI(s), co-PI(s), and any named personnel) have financial ties, including advisory committees (specify type), boards of directors, or prospective employees. **Following the Instructions provided in the template, the completed Excel Workbook should be emailed to IOScoispreadsheet@nsf.gov immediately after you submit your proposal, but no later than the proposal deadline.** Do not use the temporary Fastlane ID or a Research.Gov ID to fill out the COI template. You must use only an assigned NSF Proposal ID, which should be 7 digits long and will start with the fiscal year numbers (e.g., for FY14, all the Proposal ID's will start with "14"). Do not send in the COI template until you have been assigned the official NSF Proposal ID at the time of submission. Do not use the DEB COI template for the IOS submission, the formats are different and the spreadsheets are not interchangeable.

- **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 which should include the nature of and need for the collaboration. No additional text 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.

  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: _____

  Please note that generic letters of general support are not allowed.

Invited Full Proposal Checklist For Compliance

Prior to submission, please review your invited full proposal against this checklist to ensure that it is fully compliant with the guidelines provided in this solicitation:

- The **invitation to submit a full proposal** is uploaded into **Single Copy Documents.**
- The **intellectual merit** and **broader impacts** of the proposed research are addressed in the **Project Summary** and in the **Project Description**.
- The **Biographical Sketches do not** include information about advisors, advisees, and collaborators.
- **Planned REU, RET, RAHSS, and ROA activities** are included in the budget request.
- The **Data Management Plan, and (where applicable) Postdoctoral Mentoring Plan,** and/or REU Request, have been uploaded into **Supplementary Documents**. Contact a cognizant Program Director if you have questions about these or other Supplementary Documents that you plan to upload.
- **Letters of Collaboration** conform to the provided template and are loaded into **Supplementary Documents**. **Generic Letters of support are not allowed.**
- A **Combined Conflict of Interest Document** prepared according to the provided template and emailed to ioscoispreadsheet@nsf.gov by the full proposal deadline.
- It is highly recommended that a **list of 12 suggested reviewers** be entered into the appropriate tab on the COI spreadsheet template, including the individuals' names, institutions, and areas of expertise, email addresses and URLs if available. Please contact a Program Director for guidance if you are unable to download the template.
- Ensure that your final submitted pdf conforms to the typeface size limits (at least 10-11 pt depending on font), line spacing maximum (no more than six lines of text per vertical space of one inch) and margins (at least one inch on all sides of page) specified in the GPG.

The invited full proposal must be submitted to this Program Solicitation (not the GPG) and the Program area to which the Preliminary Proposal was submitted should be selected from the pull-down menu.

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)***:***

  January 17, 2014

  Third Friday in January, Annually Thereafter

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

  August 01, 2014

  First Friday in August, Annually Thereafter

  By Invitation Only

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

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

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

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

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

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

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

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

Additional Solicitation Specific Review Criteria

For preliminary proposals, it is recommended that reviewers focus on the following critical aspects of the proposed work:

- The questions driving the research
- The goals expected to be accomplished
- The approaches employed in the proposed research

In addition, it is suggested that the following issues be considered as they prepare their reviews:

- Are the ideas innovative or potentially transformative?
- Are the ideas conceptually well grounded?
- Are the experimental approaches and experimental design feasible and logically linked to the central ideas?
- Are the PIs well qualified and sufficiently experienced with the approaches to effectively conduct the research?
- What risks are involved and can they be overcome?
- What is the potential impact of the science?
- Is there a convincing and significant effort made towards broader impacts?

A strong preliminary proposal is one in which the logical flow and significance of the proposed line of investigation are articulated clearly and the broader impacts of the work are apparent. In short, IOS would like reviewers to identify preliminary proposals that address questions and/or ideas that are most likely to lead to large advances in the field.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

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

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

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

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

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

C. Reporting Requirements

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

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of

any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- 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, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

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

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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