Plant Genome Research Program (PGRP)

PROGRAM SOLICITATION
NSF 16-614

REPLACES DOCUMENT(S):
NSF 15-548

National Science Foundation

Directorate for Biological Sciences
Division of Integrative Organismal Systems

Full Proposal Deadline(s):

Proposals Accepted Anytime

IMPORTANT INFORMATION AND REVISION NOTES

There are no deadlines or target dates for proposal submission in response to this solicitation. Proposals may be submitted at any time.

Two new Challenge Grant opportunities are available: (1) Challenge Grant Awards to advance plant transformation capabilities for crops and related plants (TRANSFORM-PGR) and (2) Challenge Grant Awards to mine existing data (MINE-PGR).

The Early Career Awards (ECA-PGR) and Mid-Career Awards (MCA-PGR) continue to be available.

Basic research and tool development opportunities continue to be available (RESEARCH-PGR).

The limit on the number of proposals per Co-PI has changed.

Any proposal submitted in response to this solicitation prior to January 30, 2017, should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 16-1). NSF anticipates release of a revised PAPPG (NSF 17-1) in the Fall of 2016 and it will be effective for proposals submitted or due on or after January 30, 2017.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Plant Genome Research Program (PGRP)

Synopsis of Program:

The Plant Genome Research Program (PGRP) supports genome-scale research in plant genomics that addresses challenging questions of biological importance and of relevance to society. The Program encourages the development of innovative tools, technologies and resources that push the boundaries of research capabilities and permit the community to answer seemingly intractable and pressing questions on a genome-wide scale. Emphasis is placed on the creativity of the approach and the scale and depth of the question being addressed. Data produced by plant genomics should be usable, accessible, integrated across scales and of high impact across biology. Training and career advancement in plant genomics is featured as an essential element of scientific progress. The PGRP continues to focus on plants of economic importance and biological processes and interactions that will have broad impact on the scientific research community and society in general.

Four funding opportunities are currently available:

1. Genome-scale plant research and/or tool development to address fundamental biological questions in plants of economic importance on a genome-wide scale (RESEARCH-PGR);
2. Plant Transformation Challenge Grants to overcome constraints in plant transformation through breakthrough discoveries (TRANSFORM-PGR);
3. Data Mining Challenge Grants to mine, reuse and unleash new information from available large-scale datasets (MINE-PGR);
4. Career Advancement to build new careers in plant genomics as early career awards (ECA-PGR) or mid-career awards (MCA-PGR).

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.

- Anne W. Sylvester, 675.01, telephone: (703) 292-4400, email: dbipgr@nsf.gov
- Timothy Nelson, 685N, telephone: (703) 292-4400, email: dbipgr@nsf.gov
- Thomas Okita, 685N, telephone: (703) 292-4400, email: dbipgr@nsf.gov
- C. Eduardo Vallejos, Program Director, 685N, telephone: (703) 292-4400, email: dbipgr@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 or Cooperative Agreement

Estimated Number of Awards: 10 to 20

Anticipated Funding Amount: $15,000,000

Up to $15 million is available for the fiscal year, pending availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

- A consortium of organizations must submit a single proposal with one eligible organization serving as the lead and all other organizations as subawardees. Separately submitted collaborative proposals will be returned without review. International subawards are permitted if justified by unique opportunities and capabilities not available in the U.S.

Who May Serve as PI:

For Early Career Investigator Awards (ECA-PGR) only: Individuals must hold an appointment as a tenure-track Assistant Professor (or equivalent) at a U.S. academic or non-profit research institution within 6 months of submission of the proposal and may submit for up to four years from the start date of the appointment.

For Mid-Career Investigator Awards (MCA-PGR) only: Individuals must hold a tenure track position (or equivalent) at a U.S. academic or non-profit research institution and have an active research program that would benefit from genomics approaches. Eligible individuals must be post-tenure and pre-retirement (or at an equivalent career stage).

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

An investigator may submit only **one** proposal as PI within a 12-month period, counted from the date of submission, whether a proposal is declined or awarded. Proposals submitted in excess of this limit within the 12-month period will be returned without review. There is no limit to the number of proposals submitted by an investigator as co-PI or senior personnel.

Resubmissions are not permitted within 12 months counted from the date of proposal submission. Resubmission of a proposal within 12 months, and with a different PI, will be returned without review.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

  Not Applicable

- **Other Budgetary Limitations:**

  Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)**:

  Proposals Accepted Anytime

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.

TABLE OF CONTENTS

I. INTRODUCTION

Plants are of fundamental importance to society and are the basis of our carbon economy. Over the years, research in plant genomics has provided unprecedented access to the knowledge and capabilities needed to address challenging biological questions of societal importance. The promise of plant genomics is that the discoveries from basic research will contribute to solving pressing global problems. This will be accomplished by continuing to uncover fundamental biological principles and by developing the tools and resources to do so. Under the guidance of the National Plant Genome Initiative (NPGI), the PGRP supports research that provides essential upstream information that will ultimately bridge to practical outcomes. Established in 1998, the NPGI has provided

a series of five-year strategic plans that have steered advances in plant genomics from basic research to effective outcomes by coordinating action across federal agencies. The NPGI and the PGRP are currently guided by the fourth of these strategic plans (http://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/npgi_five-year_plan_5-2014.pdf).

The overarching goals of the PGRP are: (1) to support cutting edge research that investigates the structure and function of the genomes of economically important plants, including biological processes and biotic/abiotic interactions of societal importance, (2) to further the development of innovative tools, technologies and resources that drive genomics research, (3) to promote the integration, accessibility and analysis of genome-wide datasets, and (4) to promote the development of human resources in plant genomics and stimulate full engagement of all sectors in scientific achievement, training and communication.

II. PROGRAM DESCRIPTION

The Plant Genome Research Program (PGRP) supports genome-scale research that frames questions at the frontier of plant biology and of importance to society. Combined with technology breakthroughs, plant genomics research continues to develop critical tools and resources in economically important plants. Significant questions can be addressed about how plant genomes function independently and together with other genomes, in response to the environment, and across scales. At the same time, new data challenges are emerging and assimilation of diverse data sets into a comprehensive framework is needed. There thus remains a pressing need to refine the questions and generate the tools, resources and capabilities to advance knowledge and produce outcomes that will revolutionize agriculture, address fundamental issues of climate change and build a scientifically engaged population.

The PGRP invites proposals that focus on basic research and tool development in economically important plants. Targeted challenge grant opportunities are available to stimulate breakthroughs in plant transformation capabilities and to expand information access by mining and reusing existing datasets. The Program promotes training and career advancement in plant genomics by supporting early and mid-career investigators. Proposals are encouraged in the following four major areas:

Genome-scale research and/or tool development (RESEARCH-PGR): *To tackle questions in plant biology on a genome-wide scale and develop the tools and resources that enable discovery.*

The PGRP continues to support projects that emphasize hypothesis-driven research and/or tool and resource development on a genome-wide scale. Proposals should be innovative and explore new scientific territory, and should articulate the problem, question, hypothesis, or grand challenge of the genomics-related topics. Especially encouraged are proposals that address challenging questions that can be tackled afresh using genome-wide, large-scale methods. Proposals that focus on generating new tools or community resources are encouraged. Examples of areas for research and tool development are provided here:

- *Genome by Genome Interactions*: Plant genomes function in coordination with multiple other genomes including those of microbes, invertebrates, fungi, other plants and within cells. Research emphases should be on responses and interactions from the host plant perspective.
- *Genomes by Epigenomes by Environment Interactions:* Plants are responsive to their environment at multiple time and spatial scales. Basic research is needed to identify mechanisms of interaction, resilience to climate change and responses to abiotic and biotic stresses in plants of societal importance on a genome-wide scale.
- *Genotype to Phenotype:* Gaps exist in understanding how plants process and assimilate genomic and epigenomic information, within the context of physiology, biochemistry, growth and development, to produce an integrated phenome. Research that embraces holistic approaches is especially encouraged.
- *High-throughput Phenotyping:* Connecting genotypes to phenotypes will be accelerated by advances in throughput and automation of phenotyping, especially under field conditions and over time. Connecting and integrating these data outputs to underlying sequence information is essential.
- *Breakthrough Technologies:* Novel ideas and exploratory technologies revolutionize the ability to answer challenging questions in plant genomics. Potent breakthrough technologies that advance research in plant genomics are welcome.
- *Data Challenges:* New approaches are needed to address remaining challenges in data generation, analytics and management. These include developing frameworks for harmonizing, coordinating, producing, archiving or discarding, analyzing and optimizing the datasets produced. Novel approaches to addressing data challenges are encouraged.
- *Visualization*: New methods are needed to improve data visualization across scales and are essential for functional genomics and for advancing the interpretation and accessibility of genomics datasets.
- *Bridging Partnerships*: The expansion and conversion of basic knowledge to studies in fields and diverse environments is a key step in translating basic discovery to practical application. Proposals are encouraged that build bridges between basic research and practical application by partnering with agriculturally oriented researchers, plant breeders or researchers from other disciplines.

Plant Transformation Challenge Grants (TRANSFORM-PGR): *Technology challenge to advance plant transformation capabilities.*

Plant transformation is a critical tool for functional genomics and for realizing the powerful potential of genome editing and synthetic biology. Advances in plant transformation have stalled in recent decades, in part due to seemingly intractable bottlenecks that vary with crop or plant species. New creative, collaborative and interdisciplinary approaches are needed to overcome these existing challenges and to catapult transformation capabilities to a new level. Proposals are invited that reach beyond the horizon, articulate the bottleneck to be overcome and pose specific bold plans to solve vexing problems in plant transformation.

Proposals are invited in any research area related to plant transformation of plants of economic importance including, but not limited to, research into the fundamental underpinnings of the biology that impedes progress. Research areas could include exploring the biological or genomic processes of transformation or plant regeneration; developing new synthetic biology approaches; enhancing somatic embryogenesis to improve plant regeneration; developing new technologies or vectors; partnering with engineers or other disciplines that can bring all-new perspectives to the problem; discovering ways to circumvent genotype-specific or tissue culture requirements; automating steps to increase throughput; and promoting education and training of experts in transformation biology. Advances that unify approaches across crops are especially encouraged. Plant species to be investigated are not delimited, but justification and/or evidence should be provided for how advancement of the transformation would benefit plants of economic importance.

Proposals must articulate the question(s) to be addressed or the particular bottleneck in the transformation pipeline for the crop(s), models or related plants being investigated. Proposals should include experimental methods, evidence of capability and facilities to carry out the work, expected outcomes, plans for dissemination and a concerted high impact training plan. High risk, high reward approaches are encouraged in this challenge grant opportunity. *Proposals that seek support exclusively for the establishment or maintenance of a major plant transformation facility are not encouraged and may be returned without review.*

Data Challenge Grants (MINE-PGR): *Data challenge for small grants to mine existing datasets.*

Sequencing and other high throughput technologies have advanced at a rapid pace, surpassing the rate of data analysis. Large publicly available datasets are untapped resources that can be analyzed in new ways and repurposed to yield new information. In the process, novel analytical tools and methods can be developed. An underlying premise of this challenge opportunity is that re-using data will help expose areas in which data standardization and coordination is needed. Enhancement of analytical tools will ultimately benefit the production and analysis of new datasets.

Researchers are invited to submit proposals to mine, re-use and potentially reconfigure data workflows to address new questions in genomics that might have not been originally conceived at the time of data generation. Especially encouraged are proposals that enable the linkage of datasets, such as sequence data with those generated by high-throughput phenotyping, proteomic or metabolomic technologies Improvement of genome sequence analysis from assembly to annotation remains critical. Plans for converging on community-approved standards for data acquisition could be included in a proposal submitted to this area.

This data challenge supports research that mines existing publicly available datasets; it does not support generation of new datasets, except as needed to complete the targeted analysis or as outcomes of the data reuse. Proposals should explain the new question or challenge being addressed, the nature of the dataset(s), the methods to be used and the products expected. Consistent with all PGRP projects, the release of all data, software and/or tools developed under these awards is required. A budget limit is not imposed, but proposals for smaller awards and/or shorter duration are welcomed where appropriate.

Early Career Awards (ECA-PGR) and Mid-Career Awards (MCA-PGR): *To advance careers in plant genomics.*

The PGRP continues to advocate for broadening the participation of scientists in plant genomics. Although well-integrated education and training efforts are expected of all proposals, the PGRP recognizes there are times when a career trajectory would benefit from focused training or mentoring in plant genomics. One important transition is when early career investigators first establish research programs in tenure-track, or equivalent, positions. Another transition is at a mid-stage (post-tenure or equivalent and pre-retirement) when research efforts would benefit from new technologies and genomics approaches. For these reasons, the PGRP offers two career funding opportunities: early career awards (ECA-PGR) to launch careers in plant genomics and mid-career awards (MCA-PGR) to revitalize a research program in state-of-the-art genomics approaches.

- ***ECA-PGR:*** Early career investigators are invited to submit proposals for PGRP projects that will advance their careers in plant genomics research. **For eligibility,** an ECA investigator must already hold or show evidence of an impending appointment (within 6 months of submission) as a tenure-track Assistant Professor, or equivalent, at the time of submission. Questions about eligibility equivalency should be addressed to a PGRP Program Director. Proposals may be submitted for up to four years following the start date of a tenure-track appointment and prior to tenure. Co-PIs and other senior personnel may be included in the proposal, particularly as mentors. An ECA investigator may submit only one proposal as a PI within a 12-month period from the date of submission. **All ECA proposals should fit the goals of the PGRP** as outlined in this solicitation. Proposals should include a brief statement about long-term career plans in plant genomics, including the identification of career mentor(s) and a description of how the awardee will interact with the mentor(s). Requests for support for travel or training may be included. As with all PGRP proposals, an ECA project should be fully integrated with the relevant genomics community of the crop plant or process being studied and should make full use of data, materials, information, expertise, and facilities already available in plant genomics. *ECA investigators are strongly encouraged to contact a PGRP Program Director for further guidance.*

- ***MCA-PGR:*** Mid-career investigators are invited to submit proposals that revitalize or infuse an already established research program with new genomics and/or bioinformatics approaches. The PGRP encourages the participation of mid-career investigators primarily trained in disciplines other than plant genomics, such as plant physiology, biochemistry, plant breeding or a non-plant research area such as mathematics, physics or engineering. Researchers focused on Arabidopsis who wish to gain experience working with crop plants are encouraged to apply. **For eligibility,** an MCA investigator is defined as any researcher who is post-tenure and pre-retirement, or at an equivalent career stage. Co-PIs and other senior personnel experience in genomics may be included in the proposal, particularly as mentors or to facilitate training. An MCA investigator may submit only one proposal as a PI within a 12-month period from the date of submission. **All MCA proposals should fit the goals of the PGRP** as outlined in this solicitation. Proposals should include a statement about the specific training activities that will engage the MCA investigator in learning plant genomics, including the site and source of the training. Requests for travel support may be included. *MCA investigators interested are strongly encouraged to contact a PGRP Program Director for further guidance.*

PGRP PRIORITIES AND ADDITIONAL CONSIDERATIONS FOR ALL PROPOSAL SUBMISSIONS

All proposals submitted under this Program Solicitation should be aligned with the goals of the PGRP articulated herein. Applicants are encouraged to contact Program Directors with any questions about research ideas and submissions. A description of the hallmarks of successful PGRP proposals may be useful when planning submission:

(1) The proposed research focuses on plants of economic importance and tackles questions of biological and societal importance. Societal needs are changing as rapidly as research is progressing. Agricultural challenges, climate change, and resource loss demands the power of foundational research that can be translated into practical outcomes. To this end, PGRP remains committed to supporting upstream basic research that can be envisioned for downstream impact, to the benefit of society. *Proposals that address Arabidopsis research exclusively, or plants not significantly linked to biological processes of societal importance, will be returned without review.*

(2) Genome-wide research questions and approaches are used. Proposals should align with the overarching scientific goals of the PGRP with emphases on genome-wide research questions and approaches in economically important plants. Proposals focused on individual genes or gene families are more appropriate for funding through other BIO programs http://www.nsf.gov/funding/pgm_list.jsp?org=BIO&ord=rect. *Proposals of this type will be returned without review.*

(3) Transdisciplinarity is included when appropriate: The Program encourages proposals that apply new skills and ideas to solve problems currently considered intractable. Breakthrough ideas and novel methodologies can be enabled by approaches that transcend boundaries of disciplines. Fields such as engineering, computational science and modeling, physics, mathematics and biomechanics have already had an impact on genomics, but there remains a need for transdisciplinary synergy to solve overarching biological problems.

(4) Investigative teams of all kinds, including single- or multi-investigator and single- or multi-institutional are justified. PGRP investigators have established a highly collaborative culture that values and benefits from shared research and multi-disciplinary training. This high impact research can occur with multiple or single investigators, one institution or many, and large or small budgets. Teams should be optimally designed to achieve the goals of the proposed work, and budgets should be commensurate with manageable project goals.

(5) Public access and timely data release is routine. Data products generated from PGRP-supported research have diversified

over the years and continue to be produced in massive quantities. Data products include sequences of all types, seeds, diversity populations, biological materials, genetic maps, genome browsers, informatics tools, images, software, publications, videos and movies, and teaching curricula, among other products. PGRP expects proposals to identify all data products, and to present a plan for full release and ready access within a reasonable time consistent with community standards, as articulated in the Supplementary documents of the proposal (Appendix A-1)

(6) International cooperation is included when appropriate. The PGRP encourages international research collaborations. It is generally expected that non-U.S. participants will secure support from their own national programs. However, international subawards may be included under circumstances in which international investigators bring unique expertise and/or resources not available in the U.S. Information about international subawards is available in the PAPPG. In addition, a PGRP Program Director should be contacted for guidance about international collaborations and subawards.

(7) Broadening participation is inherent to the project. Public access to PGRP research outcomes should enable any institution to participate in plant genomics research. To broaden participation, PGRP encourages applications from EPSCoR jurisdictions, Primarily Undergraduate Institutions (PUI), Historically Black Colleges and Universities (HBCU), Hispanic Serving Institutions (HSI), and Tribal Colleges and Universities (TCU). Investigators are encouraged to think beyond their immediate colleague network to incorporate diversity in their scientific endeavors. *All projects are expected to explain how project participation will be diversified and broadened as part of their Broader Impacts activities.*

(8) Training, education and communication is strong and fully integrated. Research ideas and endeavors need rejuvenation by new participants. For this reason, PGRP continues to emphasize training, outreach and education that is integrated with the research and with tangible outcomes. There are also major gaps in communication about science society-wide. Investigators are encouraged to think creatively and include activities that will successfully penetrate societal communication barriers. Efforts could include, but are not limited to, training for translational research by including breeders in genomics projects and developing citizen science activities or other public outreach. For additional guidance please see the NSF's Perspective on Broader Impacts (https:www.nsf.gov/od/iia/publications/Broader_Impacts.pdf).

ADDITIONAL FUNDING OPPORTUNITIES

Resources for information about additional funding opportunities including Supplements, CAREER submissions, EArly-concept Grants for Exploratory Research (EAGERs) and other opportunities can be found at the following sites:

- NSF PAPPG-http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp
- Directorate of Biological Sciences website-http://www.nsf.gov/dir/index.jsp?org=BIO
- PGRP website-http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5338&org=IOS&from=home

Please contact the PGRP Program Directors for additional information.

III. AWARD INFORMATION

Projects will be supported either as standard grants, continuing grants or cooperative agreements. The award size will be determined based on the nature and level of the activities, as well as the availability of funds. Budget limits are not identified, but all budgets should be commensurate with the activities proposed. An investigator may submit only one proposal as a principal investigator (PI) per year in response to this Program Solicitation, counted as 12-months after the date of proposal submission. This limit does not apply to investigators serving as Co-PIs or other senior personnel. Declined proposals resubmitted within a 12-month period of the original submission, and with a different PI, will be returned without review. Proposals received in excess of this single proposal limit will be returned without review. The estimated number of awards is 10-20, pending availability of funds, and approximately $15 million is available for new awards supported through this solicitation, pending availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

- A consortium of organizations must submit a single proposal with one eligible organization serving as the lead and all other organizations as subawardees. Separately submitted collaborative proposals will be returned without review. International subawards are permitted if justified by unique opportunities and capabilities not available in the U.S.

Who May Serve as PI:

For Early Career Investigator Awards (ECA-PGR) only: Individuals must hold an appointment as a tenure-track Assistant Professor (or equivalent) at a U.S. academic or non-profit research institution within 6 months of submission of the proposal and may submit for up to four years from the start date of the appointment.

For Mid-Career Investigator Awards (MCA-PGR) only: Individuals must hold a tenure track position (or equivalent) at a U.S. academic or non-profit research institution and have an active research program that would benefit from genomics approaches. Eligible individuals must be post-tenure and pre-retirement (or at an equivalent career stage).

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

An investigator may submit only **one** proposal as PI within a 12-month period, counted from the date of submission, whether a proposal is declined or awarded. Proposals submitted in excess of this limit within the 12-month period will be returned without review. There is no limit to the number of proposals submitted by an investigator as co-PI or senior personnel.

Resubmissions are not permitted within 12 months counted from the date of proposal submission. Resubmission of a proposal within 12 months, and with a different PI, will be returned without review.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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

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

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

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.

ADDITIONAL PROPOSAL PREPARATION INSTRUCTIONS

(1) Proposal Cover Sheet: Titles must start with acronyms listed in this Program Solicitation for the area of submission including

- "RESEARCH-PGR:…" for proposals submitted to Genome-Scale Research and Tool Development
- "TRANSFORM-PGR:…" for proposals submitted to the Transformation Challenge
- "MINE-PGR:…" for proposals submitted to the Data Mining Challenge
- "ECA-PGR: or MCA-PGR:…" for proposals submitted as Early or Mid-Career Awards

Please note that a maximum of four Co-PIs can be listed on the cover page. Additional Co-PIs and other Senior Personnel should be included in a complete list in the Project Summary.

(2) BIO Proposal Classification Form (PCF): Complete the BIO PCF, an on-line coding system that allows the PI to characterize the project when submitting proposals to the Directorate for Biological Sciences (BIO). The PCF is automatically generated through the Form Preparation screen when the PI prepares a coversheet via Fastlane. Additional information about the BIO PCF is available at http://www.fastlane.nsf.gov/a1/BioInstr.htm. Grants.gov Users: Refer to Section VI.5. of the NSF Grants.gov Application Guide for specific instructions on how to submit the BIO Proposal Classification Form.

(3) Project Summary: As per the PAPPG, Project Summaries **MUST** include three sections:

- Overview: This section must include a list of all senior personnel (PI, Co- PIs, key collaborators) along with their home institutions;
- Statement on Intellectual Merit: Identify clearly the specific aims of the project
- Statement on Broader Impacts

The summary should be written in the third person and understandable to a scientifically or technically literate reader. *Proposals that do not separately and explicitly address the overview, and both intellectual merit and broader impacts in the Project Summary not be accepted or will be returned without review.*

(4) Project Description (maximum 15 pages, including figures and tables): The standard description of the Project Description in the PAPPG should be followed. Additional information is provided here:

- Results from prior NSF support (maximum 5 pages): Only the most relevant prior NSF awards (PGRP or non-PGRP) should be listed in this section for the PI and all Co-PIs. Results from closely related awards from other federal agencies should be described, if applicable.
- Relevance and justification: Briefly explain the relevance of the proposed research to the stated goals of the PGRP, as articulated in this Program Solicitation.
- Research plan: Describe the goals of the project, including the necessary background for scientific, technical and informatics approaches, along with expected outcomes. Descriptions must be sufficiently detailed to allow adequate review. In addition, if a letter of collaboration is provided as a Supplementary Document, the project description should also include a detailed

description of the nature of collaboration, the role of collaborator(s), and the expected outcomes/deliverables from the collaboration.
- Broader Impacts: As per guidance in the PAPPG, the **Project Description must contain a heading labeled "Broader Impacts of the Proposed Work"** followed by a significant description of the activities planned. This section should convey how the proposed activities benefit society and achieve specific, desired societal outcomes. All PGRP projects are expected to broaden participation in research, educational and outreach activities. Additional creative and relevant activities should be proposed. Goals and expected outcomes for the proposed activities should be articulated and achievable. The scale of the activities should be commensurate with the scale and scope of the proposed research and should be integrated with the research objectives.

(5) References Cited: Indicate with an asterisk any cited publications that resulted from prior research funded by NSF for the PI or Co-PI.

(6) Biographical Sketches (2 pages each): Biographical sketches following the PAPPG guidelines must be provided as separate documents for the PI, Co-PIs and *each of the Senior Personnel listed on the Project Summary page.*

(7) Proposal Budget: Provide a summary budget and a yearly budget for the duration of the proposed project, including any subawards, if appropriate. A Budget Justification should be provided for each budget submitted. *It is recommended the Budget Justifications be structured with the same headings and subheadings as the Budget sheet.* Funds for facility support, construction or renovation may not be requested. Funds to cover the cost of attendance of the PI at each year's annual awardee meeting in Arlington, VA should be included in the budget.

(8) Current and Pending Support: Current and Pending Support following the PAPPG guidelines must be listed for the PI, Co-PIs and *each of the Senior Personnel and Key Collaborators listed on the Project Summary page.*

(9) Facilities, Equipment and Other Resources: Provide a description of available facilities. For projects requiring additional equipment, justify the need for these resources in the context of the innovative work proposed.

SUPPLEMENTARY INFORMATION REQUIRED BY PGRP

The PGRP requires additional materials in addition to the Project Description. These materials should be labeled clearly and included in the Supplementary Documents section of FastLane or Grants.gov. Provide only the allowable and applicable items as noted in the PAPPG or NSF Grants.gov Application Guide and this section. Proposals that contain any material not specifically requested, or in excess of the page allowances, will be considered non-compliant and may be returned without review. Supplementary documents in this section should be labeled and include the information described:

(A-1) Sharing of Results and Management of Intellectual Property (maximum 3 pages): Describe the management of intellectual property rights, including plans for sharing data, information, and materials resulting from the award. Data products should be identified and should include, but are not exclusive, to sequence data and other products defined below. This plan must be specific about the nature of the results to be shared, the timing and means of release, and any constraints on release. In each instance, the person responsible for data release should be clearly identified in this section. The guidelines provided here follow recommendations of the community-driven ***Toronto International Data Release Workshop*** described on the PGRP website. The proposed plan must take into consideration the following conditions where applicable:

- High-throughput large-scale sequencing projects that produce whole genome sequences, genome assemblies, whole genome SNP and methylome collections, BAC end sequencing, transcriptomes, ESTs, and full-length cDNA sequences, among others, produce the major resources from PGRP investment. For this reason, these sequences must be uploaded to a public databases, such as NCBI GenBank, at the pre-publication stage as soon as they are assembled and quality checked following currently accepted community standards (e.g. Bermuda/Ft. Lauderdale agreement, see PGRP website.). Release of these sequences to project websites is acceptable, but such releases are of limited longevity; therefore, evidence of release to public repositories is required.
- Sequences generated by hypothesis-driven projects and of limited scope are required to be released to a public database (e.g. NCBI GenBank) at the time of publication or before the end of the project, even if publication has not been completed. These data are required to meet acceptable quality standards and should include metadata.
- Projects that produce genome-wide information, including, but not exclusive to, nucleotide, epigenomic, small RNA, RNA sequencing, proteomics and/or metabolomics data must also be made available as soon as quality check satisfies specifications articulated. The timing of release should be stated clearly in the proposal. The public databases where the data will be deposited should be clearly indicated. Release of these data to project websites is acceptable, but such releases are of limited longevity; therefore, evidence of release to public repositories is required.
- Biological materials, including seeds, as well as constructs, software and similar community resources produced with NSF funding, must be made available in a timely manner to the scientific community, including industry. These materials should be checked for quality according to standards specified. Plans for release of information, and/or collaboration through publication, must be explained. Resource projects may develop authorship arrangements as appropriate for the project and should explain expected collaborative authorship.
- Projects that produce non-sequence data or biological resources such as seeds, constructs, and/or curricular materials (or other such resources) must provide a sustainability plan to maintain the resources post-award. The sustainability plan cannot include seeking additional Program funds for maintenance. Outlets such as DRYAD and other public repositories could be included as part of the sustainability plan.
- Letters of commitment should be provided from databases or stock centers that agree to distribute project outcomes, including the actions planned and funds needed (if any) for the distribution.
- A reasonable charge for community resources is permissible, but the fee structure must be outlined clearly in the proposal. For this reason, budgeting and planning for short-term and long-term distribution of the project outcomes must be described. Any charge or access differences between industry and the academic community must be clearly spelled out. If a Material Transfer Agreement is required for release of project outcomes, the terms must be described in detail. No reach-through rights are allowed. Data or materials resulting from NSF-funded research obtained with proprietary materials must be readily available without any restrictions to the users. For this reason, the terms of any usage agreements should be stated clearly in the proposal.
- In case of a multi-institutional proposal, the lead institution is responsible for coordinating and managing the intellectual property resulting from the PGRP award. Institutions participating in multi-institutional projects should formulate a coherent plan for the project prior to submission of the proposal.

IMPORTANT: Appendix A-1 must be submitted as a supplementary document *in lieu* of the DATA MANAGEMENT PLAN (DMP) required of all proposals submitted to NSF. PGRP permits up to 3 pages for the DMP. However, FastLane will not allow submission of a proposal with a DMP in excess of the 2-page maximum. ***For this reason, you must submit a single sheet in the DMP module and add the text "SEE APPENDIX A-1 UPLOADED AS A SUPPLEMENTARY DOCUMENT".***

(A-2) Management Plan (maximum 5 pages): Projects involving more than one investigator must provide a description of the management plan for coordinating the project.

- This description should include plans for communication, coordination of data and information management, evaluation and assessment of progress, allocation of funds and personnel, interaction with the customers in a service project, and other specific issues relevant to the proposed activities.
- A table summarizing the role of each investigator is required for multi-investigator proposals. The exact time commitment of each key project member should be indicated, regardless of any salary request from NSF. Community resource projects should include a timetable with yearly goals, each with benchmarks for the major anticipated outcomes and expected dates for their release.
- Proposals that include distribution of community research resources should include a management plan. This plan should include: methods to make the community aware of the available services or resources including conditions for access, methods for quality control, and ways to solicit feedback from the community. The plan should also document institutional commitment to the facility, user fees if anticipated, and plans for long-term support after the end of the project. Appointment of a project manager and/or administrator is feasible in some cases.
- Management of educational, outreach or training activities should be included.

(A-3) Coordination with Outside Groups (maximum 2 pages): Projects with activities that are part of a national or international collaboration should describe the relationship of the proposed activities and how the components will be coordinated.

(A-4) Responses to Prior Reviewer Comments (**OPTIONAL**; maximum 1 page): Resubmitted proposals may describe changes in response to prior reviewer comments. Use of this Appendix is optional: PIs are not required to indicate if a proposal is a resubmission or address prior reviewer comments. As per the NSF PAPPG, *a proposal that was previously reviewed and declined by NSF will be returned without review if it has not been substantially revised since the last submission. Proposals resubmitted within 12-months of the original submission will be returned without review.*

(A-5) Plans for Undergraduate and Graduate Student Mentoring (maximum 1 page): All proposals that include funding to support undergraduate or graduate students must include a description of the mentoring activities for the students, regardless of location.

- **IMPORTANT:** A POSTDOC MENTORING PLAN (PDM) plan is also required for all proposals that include post-doctoral researchers in the budget, as described in the PAPPG. The PDM should be submitted in the designated PDM module in Fastlane. Please note that page limits apply as per the PAPPG, so the PDM should be compiled as a single 1 page document for all PIs of a large project.

(A-6) Career Development Plan (for ECA-PGR and MCA-PGR proposals only; maximum 1 page):

- A plan for early career investigators should include: 1) a brief introduction identifying former training or activities as pre-tenure faculty; 2) a statement of the long term career objectives and plans for achieving them; 3) plans for networking with other plant genomics projects; and 4) a description of mentoring plans for career advancement in plant genomics.
- A plan for mid-career investigators should include: 1) a brief introduction identifying current research and expertise; 2) a statement of training objectives and how the training objectives will be achieved; 3) plans for networking with other plant genomics projects; and 4) an explanation of long-term impact on the applicant's future research in plant genomics.

ADDITIONAL INFORMATION FOR SUBMISSION

(1) Optional Supplementary Documents: Letters of Collaboration. Letters of collaboration from individuals or organizations that are not supported by subawards may be included. Involvement must be integral to the project. All letters of collaboration:

- Should include a detailed description of the nature of the collaboration, the role of collaborators, and the expected outcomes/deliverables.
- Should be provided only by collaborators, not from designated Co-PIs or senior personnel.
- Are not required from subawardee organizations.
- Should articulate the type of support provided**.** *Generic letters of support are not allowed.*
- Should be uploaded as Supplementary Documents.
- Note: For ECA and MCA submissions, letters from mentors or those facilitating training are allowed.

(2) Required Single Copy Document: Collaborators and Other Affiliations Information. A document identifying all collaborators and affiliations must be submitted as a Single Copy document along with the proposal. Please note that Single Copy documents are only available to NSF staff and not visible or accessible to reviewers. The document **must be prepared using a designated template**. The template is found at https://www.nsf.gov/bio/ios/ioscoatemplate.xlsx and contains a total of five tabs. Instructions for filling out the template are provided here and more detailed instructions are on the first tab of the template.

- Using the template, compile an Excel Workbook that identifies Collaborators and Other Affiliations for all persons listed on the Proposal Cover Page, including other senior personnel and/or collaborators and subaward lead(s).
- Collaborators and Other Affiliations are defined as: (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.
- Note that for publications developed by large consortia, **only co-authors interacting directly on the project** would be included as a co-author and would be included in the template. Members of current Advisory Committees who receive reimbursement for travel or honoraria would be considered collaborators and should be included in the last category. Please refer to the PAPPG for additional information that may be useful during preparation of this list.
- **Follow the instructions on the first tab of the template**. Please note that you must leave column A of the Collaborations and Other Affiliations tab blank for submission of the Single Copy document.
- **A list of 12 suggested reviewers (who are not collaborators or affiliated with any of the personnel in the proposal)** may be entered into the appropriate tab on the **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.**

(*3) Submission of the template by email: Collaborators and Other Affiliations Information.* After the proposal has been submitted by Fastlane, the original template for Collaborators and Other Affiliations (saved as an excel file .xls or .xlsx) should be sent by email attachment to Program staff at the designated email address. Please name the file according to the information in the Instruction tab of the template. Before submitting this Workbook as an email attachment, Column A of the Collaborations and other Affiliations tab should be completed **with the new Proposal ID number from Fastlane.** The template should be emailed within 24 hrs of proposal submission to IOScoaspreadsheet@nsf.gov.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

- **Full Proposal Deadline(s)**:

  Proposals Accepted Anytime

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

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

For Proposals Submitted Via Grants.gov:

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

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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

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

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

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

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

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

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

Additional Solicitation Specific Review Criteria

For proposals submitted to the MCA-PGR opportunity, reviewers will be asked to comment on the proposed training plan (Appendix A-6) and whether the proposed activities will enhance the applicant's career development and research transition to the field of plant genomics.

For proposals submitted to the ECA-PGR opportunity, reviewers will be asked to comment on the career development plan (Appendix A-6), including mentoring, and whether the proposed activities will help launch the career of the applicant.

For proposals involving international collaborations and subawards, reviewers will be asked to assess the mutual benefits and collaboration potential among the partners. Reviewers will comment on whether the expertise and specialized skills, facilities, sites and/or resources of the international counterparts are essential to project outcomes.

For all proposals submitted, reviewers will be asked to specifically comment on the following aspects of a project:

- The data management plan (Appendix A-1) will be evaluated to ensure that the plan for data release and access is consistent with PGRP objectives.
- Reviewers will be asked to assess plans for sustainability, continued access, maintenance and/or operation of services past the lifetime of an award.
- Reviewers will be asked to comment on the training and mentoring plan for post-docs, graduate students and undergraduate students, if these individuals are included in the budget.
- Reviewers will be asked to comment on feasibility of time commitments for all investigators, including PI, co-PI and senior personnel.

B. Review and Selection Process

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

Several review panels will be assembled, depending on the number of proposals received. Some panelists may participate virtually.

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

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

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

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

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

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

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

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- Anne W. Sylvester, 675.01, telephone: (703) 292-4400, email: dbipgr@nsf.gov
- Timothy Nelson, 685N, telephone: (703) 292-4400, email: dbipgr@nsf.gov
- Thomas Okita, 685N, telephone: (703) 292-4400, email: dbipgr@nsf.gov
- C. Eduardo Vallejos, Program Director, 685N, telephone: (703) 292-4400, email: dbipgr@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Maya S. Anderson, 685N, telephone: (703) 292-4400, email: dbipgr@nsf.gov

For questions relating to Grants.gov contact:

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

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website.

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

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.

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