

2010 Project

Program Solicitation

NSF 05-624

Replaces Document NSF 04-617



National Science Foundation
Directorate for Biological Sciences

Full Proposal Target Date(s):

January 23, 2006

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

2010 Project
To determine the function of all genes in *Arabidopsis thaliana* by the year 2010

Synopsis of Program:

The Directorate for Biological Sciences (BIO) of the National Science Foundation (NSF) announces its intention to continue support of research to determine the function of all genes in the model plant *Arabidopsis thaliana* by the year 2010. Individual investigators or groups of investigators will be supported to conduct creative and innovative, genome-wide or systems-level research designed to determine, using all available means, the functions of *Arabidopsis* genes. This year, the Program will focus on: (1) projects that include genome-wide analyses for benchmarking the function of all genes in the genome; (2) projects that will develop experimental and computational methods, tools, and resources for enabling a broad community of scientists to conduct functional genomics research on *Arabidopsis*; and (3) research on exemplary networks that use high throughput methods and integrate modeling with experimental data to understand the gene circuitry underlying basic plant processes.

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

- 47.074 --- Biological Sciences

Eligibility Information

- **Organization Limit:**

Proposals are accepted only from US academic institutions, US non-profit research organizations including museums, research laboratories, professional societies and similar organizations in the US that are directly associated with educational or research activities, and consortia of such organizations with appropriate research and educational facilities. The eligibility criteria apply to both the main and sub-awardees.

- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 12 - Approximately 12 awards.
- **Anticipated Funding Amount:** \$10,000,000 Approximately \$10M for new awards in FY 2006, pending the availability of funds with individual award amounts as noted in Section IV for research or resource development projects.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Full Proposal Target Date(s):**
January 23, 2006

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The Directorate for Biological Sciences (BIO) of the National Science Foundation (NSF) announces its intention to continue support of research to determine the function of all genes in the model plant *Arabidopsis thaliana* by the year 2010. This represents a continuation of the *Arabidopsis* genome research initiative BIO has supported since 1990 and of the 2010 Project begun in FY 2001. The program continues to be a BIO Directorate-wide activity. It is also part of an international effort on the functional genomics of *Arabidopsis*, called "The Multinational Coordinated *Arabidopsis thaliana* Functional Genomics Project: Beyond the Whole Genome Sequence" (see <http://www.nsf.gov/pubsys/ods/getpub.cfm?bio0202>.)

The year 2005 is a mid-point of the 2010 Project. The North American *Arabidopsis* Science Committee held a workshop in August 2005, to assess the status of the Project, to recommend the objectives for the next five years, and to ensure that the Project can reach its original goals by the year 2010. The workshop report is posted at http://www.arabidopsis.org/info/2010_projects/AT2010WorkshopFinal.pdf. This solicitation incorporates some of the recommendations of the workshop as well as other inputs such as the annual report of the Multinational Coordinated *Arabidopsis thaliana* Functional Genomics Project (available at http://www/bio/pubs/reports/masc_annual_june05.pdf).

The 2010 Project is distinct from the Plant Genome Research Program. The Plant Genome Research Program will not consider proposals in which *Arabidopsis* is the only research focus, although it will consider proposals that transfer the knowledge gained in *Arabidopsis* to studies of fundamental biological processes in economically important plants (see [NSF 05-603](#) for detail). The 2010 Project is also distinct from existing disciplinary programs in the Directorate for Biological Sciences, and is not meant to be an alternative source of funding for all proposals involving *Arabidopsis*. Proposals investigating the detailed, biological function of individual genes or gene families should be submitted to the appropriate disciplinary program (See <http://www.nsf.gov/bio> for description of various BIO programs.) Proposals that relate to improving various informatics tools to enhance utilities of the vast array of *Arabidopsis* data and information available in cyberspace can be submitted to the Biological Database and Informatics program ([NSF 05-577](#)).

Opportunities for advanced graduate students to work in German functional genomics laboratories are provided by a program funded by NSF and the German Research Foundation (DFG). The program is coordinated by the University of Minnesota. Please see the announcement posted at http://www.arabidopsis.org/news/job_postings/internsGermany080805.txt or contact Dr. Isabell Witt at isawi@duke.edu.

Projects that are not responsive to this program solicitation or are inappropriate for funding under the 2010 Project may be transferred to an appropriate disciplinary program, or returned without review if such transfer is deemed inappropriate.

II. PROGRAM DESCRIPTION

In FY 2006, the 2010 Project will focus on the following activities:

1. Benchmarking gene function

In order to meet the stated goal of the *Arabidopsis* 2010 Project, it is imperative that certain benchmarks for assigning gene function be defined and applied on a genome-wide scale. Functions of both characterized and uncharacterized genes can be revealed from a set of benchmarks, including, but not limited to, gene expression patterns at high spatial and temporal resolution, interacting partners under defined, physiologically relevant conditions, and identity of cis-elements. The objective of this activity should be to define each gene by a defined set of criteria that can be assessed in a high throughput manner. It is expected that benchmarking gene function will provide the community with standard reference points on the genome that can be used to elucidate detailed information about the functions of individual genes, gene families, and gene networks.

2. Developing genome-wide experimental approaches and tools for analyzing gene function and regulation

The 2010 Project will continue to support development of experimental methods/techniques and research tools, including biological resources and informatics tools. Emphasis will be on development of a variety of approaches and tools that provide quantitative readouts, are cost effective and comprehensive, and that can be readily adopted by the scientific community. New methods and tools to be developed are expected to complement the substantial numbers of tools and research resources that already exist world-wide, and to represent significant added value to a broad community of plant biologists. Special attention should be paid to methods and tools that will enable genome-wide functional analysis of genes of unknown function and classes of genes that have been underrepresented up to this point, such as those encoding non-protein coding RNAs. Large production-scale projects using proven technologies as well as pilot projects to demonstrate feasibility of novel methods and technologies will be considered.

3. Exploring exemplary networks and systems

Efforts to determine the function of a network of genes will continue to be supported in FY 2006, with an emphasis on research on exemplary gene networks and systems, rather than gene families. *Arabidopsis* genes and their products function as nodes in overlapping, dynamic biological processes. Determining the gene circuitry underlying a biological process is essential in the systems-level understanding of *Arabidopsis*. The objective of this activity is to construct and analyze representative gene networks involved in major biological processes in plants, including developmental, regulatory, biotic, physiological and metabolic processes as well as meta-networks connecting these processes. Such projects are expected to include protein-coding genes, genes for functional non-protein coding RNAs, or both.

NSF recognizes that many projects will encompass two or more emphases discussed here. For example, projects that undertake genome-wide analyses of gene function may also develop new methods, generate resources and/or computational tools. In all projects, high throughput and cost-effective approaches will be encouraged. Although the areas listed above are the focus of the FY 2006 competition, all imaginative and innovative proposals will be considered as long as they are justified on the basis of the goal of the 2010 Project.

While keeping in mind the emphasis as described above, proposers are strongly encouraged to consult the scope of the awards in the previous years of the 2010 Project Program (see the lists of previous awards at <http://www.nsf.gov/bio/pubs/awards/2010awards.htm>), as well as the projects funded elsewhere in the world including the German *Arabidopsis* Functional Genomics Network Program (<http://www.uni-frankfurt.de/fb15/botanik/mcb/AFGN/AFGNHome.html>) and GARNET (the genomic *Arabidopsis* Resource Network in the U.K. (<http://www.york.ac.uk/res/garnet/garnet.htm>)). Proposers are further encouraged to coordinate proposed activities with funded projects prior to submission of new proposals. If activities similar to an already funded project are to be proposed, the proposal must describe clearly a mechanism to coordinate with ongoing activities as well as a rationale based on benefits to the overall goal of the 2010 Project. NSF encourages participation of investigators and institutions that have not been involved in the previously funded 2010 activities.

In addition to research, this Program will support workshops, summer courses and other outreach/training activities designed to educate and train a broad community of scientists and students in unique scientific opportunities and approaches afforded by the 2010 Project.

For required items to be included in the proposal, please see "Project Description" under Section V.A. below.

Additional considerations:

Sharing of the project outcome: Success of the *Arabidopsis* 2010 Project will be ultimately measured by the extent that its products (data, information, research tools, biological resources and human resources) impact the advances in our understanding of the function of genes in *Arabidopsis*. NSF believes that one way to ensure success is to make available the outcomes of 2010 Projects openly, widely, rapidly, and in an easily accessible manner. NSF expects biological materials resulting from 2010 projects to be deposited at an established public depository (i.e., the *Arabidopsis* Biological Resource Center). In terms of information and data, NSF expects them to be made available through an established public database (i.e., the *Arabidopsis* Information Resources, NCBI databases, etc.), in addition to the project website.

Integration of research and education, and broadening participation: As in all other NSF programs, investigators are expected to integrate research and education in proposals submitted to the 2010 Project. Activities that promote participation of under-represented and under-served groups, including investigators at small institutions, minority-serving institutions, and community colleges are especially encouraged. Both activities should be well integrated into the proposed project, taking advantage of the opportunities the proposed project can uniquely offer.

Coordination among projects: If research similar to the proposed project is already funded in another NSF 2010 award or in similar functional genomics programs in other countries (http://www.arabidopsis.org/info/2010_projects/index.jsp), the PI should provide a plan for coordinating activities with the funded project. If two or more proposals with substantially overlapping goals and scope remain in consideration for funding after initial merit review, the PIs of those proposals may be asked to collaborate, and to submit a coordination plan prior to the final funding decision.

International collaboration: The 2010 Project encourages laboratory-to-laboratory interactions between US and foreign laboratories whenever such opportunities exist. NSF 2010 Project funds may be requested to support foreign investigators and students to work in US laboratories and for US investigators and students to work in international laboratories. However, foreign counterparts should secure support for their projects from their own national programs. A list of *Arabidopsis* functional genomics projects in other countries can be found at http://www.arabidopsis.org/info/2010_projects/index.jsp.

Intellectual property: When the project involves the use of proprietary data or materials, any data or materials resulting from NSF-funded research must be made promptly available, without any restrictions, to the users of such data or materials. It should be noted that prospective awardee institutions may be requested, prior to an award decision, to submit copies of any intellectual property agreements or material transfer agreements that any of the key project personnel have signed, or are planning to sign, that would impact the unrestricted and timely distribution of the outcomes of the NSF-funded research. Only NSF officials will review this material. In the case of a multi-institutional proposal, the lead institution will be responsible for coordinating and managing the intellectual property resulting from the 2010 Project award.

Industrial interactions: NSF recognizes that some of the resources and technologies needed to address the next set of challenges in *Arabidopsis* functional genomics exist in industry and encourages the use of their services if it would result in cost-savings and more rapid progress of the project. Such arrangements would usually involve purchase of resources or services from industry, and must be made without any restrictions on sharing the research outcomes with other researchers or on depositing information and physical resources in The *Arabidopsis* Information Resources (<http://www.arabidopsis.org/>) and The *Arabidopsis* Biological Resources Center (<http://www.biosci.ohio-state.edu/~plantbio/Facilities/abrc/abrchome.htm>), respectively. In these cases, the usual procurement procedures and rules of the grantee institution must be followed. Another mode of industrial interactions may involve equal partnerships between academia and industry. Under such an arrangement, NSF funds may not be used to support the industrial collaborators. Both parties are expected to bring their own resources to the project and share the results openly and quickly with the rest of the community according to the policy applicable to all awards funded under this program solicitation.

III. ELIGIBILITY INFORMATION

Proposals are invited only from US academic institutions, US non-profit research organizations including museums, research laboratories, professional societies and similar organizations in the US that are directly associated with educational or research activities, and consortia of such organizations with appropriate research and educational facilities. The eligibility criteria apply to both the main and sub-awardees.

PI Eligibility Limit: None Specified.

Limit on Number of Proposals: None Specified.

IV. AWARD INFORMATION

It is anticipated that approximately \$10 million will be made available for an estimated 12 new awards in FY 2006, contingent upon the quality of proposals received and the availability of funds.

Awards are expected to range up to a total of \$5 million for up to 4 years. However, the award duration for proposals to build community resources may not exceed 3 years. Budget requests must be justified in relation to the proposed activities.

Funding decisions are anticipated by the end of July 2006, with awards expected to start in September 2006. Awards will be made as standard or continuing grants.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/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 pubs@nsf.gov.

The following additions or modifications apply to proposals submitted in response to this solicitation:

Project Summary (1 page):

The project summary should consist of three parts in the following order:

1. A list of senior personnel (PI, Co-PIs, and Key Collaborators) along with their home institutions (please note that more than 4 co-PIs may be listed here although the FastLane cover page allows only 4 official co-PIs)
2. A summary of the proposed project
3. Broader Impacts of the proposed research project (details at <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>)

Please note that a project summary that does not include both scientific goals and the expected broader impacts will be returned without review. A detailed explanation can be found at <http://www.nsf.gov/pubsys/ods/getpub.cfm?iin127>

Project Description (maximum 15 pages including figures and tables):

In addition to the standard description in the GPG, the following guidelines must be followed:

- **Results from Prior NSF Support (up to 5 pages):** Only the most relevant prior awards should be included in this section for the PI and any of the Co-PIs listed in "Project Summary". If the PI or any of the Co-PIs has had a 2010 award, dissemination of the outcomes from the prior award must be described in this section.
- **Justification:** Briefly explain how the proposed activities meet the goals of the 2010 Project.
- **Research plan:** Describe the goals of the project, scientific and technical approaches, including informatics where appropriate, with expected outcomes. Descriptions must be sufficiently detailed to allow adequate review. All projects are expected to contain information about how the investigators plan to add their results to the community-wide effort to update and add value to the primary sequence information in GenBank as well as a projected timetable for accomplishing the stated proposal goals. If research tools and resources such as mutants and global expression data are produced during the course of the proposed project, the proposal should describe a plan for their public release and coordination with the existing distribution mechanisms. NSF expects biological materials resulting from 2010 projects to be deposited at an established public depository (i.e., the *Arabidopsis* Biological Resource Center). In terms of information and data, NSF expects them to be made available through an established public database (i.

e., the *Arabidopsis* Information Resources, NCBI databases, etc.), in addition to the project website (see the supplemental information A-4, below).

For proposals aimed exclusively at developing research methods, tools, and resources for the *Arabidopsis* functional genomics community, the following information must be included: (1) a list of deliverables including necessary informatics tools; (2) experimental plans to develop the methods/resources/tools including mechanisms of quality assessment; (3) project timetable; (4) a detailed plan for public release of the resources/tools; (5) any conditions to be placed on users, e.g. material transfer agreement, if any; (6) a plan to maintain and distribute the resource after NSF support has ended. It should be noted that resources (biological materials, software, etc.) produced with the support of NSF in all 2010 projects must be made available as soon as their quality is checked to satisfy the specifications described in the proposal and approved by reviewers. Further, they must be made available to all segments of the scientific community. Budgeting for short-term and long-term distribution of the project outcomes needs to be described in the proposal. A reasonable user charge is permissible, but the fee structure must be clearly outlined in the proposal. If accessibility differs between industry and the academic community, the differences must be clearly described. It will be permissible to use a qualified commercial operation for long-term maintenance and distribution of the project outcomes, if appropriate; however, such an arrangement should be made clear in the proposal.

- The broader impacts of the proposed activities should be described [See "NSF Review Process" below for examples of "broader impacts"]. Plans for integration of research and education must be described within the context of the proposed activity.

Proposal Budget:

Provide a summary budget and a yearly budget for the duration of the proposed project. When subawards are involved, summary and yearly budgets are required for each subaward. A Budget Justification should be provided for both the proposer and any subawardees. Institutions that do not meet the eligibility criteria in Section III above may not participate as subawardees. The 2010 Project program is fully committed to provide sufficient funds to complete any project it supports. A careful and realistic budget will add to the overall strength of a proposal. Funds for facility construction or renovation may NOT be requested. It is expected that foreign collaborators' projects will be supported by their national sources. NSF funds may be used for US investigators, postdoctoral fellows and students on exchange visits to their foreign collaborator's laboratory or to cover expenses associated with hosting foreign collaborators in the US investigator's laboratory.

Special Information and Supplementary Documentation:

Include the following materials, if applicable, in addition to the 15 page Project Description. Additional materials should be clearly labeled and included in the Supplementary Documents section of FastLane.

(A-1) Data Management Plan (maximum 1 page): Development and adherence to community-wide standards for collection and presentation of data, such as microarray or interactome data, are highly encouraged. Large-scale datasets must be made available in a format that enables rapid comparison and effective utilization of reproducible information. All proposals must include a detailed data management plan if the project is expected to generate significant digital data for preservation (maximum 1 page). The contents of the data management plan should include:

- The types of data to be produced
- The standards that would be applied for format, metadata content, etc.
- Provisions for archiving and preservation
- Access policies and provisions
- Plans for eventual transition or termination of the data collection after the NSF funding period

(A-2) Project Management Plan (maximum 2 pages):

Each proposal involving 4 or more PIs (1 PI and 3 Co-PIs) OR with PIs/Co-PIs from 3 or more different institutions, OR proposing to develop community research tools and resources must provide an additional description of the management plan for coordinating activities of the group or the management of the service aspect. This description should include plans for internal means of communication, coordinating data and information management, evaluating and assessing progress, allocating funds and personnel, interacting with users in a service project, and other relevant issues specific to the proposed activities. The overall project leader (normally the PI) must be identified and his/her role should be described. Change of project leader will require prior NSF approval. For complex projects, appointment of a project manager/administrator in addition to the PI(s) is strongly encouraged. The exact time commitment of each key member to the project should be indicated in the management plan, regardless of whether any of his/her salary has been requested from NSF. A project timetable with yearly goals should be included for all projects, regardless of the number of personnel involved.

(A-3) Coordination with Outside Groups (maximum 3 pages): If the proposed activity is part of a national or international collaborative project including public-private partnerships, describe the relationship of the proposed activity to the overall collaborative project and how the components will be coordinated. If a project similar to the proposed project (e.g., either

addressing the same exemplary network of genes or producing the same kind of community resources) is already supported elsewhere, a coordination plan is mandatory.

(A-4) Project web site: All 2010 Projects are required to have a web site specific for disseminating information about the scope and progress of the project. Describe a plan to develop and update the project website, including the timetable for development and the personnel involved. The project website should be open to public, and preferably, non-password protected. If any of it is password protected, the condition for granting access must be clearly stated on the first page. The web page should be specific to your 2010 project, should be user friendly, and should contain the following information at the least:

- A list of identifiers for the genes included in your project, if applicable.
- Project abstract
- Project participants
- Progress in identifying the functions of the genes under study- updated on a regular basis
- Outcomes: Publications, resources generated in the project and their availability (e.g. homozygous mutants generated in the project and their availability in ABRC), data generated in the project and its availability (e.g. microarray datasets generated in the project and their availability in TAIR, NCBI, or on your project website), tools generated in the project and their availability (e.g. new computational tools and where to download them).

Color Images: Be advised that NSF cannot accommodate the printing of color images as part of proposal submission through the FastLane system, and submitted proposals that require the use of color or of very high resolution photographic images will necessitate additional steps.

Provide only the allowable and applicable items as noted in the GPG. Include the materials in the FastLane submission by transferring them as PDF files through the "Supplementary Docs" module of the FastLane system.

Single-Copy Document(s):

A "conflict of interest" list must be included as an "additional single-copy document" at the time of FastLane proposal submission. This document must be in the form of a **single alphabetized table** that includes full names of all conflicts of interest for all senior personnel (PI and Co-PIs) as well as for any named personnel whose salary is requested in the project budget. Conflicts to be identified are (1) PhD thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months, and (3) any other individuals or institutions with which the investigator has financial ties (please specify type).

An alphabetized list of suggested reviewers can be submitted through the single-copy document module of FastLane.

Proposals that are not compliant with the guidelines may be returned without review.

Proposal Checklist:

NSF again stresses the importance of reading the program solicitation and GPG, and following the guidelines and requirements before the SRO submits the proposal through FastLane. Below is a checklist of items that, if not compliant, will most likely result in proposals being returned without review. This is not meant to be an exhaustive checklist. It is the submitting organization's responsibility to ensure that the proposal is totally compliant with the applicable guidelines.

- Project Title starts with "Arabidopsis 2010:..."
- Project summary is one page and consists of the three required parts.
- Project description is no more than 15 pages including tables and figures, using the correct font size and margin as required by the GPG. (It might be useful to print the submitted proposal from within the FastLane module to check for font size and margins because Acrobat-PDF conversions may cause changes in the NSF-viewable version of your proposal.)
- Biographical sketches for all personnel listed on the project summary page are included, and each is no longer than 2 pages and follows the format in the GPG.
- Current and pending support information is provided for all personnel listed on the project summary page.
- Budget and budget justifications – yearly and summary budgets with a budget justification of no more than 3 pages: the same applies to any subaward budget.
- Supplemental documents – All applicable and/or required items included. Unallowable items (e.g., letters of general endorsement or reprints) should not be included.
- Conflict of interest list conforms to the required format and is submitted through the single-copy document module of FastLane.
- No extraneous materials are included.

Proposers are reminded to identify the program announcement/solicitation number (05-624) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required by NSF in proposals submitted under this Program Solicitation.

Budget Preparation Instructions:

Awards are expected to range up to a total of \$5 million for up to 4 years. However, the award duration for proposals to build community resources may not exceed 3 years. Budget requests must be justified in relation to the proposed activities.

C. Due Dates

Proposals must be submitted by the following date(s):

Full Proposal Target Date(s):

January 23, 2006

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the

preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

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

What are the broader impacts of the proposed activity?

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

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. As in the past, proposals submitted in response to this program solicitation will be assigned to the most appropriate programs within the Directorate for Biological Sciences for proposal review and award management. They will be reviewed by a combination of ad hoc and panel reviews. This year, a single panel will be formulated to review all proposals submitted to this solicitation. .

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the

decision to award or decline funding.

In most cases, proposers will be contacted by the Program Officer after his or her recommendation to award or decline funding has been approved by the Division Director. This informal notification is not a guarantee of an eventual award.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division 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.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at <http://www.nsf.gov/awards/managing/>. Paper copies of these documents may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

In addition to the standard items outlined in the FastLane annual report template, the PI will be required to submit the following information in the report:

- Progress toward the goals, research plan, and timetable described in the awarded proposal
- If the project has generated community research resources/tools/methods (specified deliverables), description of,

- what, when and how they are being shared with the community.
- URL for the project website
- Significant findings
- Significant delays and difficulties encountered; and how the PI has overcome them
- Plan for the coming year if different from the original plan
- New collaborations formed since the start of the project with other US investigators including other 2010 PIs, industry labs, and international colleagues
- Outreach activities, efforts to broaden participation of under-represented and/or under-served groups
- Any publicity materials the project has produced

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project reporting system, available through FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Machi F Dilworth, Division Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: bio-2010@nsf.gov
- Parag R Chitnis, Program Director, Directorate for Biological Sciences, Division of Molecular & Cellular Biosciences, 655 S, telephone: (703) 292-8443, fax: (703) 292-9061, email: bio-2010@nsf.gov
- Diane Jofuku Okamuro, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: bio-2010@nsf.gov
- Steve Rodermeil, Program Director, Directorate for Biological Sciences, Division of Integrative Organismal Biology, 685 S, telephone: (703) 292-8420, fax: (703) 292-9153, email: bio-2010@nsf.gov
- James Rodman, Program Director, Directorate for Biological Sciences, Division of Environmental Biology, 635 N, telephone: (703) 292-7184, fax: (703) 292-9064, email: bio-2010@nsf.gov

For questions related to the use of FastLane, contact:

- Jessie Brown, Science Assistant, Division of Biological Infrastructure, telephone: 703 292-8470, email: biofl@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *MyNSF News Service* (<http://www.nsf.gov/mynsf/>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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: pubs@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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). 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 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.

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