

2010 Project

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

Program Solicitation

NSF 04-617

Replaces Document NSF 04-502



National Science Foundation
Directorate for Biological Sciences

Full Proposal Target Date(s):

January 21, 2005

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 research designed to determine, using all available means, the function of a suite of genes of the investigator's interest and choice. This year, the Program continues to solicit proposals that will use high throughput methods to understand the gene circuitry underlying plant processes and proposals to determine the function of genes of unknown function. Also supported will be development of *Arabidopsis* functional genomics tools that will enable a broad community of scientists to participate in the 2010 Project.

Cognizant Program Officer(s):

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

- 47.074 --- Biological Sciences

Eligibility Information

- **Organization Limit:**

Proposals are invited 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.

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

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 15 - Approximately 15 awards.
- **Anticipated Funding Amount:** \$13,000,000 Approximately \$13M in FY2005, pending the availability of funds with individual award amounts as noted below 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 21, 2005

Proposal Review Information

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

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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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 entire DNA sequence of *Arabidopsis thaliana* was completed at the end of 2000. For the first time, we know the sequence of all genes necessary for a flowering plant to function. Based on the continued genome annotation efforts, the number of protein-encoding genes in the *Arabidopsis* genome currently exceeds 28,000. As a follow-up to the *Arabidopsis* genome sequencing efforts, and to take full advantage of the opportunities created by them, the community of plant biologists has proposed an important and revolutionary new initiative to determine the function of all genes of a reference species within their cellular, organismal and evolutionary contexts by the year 2010 (the 2010 Project). Details can be found at <http://www.nsf.gov/cgi-bin/getpub?bio011> and <http://www.arabidopsis.org/info/workshop2010.jsp>. In response, the Directorate for Biological Sciences has established the 2010 Project as a Directorate-wide activity.

As with the original Multinational Coordinated *Arabidopsis thaliana* Genome Research Project, research on functional genomics in *Arabidopsis* is an international effort. The Multinational *Arabidopsis* Steering Committee has issued a long-range plan in a report, "The Multinational Coordinated *Arabidopsis thaliana* Functional Genomics Project: Beyond the Whole Genome Sequence". The report is posted at <http://www.nsf.gov/pubs/ods/getpub.cfm?bio0202>. This was followed by annual reports updating the progress and goals of this international effort (see http://www.nsf.gov/bio/pubs/reports/masc_annual_june03.pdf and http://www.arabidopsis.org/info/2010_projects/MascReport2ndEdition.pdf for the 2003 and 2004 reports). These reports identify several areas of research and resources that are needed urgently for sustaining rapid progress in *Arabidopsis* functional genomics.

One of the factors that contributed to the success of the Multinational Coordinated *Arabidopsis thaliana* Genome Research Project was worldwide collaboration among the researchers involved. The *Arabidopsis* research community has become a model for international research collaboration. It is expected that continued efforts by the international community of scientists would be essential for the success of the 2010 Project. NSF will continue to foster activities to advance international collaboration and coordination of the 2010 Project.

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 primary research focus. 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 function of individual genes or small families of genes and proposals addressing specific biological questions using *Arabidopsis* as a model system should be submitted to the appropriate disciplinary program (See <http://www.nsf.gov/bio/> for description of various BIO programs.)

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 2005, the 2010 Project will focus on the following two activities:

1. Determination of gene function of a network or a large group of genes with special emphasis given to gene networks underlying biological functions as well as to the genes of unknown function, and
2. Development of research tools and resources.

In both types of projects high throughput and cost-effective approaches will be encouraged. Although these two areas are the focus of the FY 2005 competition, all imaginative and/or 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.

Determination of gene function:

Individual investigators, or groups of investigators, will be supported to conduct creative and innovative research designed to determine, using all available means, the function of a specific set or network of genes in *Arabidopsis thaliana* of the investigator's interest and choice. The number of investigators involved in a single proposal should be determined by the scope and approach used in the proposal. The NSF expects that both large and small laboratories should be able to participate in the 2010 Project by taking advantage of various publicly available genomic tools and resources, such as knockout mutants and cDNA clones.

During FY 2005, emphasis will be placed on:

- Identification and analysis of function of networks of genes that underlie plant processes. Special consideration will be given to proposals describing innovative approaches to dissect nodes in network(s) and for integration of computational modeling with experimentation.
- Understanding roles of the genes with currently unknown functions: Many *Arabidopsis* genes encode many plant-specific proteins with no known function. Imaginative projects using high throughput methods for identifying functions of these genes will be given higher priority for funding than the projects that experimentally demonstrate functions of genes with fairly certain putative functions (based on homology).

Investigators are expected to have selected a set of genes as the subject of their research prior to the submission of a proposal. These genes must be identified in the proposal by GenBank accession number or by other identifiers from a publicly accessible database. The size of the selected gene set will depend on a number of factors, such as how the particular set was selected (e.g., based on a specific sequence motif or a set of genes expressed under a specific condition), and the interest and throughput capacity of the proposer. During FY 2005, higher priority will be given for the proposals that include large gene sets and use high throughput methods in functional analyses than is used in traditional research projects. Projects that focus on small numbers of genes, those that depend on existing low throughput methods, or proposals addressing specific biological questions using *Arabidopsis* as a model system are more appropriate for the disciplinary programs at NSF. During the FY 2005 competition of the 2010 Project, priority will be given to proposals to study genes unique to plants and to study genes not being studied in other currently funded *Arabidopsis* functional genomics projects. Genes being investigated by the previous 2010 Project awardees are publicly posted on an individual 2010 project's website, addresses of which can be found in the award abstracts available through the award lists (<http://www.nsf.gov/bio/pubs/awards/2010awards.htm>).

For required items to be included in the proposal please see "Project Description" section below.

Development of research tools and resources:

While the genome sequence and annotation information in public databases, microarray expression data at public websites, and a variety of biological resources at the *Arabidopsis* Biological Resource Center provide a good start for the community to begin the 2010 Project, NSF recognizes that additional tools and community biological resources are needed to enable individuals or groups of individuals in the scientific community to participate in the 2010 Project. As in previous years, proposals to build necessary and critical tools and resources will be supported in FY 2005. Special consideration will be given to:

- New informatics tools that allow individual investigators to access, analyze, and utilize the vast amounts of rapidly accumulating data on *Arabidopsis*. Proposals are especially encouraged that enable individual researchers to query available resources to determine the function of genes.
- Also encouraged are proposals to design and provide bioinformatics and experimental tools to facilitate the study of genes of unknown function.
- New technologies that allow high throughput analyses of large sets of gene products and/or mutants, including projects that include innovative informatics, engineering developments and biological tools and approaches.

Proposals for developing community resources must have a clear focus on service, and should not include research on the materials or information to be produced. No selected group including the Principal Investigator (PI's) should have priority access to the resources/tools to be produced for general community use.

For required items to be included in the proposal please see "Project Description" section below.

Additional considerations:

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.

Coordination among projects: If research on the chosen set of genes 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 opportunity: 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 are likely to involve purchase of resources or services from industry, and must be without any restrictions on the distribution of the resources to 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/abr/abrhome.htm>), respectively. In these cases, the usual procurement procedures and rules of the grantee institution will be followed. Another mode of industrial interactions may involve sharing of knowledge, services and resources without any transfer of NSF funds to the industrial partner. The key to successful public-private collaboration is participation of both sides as equal partners by bringing their own resources to the project and sharing the results openly and quickly with the rest of the community. In such interactions, all details should be clearly stated in the supplementary materials, including the credit and advantages for the private sector investigators.

III. ELIGIBILITY INFORMATION

Proposals are invited 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 \$13 million will be made available for an estimated 15 awards in FY 2005, contingent upon the quality of proposals received and the availability of funds.

The award size for proposals to determine gene function will range widely and may be up to \$1 million per year for up to 4 years. Proposal budgets should be based on the realistic assessment of resources necessary to accomplish the stated proposal goals. Proposals with large budgets are expected to determine the function of a large number of genes.

The award size for proposals to build community resources may be up to a total of \$3 million for 2 years. Budget requests must be justified in relation to the proposed activities. Budget requests larger than the above guidelines will be considered if justified well.

Funding decisions are anticipated by the end of July 2005, with awards expected to start in September 2005. Awards will be made either as grants or cooperative agreements.

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.

Proposals must be submitted by FastLane (see "FastLane Submission" section below) and must follow guidelines described in the GPG. The following additions or modifications apply to proposals submitted to this Program:

Proposal Cover Sheet:

In the NSF FastLane system, follow instructions on proposal preparation. When completing the Cover Sheet, click on the GO button at "Program Announcement / Solicitation / Program Description No." Highlight **2010 Project**, and click on the Select button. Your proposal will automatically be assigned to BIO - 2010 Project. You must then "Go Back" to the Cover Sheet Components Form and complete the remainder of the cover sheet.

BIO Proposal Classification Form (PCF):

Complete the BIO PCF, available on the NSF FastLane system. The PCF is an on-line coding system that allows the Principal Investigator to characterize his/her project when submitting proposals to the Directorate for Biological Sciences. Once a PI begins preparation of his/her proposal in the NSF FastLane system, selects any cluster within the Directorate for Biological Sciences as the first (or only) organizational unit to review the proposal, and saves the cover sheet, the PCF will be generated and available through the Form Preparation screen. Additional information about the BIO PCF is available in FastLane at <http://www.fastlane.nsf.gov/a1/BioInstr.htm>.

Project Summary (1 page):

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

- A list of senior personnel (PI, Co-PIs, and Key Collaborators) along with their home institutions;
2. A summary of the proposed project in 200 words or less. Principal Investigators must state in the very first sentence of the Summary whether the proposed work pertains to:

(1) Determination of gene function for a network or group of genes

OR

(2) Development of research tools or resources for the community.

3. Broader Impacts of the proposed research project in 200 words or less.

Please note that a project summary that does not include both scientific goals and the expected broader impacts will be returned without review. 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 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 any of the PIs and Co-PIs listed in "Project Summary".
- **Justification:** Briefly explain how the proposed activities meet the goals of the 2010 Project.
- **For proposals aimed at determining the function of a network of genes, the following information must be included in the project description:** (1) a list of genes to be studied identified by their accession numbers in GenBank or other identifiers in a publicly accessible database. If the list is long, this can be attached as an appendix outside of the 15 page limit [See **Special Information and Supplementary Documentation A-1** below]; (2) why and how those genes were selected; (3) experimental plans to determine their function, including the level at which the functions are determined, e.g., the molecular/protein, biochemical, cellular, or higher levels; (4) 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; and (5) 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.
- **For proposals aimed at building research 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 resources/tools including mechanisms of quality assessment; (3) project timetable; (4) detailed plan for public release of the resources/tools; (5) any conditions to be placed on users, e.g. material transfer agreement; (6) if applicable, list related, ongoing activities in the US as well as elsewhere in the world so as to maximize the efficiency and the usefulness to the research community. Coordination mechanisms can be provided as an appendix outside of the 15 page limit. [See **Special Information and Supplementary Documentation A-3** below]; and (7) 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 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 spelled out. It will be permissible to use a qualified commercial operation for long-term maintenance and distribution of the project outcome, 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 described 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 investigators 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) List of genes to be studied (no page limit):

If the proposal is to determine the function of a network of genes, a list of genes to be studied must be included. Each gene must be identified by its accession number in GenBank or other identifiers in a publicly accessible database. Provide this information in a tabular form, using a font size no smaller than 10 point. Inclusion of the list is needed to ensure avoidance of unnecessary overlap and to facilitate interactions among *Arabidopsis* researchers. Consequently, if the proposal is funded, the PI will be required to have a website specific to the 2010 project and make the list available on the site. NSF recognizes that functions and interactions of additional genes will be discovered during the progress of the research and the PI is expected to update the list of genes on the project web site.

(A-2) Management Plan (maximum 3 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 set of genes or producing the same kind of community resources) is already supported elsewhere, a coordination plan is mandatory.

(A-4) 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) postdoctoral advisors or advisees, (3) collaborators or co-authors for the past 48 months, and (4) 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 SPO 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 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 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. No unallowable items (e.g., letters of general endorsement or reprints) should 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 (04-617) 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.

C. Due Dates

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

Full Proposal Target Date(s):

January 21, 2005

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 review by disciplinary panel(s) and ad hoc reviewers .

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.

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 also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). 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 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. The PI must deposit the outcome of awarded research in public repositories as specified at the time of the award.

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 Rodermel, 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:

- Sarah A Clark, 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 (FASED) 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.

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