

# **BIOCOMPLEXITY: PHASE I**

## **RESEARCH ON THE FUNCTIONAL INTERRELATIONSHIPS BETWEEN MICROORGANISMS AND BIOLOGICAL, CHEMICAL, GEOLOGICAL, PHYSICAL AND SOCIAL SYSTEMS**

---

### ***PROGRAM ANNOUNCEMENT***

#### ***NSF 99-60***

DIRECTORATE FOR BIOLOGICAL SCIENCES  
DIRECTORATE FOR COMPUTER, INFORMATION SCIENCE AND  
ENGINEERING  
DIRECTORATE FOR ENGINEERING  
DIRECTORATE FOR GEOSCIENCES  
DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES  
DIRECTORATE FOR SOCIAL, BEHAVIORAL AND ECONOMIC  
SCIENCES  
OFFICE OF POLAR PROGRAMS

***DEADLINE DATES: PRE-PROPOSALS March 15,1999  
FULL PROPOSALS June 15,1999***



**NATIONAL SCIENCE FOUNDATION**

# Summary of Program Requirements

---

## GENERAL INFORMATION

- **Program Name:** Biocomplexity:  
Phase 1. Research on the Functional Interrelationships between Microorganisms and Biological, Chemical, Geological, Physical and Social Systems
- **Short Description/Synopsis of Program:**

As a first step in a longer-term effort to understand the nature and dynamics of biocomplexity, NSF announces a special competition to support integrated research on the functional interrelationships between microorganisms, defined here as prokaryotes (archaea and eubacteria) and unicellular eukaryotes (algae, protozoa, fungi) and the biological, chemical, geological, physical, and/or social systems that jointly comprise complex environmental systems. Projects that explicitly focus on the role that microorganisms play in structuring or controlling complex systems are particularly encouraged. Knowledge of how microorganisms control or structure the biological, chemical, geological, physical or social environment or are controlled by them could have profound effects on our ability to understand and manage complex systems, monitor and restore the natural environment, and lead to new resources for biotechnology.

## COGNIZANT PROGRAM OFFICER(S):

### Biological Sciences (BIO)

Joann Roskoski  
Phone: (703) 306-1480  
E-mail: jroskosk@nsf.gov

### Computer and Information Science and Engineering (CISE)

Maria Zemankova  
Phone: (703) 306-1125  
E-mail: mzemanko@nsf.gov

### Engineering (ENG)

Janie M. Fouke  
Phone: (703) 306-1320  
E-mail: jfouke@nsf.gov

### Geosciences (GEO)

Phillip R. Taylor  
Phone: (703) 306-1587  
E-mail: prtaylor@nsf.gov

### Mathematical & Physical Sciences (MPS)

Marge Cavanaugh  
Phone: (703) 306-1842  
E-mail: mcavanau@nsf.gov

### Social, Behavioral and Economic Sciences (SBE)

Cheryl Eavey  
Phone: (703) 306-1729  
E-mail: ceavey@nsf.gov

### Office of Polar Programs (OPP)

Linda E. Duguay  
Phone: (703) 306-1029  
E-mail: lduguay@nsf.gov

## ELIGIBILITY

- **Limitation on the categories of organizations that are eligible to submit proposals:** U.S. institutions that are eligible for awards from the National Science Foundation, including colleges, universities, and other nonprofit research institutions such as botanical gardens, marine and freshwater institutes, and natural history museums may submit proposals. The NSF encourages collaborations with scientists at foreign institutions; however, primary support for any foreign participants/activities must be secured through their own national sources.
- **PI eligibility limitations:** None
- **Limitation on eligible topics:** For purposes of this competition, NSF will not support research on human disease, including work on the etiology, diagnosis, or treatment of physical or mental disease, abnormality, or malfunction. Studies of animal models for such conditions, the design and testing of drugs or other procedures for their treatment are also not eligible for support. NSF does not normally support technical assistance, pilot plant efforts, research requiring security classification, the development of products for commercial marketing, or market research for a particular project or invention.

- **Limitation on the number of proposals that may be submitted:** Proposals already submitted to other NSF programs are not eligible for consideration by this special competition. However, NSF will simultaneously review proposals submitted to another Federal agency when both agencies have agreed to joint review and possible joint funding of the proposal.

## AWARD INFORMATION

- Type of award anticipated: **Standard and Continuing Grants**
- Number of awards anticipated in FY 99: **up to 10 awards**
- Amount of funds available: **Approximately \$11 million will be available for this initiative in FY 1999**
- Anticipated date of award: **September 1999**

## PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

- Letter of Intent requirements: **None**
- Pre-proposal requirements: **Required**
- Proposal Preparation instructions: **Standard**
- Supplemental full proposal preparation instructions: **For research in Arctic regions, the Arctic Logistics Coordination form (see NSF-98-72) must accompany all submissions proposing fieldwork. NSF-UNOLS Ship Time Request Form must accompany all proposals requesting ship time. For research in the Antarctic, the Operational Requirements Cover Sheet and necessary worksheets must be submitted as described in NSF 96-93. For additional requirements see text of announcement.**

## BUDGETARY INFORMATION

- Cost sharing/matching requirements: **None**

- Indirect cost (F&A) limitations: **None**
- Other budgetary limitations: **Funds may not be requested or used for construction or renovation of facilities.**

## FASTLANE REQUIREMENTS

- Fastlane proposal preparation requirements: **FastLane (<http://www.fastlane.nsf.gov>) submission required for preproposals and full proposals**

FastLane point of contact: **For technical assistance with FastLane, please send an e-mail message to [biofl@nsf.gov](mailto:biofl@nsf.gov).**

## DEADLINE/TARGET DATES

- Pre-proposal Deadline **5:00 P.M., submitter's local time, March 15, 1999**
- Full Proposal Deadline **5:00 P.M., submitter's local time, June 15, 1999**

## PROPOSAL REVIEW INFORMATION

Merit Review Criteria: **Standard National Science Board approved criteria**

## AWARD ADMINISTRATION INFORMATION

Special grant conditions anticipated: **None**

## INTRODUCTION

Complexity is a dynamic property of life that arises from the interaction of living organisms with their environment. Thus, biological complexity emerges from the functional interrelationships between biological entities, at all levels of organization, and the biological, chemical, geological, physical and social environment, at all levels of aggregation. The resulting complex natural and anthropogenic systems range from microscopic to global in scale and in totality comprise the earth system. Humankind depends upon complex systems for food, fiber, breathable air, and other vital natural resources. Such systems also establish the parameters for, and the environments in which occur, all human economic and social interactions. Consequently, understanding the role of biological complexity in complex systems is critical.

Because all biological systems, from molecular to ecosystem levels, are inherently complex, it has been difficult to understand their role within, and effect upon, the environmental systems in which they occur.

Fortunately, our ability to study biological complexity has been enhanced by the advent of powerful new technologies. Genome sequencing and DNA-chips, new tools in computational analysis, mathematical and statistical modeling, robotics, new sensors and monitoring devices, along with satellite-based imaging of the land and sea - are all contributing to the flood of data about the Earth's biological complexity. While the analysis of massive data sets is a crucial ingredient, data acquisition alone will not enhance our understanding of biological complexity and its role in complex systems.

It is apparent that understanding biological complexity requires a sophisticated approach that addresses integration across temporal, spatial and conceptual boundaries to identify and represent design principles and dynamic patterns at multiple levels of organization and scale. Collaborations involving scientists from a range of disciplines (e.g. biology, physics, chemistry, geology, hydrology, social sciences, statistics, mathematics, computer science and engineering) will be essential to advance our understanding of biological complexity and its role in complex environmental systems. These collaborations should not be constrained by institutional, departmental or disciplinary boundaries.

## **PROGRAM DESCRIPTION**

In order to encourage the bold and innovative research that can lead to an enhanced understanding of biocomplexity, the NSF announces a special competition to support integrated research on the functional interrelationships between microorganisms and the biological, chemical, geological, physical, and/or social systems that jointly comprise complex systems. While microbes, plants, and animals all contribute to shaping the Earth's biological complexity, we know the least about microorganisms, defined here as prokaryotes (archaea and eubacteria) and unicellular eukaryotes (algae, protozoa, fungi). Therefore, as the first step in a longer-term effort in this area, projects that explicitly focus on the role that microorganisms play in structuring or controlling complex systems are solicited.

Diverse environments that range from frozen polar regions to volcanic vents, from tropical forests to agricultural lands, as well as the neighborhoods of urban centers and industrial fermentation tanks are all appropriate for study. Knowledge of how microorganisms control or structure the dynamics of these environments or are controlled by them could have profound effects on our ability to understand and manage complex systems, monitor and restore the natural environment, and lead to new resources for biotechnology.

This competition complements several ongoing activities (Life in Extreme Environments NSF 99-43, Integrated

Research Challenges in Environmental Biology NSF 99-12, Environmental Geochemistry and Biogeochemistry NSF 99-9, and Microbial Observatories NSF 99-36) within the NSF priority area, Life and Earth's Environment, by supporting larger and longer duration projects in a wider variety of natural and human environments.

Non-exclusive examples of questions appropriate for research supported by this competition include:

Does functional redundancy exist in microbes that mediate key processes involved with carbon and nutrient cycling? And if so, what is its significance to the resiliency of natural and anthropogenic systems to stress?

How much does biological variation, from genes to species, determine environmental heterogeneity in terrestrial, aquatic and marine systems and result in the patterns observed in regional to global scale processes?

What are the feedbacks between human social and economic systems and the distribution and dynamics of important processes mediated by microbes?

How do chemical, physical and biological factors interact to organize, control and run "macromolecular machines" (highly coordinated assemblies of macromolecules that function in even more complex, ordered structures within cells and on which fundamental cellular mechanisms such as protein synthesis depend)?

Do microbes play key roles in the dynamics of the complex systems involved in human infrastructure (bridges, highways, water delivery systems etc.) deterioration?

How did the interaction of microbial and geological systems lead to the expansion and collapse of natural systems through geological time?

What unifying insights into the functional interrelationships between microorganisms and their biological, physical, geological, chemical, and social environments are possible using concepts such as fractal analysis, chaos, and non-linear dynamics?

## **ELIGIBILITY**

U.S. institutions that are eligible for awards from the National Science Foundation, including colleges, universities, and other nonprofit research institutions such as botanical gardens, marine and freshwater institutes, and natural history museums may submit proposals. The NSF encourages collaborations with scientists at foreign institutions; however, primary support for any foreign participants/activities must be secured through their own national sources.

For purposes of this competition, NSF will not support research on human disease, including work on the etiology, diagnosis, or treatment of physical or mental disease, abnormality, or malfunction. Studies of animal models for such conditions, the design and testing of drugs or other procedures for their treatment are also not eligible for support. NSF does not normally support technical assistance, pilot plant efforts, research requiring security classification, the development of products for commercial marketing, or market research for a particular project or invention.

Proposals already submitted to other NSF programs are not eligible for consideration by this special competition. However, NSF will simultaneously review proposals submitted to another Federal agency when both agencies have agreed to joint review and possible joint funding of the proposal.

## AWARD INFORMATION

In Fiscal Year 1999, NSF expects to make up to 10 awards from a total budget of approximately \$11 million depending on the quality of submissions and the availability of funds. Typical awards are expected to involve two or more institutions, be up to 5 years in duration, and have annual budgets of \$500,000 to \$1,000,000. The anticipated date of awards is September 1999.

## PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

### PREPROPOSALS

#### A. Preproposal Preparation Instruction

Preproposals to Biocomplexity: Phase I Research on the Functional Interrelationships Between Microorganisms and Biological, Chemical, Geological, Physical and Social Systems require electronic submission via the NSF FastLane system. All page limits are single-spaced pages prepared in accordance with the proposal format instructions in the Chapter II, Section C of the NSF *Grant Proposal Guide (GPG)*, NSF 99-2. The complete text of the *GPG* (including electronic forms) is available electronically on the NSF Web site at: <http://www.nsf.gov/>. Paper copies of the *GPG* may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

Preproposals must contain the following information:

- **Cover Page (NSF Form 1207)**

1. In the NSF FastLane system read the proposal preparation instructions located at <http://www.fastlane.nsf.gov/a1/newstan.htm>. When completing the Cover Sheet click on the "Add Org Unit" button. Scroll down and highlight "Biocomplexity Phase I" and click "OK." Clicking "OK" designates this program as the NSF organizational unit of consideration.

**NOTE: The BIO Proposal Classification Form (PCF) is not generated for proposals submitted to this competition.**

2. In the box labeled "Program Announcement/Solicitation No." enter "NSF 99-60" with no additional characters.
3. Insert the "Closing Date" information. The closing date for preproposals is 03/15/99.
4. Place a check in the box marked "If this is a preproposal check here."
5. Begin the Project Title with "BIOCOMPLEXITY: ...".
6. In addition to the Principal Investigator (PI) NSF allows up to 4 individuals to be listed as Co-Principal Investigators (Co-PIs) on a proposal. Some preproposals may involve more than 5 researchers, however. In this case the additional researchers can be listed in the Senior Personnel category. (On the FastLane FORM SELECTOR screen, click on 'Add/Modify Non Co-PI Senior Personnel')

- **Project Summary.** Provide a brief description of the project, identifying the scientific research problems to be addressed, the methodologies to be used, and the potential outcomes.
- **Project Description. Goals and Objectives (Maximum 3 pages):** Discuss the goals, objectives, and anticipated impact of the proposed project. Make clear that the proposed project is a research project, that it is multidisciplinary, and that it fits within the themes contained within this announcement. It is the nature of the work, not the number of investigators or their departmental affiliations that makes a project multidisciplinary.
- **Budget Outline.** Prepare a one-page cumulative budget for the full duration of the project. The budget need not be detailed, but should be sufficient for reviewers to grasp the intended scale of the proposed project. To create a cumulative budget use the following steps:

1. On the “Budget Selector” screen, click on “New”, then “1”, and then “Create”.
2. Enter the cumulative budget on the screen provided. FastLane will print the budget data on a Budget Year 1 page, and a cumulative page. The Year 1 page will be ignored by the reviewers.

- **Biographical Sketches.** For all senior personnel (PI, Co-PI, other senior personnel; see Appendix C of the NSF Grant Proposal Guide (*GPG*), NSF 99-2, for a definition of senior personnel) provide a brief curriculum vitae including ONLY name, current address, educational background, and up to 5 publications most closely related to the research. Do not include Conflict of Interest Information.

### **B. Preproposal Submission and Due Date**

Preproposals must be submitted via the NSF FastLane system through the institution’s Sponsored Research Office. Preproposals must be received at NSF by 5:00 p.m., submitter’s local time, March 15, 1999. Upon submission, the Sponsored Research Office may get warning messages about missing forms. These messages can be ignored if the above forms are included in the proposal. It is not necessary to send in a signed Cover Sheet (Form 1207) for preproposals.

FastLane will assign a number to the preproposal when it is submitted by your Sponsored Projects Office.

### **C. Conflicts of Interest**

Ensuring that reviewers do not have conflicts of interest can be difficult when preproposals involve multiple investigators and multiple institutions. To assist NSF in identifying conflicts of interest, send the following information to [biocom-conflicts@nsf.gov](mailto:biocom-conflicts@nsf.gov) with your preproposal number included in the following subject line(e.g. BIOCOMPLEXITY Conflict Information for 99#####). See the “Preproposal Submission and Due Date” section above for information on the preproposal assigned number.

1. **Project Personnel.** List all project personnel in alphabetical order, in the form last name, first name, role (e.g., Smith, Jane, consultant).
2. **Institutions.** List in alphabetical order all institutions involved in the project.
3. **Potential Reviewers with Conflicts of Interest.** List in alphabetical order all persons who have a conflict of interest with any of the project's senior personnel (PI, Co-PI, other senior personnel). In particular, list all persons falling into the conflict of interest categories specified in Chapter II, Section D.6.c-e of the *GPG*. Provide this information in the following

format: last name, first name, institution, nature of conflict, project personnel the conflict is with. For example, if Thomas Jones of the University of Michigan recently co-authored an article with Peter Brown, a Co-PI on the proposed project, the corresponding list entry would read as follows: Jones, Thomas, University of Michigan, co-author on article, Brown.

**The Conflicts of Interest information must be received by 5:00 p.m., submitter’s local time, March 17, 1999.**

### **D. Preproposal Review**

Preproposals will be evaluated through external peer review by multidisciplinary panels. Reviewers will evaluate the potential of the project to be developed into a strong full proposal, in light of the NSF merit review criteria described in the “Proposal Review” section of this announcement.

On the basis of the review, NSF will electronically provide feedback to those whose preproposals were “encouraged for full submission” by April 20, 1999. Those whose preproposals were placed in the “discouraged from submitting a full proposal” will receive feedback via e-mail by May 15, 1999. A summary of the panel discussion will be provided to both groups. It is strongly suggested that proposers follow the preproposal review advice if preparing a full proposal.

## **FULL PROPOSALS**

### **A. Full Proposal Preparation Instructions**

Proposals submitted in response to this program announcement should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide (GPG)*, NSF 99-2. The complete text of the *GPG* (including electronic forms) is available electronically on the NSF Web site at: <http://www.nsf.gov/>. Paper copies of the *GPG* may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

Proposers are reminded to identify the program announcement number ( NSF 99-60) in the program announcement/solicitation block on the NSF Form 1207, “*Cover Sheet for Proposal to the National Science Foundation.*” Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

Guidelines are provided for specific sections of the proposal as follows:

- **Cover Sheet (NSF Form 1207)**

1. In the NSF FastLane system read the proposal preparation instructions located at <http://www.fastlane.nsf.gov/a1/newstan.htm>. When completing the Cover Sheet click on the “Add Org Unit” button. Scroll down and highlight “Biocomplexity Phase I” and click “OK.” Clicking “OK” designates this program as the NSF organizational unit of consideration.

**NOTE: The BIO Proposal Classification Form (PCF) is not generated for proposals submitted to this competition.**

2. Begin the Project Title with “BIOCOMPLEXITY: ...”.
3. In the box labeled “Program Announcement/Solicitation No.” enter “NSF 99-60” with no additional characters.
4. In addition to the Principal Investigator (PI) NSF allows up to 4 individuals to be listed as Co-Principal Investigators (Co-PIs) on a proposal. Some preproposals may involve more than 5 researchers, however. In this case the additional researchers can be listed in the Senior Personnel category. (On the FastLane FORM SELECTOR screen, click on 'Add/Modify Non Co-PI Senior Personnel')

- **Project Description (maximum length 15 pages)**

**Research Plan:** The Research Plan should describe the strategies, protocols, and timetables to be used in experimental procedures in sufficient detail to allow informed judgement by expert reviewers. Include information on the means by which experimental data will be made available to the research community and to other users. In particular, specific arrangements made with other parties for the further exploration of selected types of discoveries should be spelled out. It is expected that proposals will take advantage of available opportunities for meaningful integration of research with education and outreach activities, and present these as an integral part of the research plan.

**Management Plan:** A Management Plan (incorporated within the 15 page Project Description section of the proposal) should identify a single institution as the lead institution, if the proposal involves multiple institutions. It should detail the duties and responsibilities of participants, including identification of a research team leader (usually the lead PI) and the operation of associated partners. A discussion of how data, ideas and

people will be networked to facilitate the management, integration and dissemination of information and the generation of new knowledge is essential.

- **The Special Information and Supplementary Documentation:** This section should include copies of permits, if required, and letters of agreement from collaborators. For research in Arctic regions, the Arctic Logistics Coordination form (see NSF-98-72) must accompany all submissions proposing fieldwork. NSF-UNOLS Ship Time Request Form must accompany all proposals requesting ship time. For research in the Antarctic, the Operational Requirements Cover Sheet and necessary worksheets must be submitted as described in NSF 96-93.

The above items can be submitted via FastLane by scanning the documents and adding them at the end of the Project Description file, or mail 15 collated copies of all materials to the Biocomplexity Competition at the same time that the signed cover sheet and certification page are sent. Only documentation as described in the *GPG*, Chapter II, Section D.10 and detailed above is allowed. **This information is not counted as part of the 15-page limit of the Project Description.**

- **Budgetary Information**

**Cost Sharing Requirements**

Cost sharing is NOT required and thus will not be a factor in the review. However, if a proposer wishes to include cost sharing, the following guidelines are provided. The proposed cost sharing must be shown on line M on the proposal budget (NSF Form 1030.)

The amount of cost sharing must be shown in the proposal in enough detail to allow NSF to determine its impact on the proposed project. Documentation of availability of cost sharing must be included in the proposal.

Only items which would be allowable under the applicable cost principles, if charged to the project, may be included as the grantee’s contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in-kind (see OMB Circular A-110, Section 23). It should be noted that contributions counted as cost sharing toward projects of another Federal agency may not be counted towards meeting the specific cost-sharing requirements of the NSF grant.

All cost-sharing amounts are subject to audit. Failure to provide the level of cost sharing reflected in the approved grant budget may result in termination of the NSF grant, disallowance of grant costs and/or refund of grant funds to NSF.

## **Full Proposal Due Dates**

Full proposals MUST be sent by 5:00 p.m., submitter's local time, June 15, 1999 via the NSF FastLane system. Copies of the signed proposal cover sheet must be submitted in accordance with the instructions identified below. **Do not mail copies of the full proposal.** NSF will make the appropriate number of copies of the proposal.

Mail the following materials directly to the Biocomplexity Phase I competition:

- a paper copy of the cover sheet, including the completed certification page ( page 2 of 2) signed by the PI and all Co-PIs and by an institutional representative; and
- fifteen (15) collated copies of the Special Information and Supplementary Documentation material only if the PI has opted to send in hard copy instead of inserting scanned copies at the end of the Project Description file in the FastLane submission.

**The grantee is responsible for ensuring that the materials are received by June 22, 1999.**

Send materials to:

Biocomplexity: Phase I -- NSF 99-60  
Division of Environmental Biology  
National Science Foundation  
4201 Wilson Boulevard  
Room 635  
Arlington, VA 22230

## **FASTLANE SUBMISSION**

In order to use NSF FastLane to prepare and submit a proposal, you must have the following software: Netscape Navigator 3.0 or above, or Microsoft Internet Explorer 4.01 or above; Adobe Acrobat Reader 3.0 or above for viewing PDF files; and Adobe Acrobat 3.X or Aladdin Ghostscript 5.10 or above for converting files to PDF.

To use FastLane to prepare the proposal your institution needs to be a registered FastLane institution. A list of registered institutions and the FastLane registration form are located on the FastLane Home Page. To register an organization, authorized organizational representatives must complete the registration form. Once an organization is registered, PIN for individual staff are available from the organization's sponsored projects office.

To access FastLane, go to the NSF Web site at <http://www.nsf.gov>, then select "FastLane," or go directly to the FastLane home page at

<http://www.fastlane.nsf.gov/>. On the FastLane home page click on "Proposal Preparation" and enter your login information, then click on the "Proposal Preparation" button. On the "PI Information" screen, review your information, then scroll down to the bottom of the screen and select "Prepare Standard Proposal" and click on "OK". Read the "PI Tipsheet for Proposal Preparation" and the "Frequently Asked Questions about FastLane Proposal Preparation," accessible at <https://www.fastlane.nsf.gov/a1/A1Prep.htm>.

**IMPORTANT NOTE:** For technical assistance with FastLane, please send an e-mail message to [biofl@nsf.gov](mailto:biofl@nsf.gov).

## **PROPOSAL REVIEW INFORMATION**

### **A. Merit Review Criteria**

Review of pre-proposals and full 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 full proposal 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, adjacent disciplines to that principally addressed in the proposal, etc.

Proposals will be reviewed against the following general merit review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal 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 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?

### **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 learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

### **Integrating Diversity into NSF Program, Projects, and Activities**

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- are 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. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

### **B. Merit Review Process**

Most of the proposals submitted to NSF are reviewed by mail review, panel review, or some combination of mail and panel review. Pre-proposals submitted in response to this announcement will receive panel review only. The panel will evaluate each proposal and be asked to recommend either "full proposal should be encouraged" or "full proposal should not be encouraged". By April 20, 1999, NSF will e-mail the principal investigators of those proposals the panel recommended for full proposal development. All others that submitted pre-proposals will be notified by May 15, 1999.

All full proposals will be reviewed by mail and panel review. Each proposal will be carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Reviewers will be asked to formulate a recommendation to either support or decline each proposal. A program officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. 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 his or her supervisor, the division director. This informal notification is not a guarantee of an eventual award. NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals in this category. In those cases where a proposal is being considered for joint funding by separate divisions, directorates, or agencies, NSF will be able to inform applicants within nine months in 95 percent of proposals. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used by the program. The interval ends when the division director accepts the program officer's recommendation.

In all cases, after final programmatic approval has been obtained, award recommendations are then 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 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 an 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 Officer does so at its own risk.

## **AWARD ADMINISTRATION INFORMATION**

### **A. Notification of the Award**

Notification of the award is made *to the submitting organization* by a Grants and Agreements Officer in the Division of Grants and Agreements (DGA). 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.

## **B. Grant Award Conditions**

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant 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 grant conditions, such as Grant General Conditions (NSF GC-1)\* or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions\* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants 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 Web site at: <http://www.nsf.gov/>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The GPM may be ordered through the GPO Web site 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.

Within 90 days after expiration of a grant, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented a new electronic project reporting system, available through FastLane, which 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. Reports

will continue to be required annually and after the expiration of the grant, but PIs will not need to re-enter information previously provided, either with the proposal or in earlier updates using the electronic system.

Effective October 1, 1998, PIs are required to use the new reporting format for annual and final project reports. PIs are strongly encouraged to submit reports electronically via FastLane. For those PIs who cannot access FastLane, paper copies of the new report formats may be obtained from the NSF Clearinghouse as specified above. NSF expects to require electronic submission of all annual and final project reports via FastLane beginning in October, 1999.

## **D. New Awardee Information.**

If the submitting organization has never received an NSF award, it is recommended that the organization's appropriate administrative officials become familiar with the policies and procedures in the NSF *Grant Policy Manual* which are applicable to most NSF awards. The "Prospective New Awardee Guide" (NSF 97-100) includes information on: Administration and Management Information; Accounting System Requirements and Auditing Information; and Payments to Organizations with Awards. This information will assist an organization in preparing documents that NSF requires to conduct administrative and financial reviews of an organization. The guide also serves as a means of highlighting the accountability requirements associated with Federal awards. This document is available electronically on NSF's Web site at: <http://www.nsf.gov/cgi-bin/getpub?nsf97100>.

## **CONTACTS FOR ADDITIONAL INFORMATION**

Inquiries regarding this announcement should be directed to one of the following cognizant NSF officials:

### **Biological Sciences (BIO)**

Joann Roskoski  
Phone: (703) 306-1480  
E-mail [jroskosk@nsf.gov](mailto:jroskosk@nsf.gov)

### **Computer and Information Science and Engineering (CISE)**

Maria Zemankova  
Phone (703) 306-1125  
E-mail [mzemanko@nsf.gov](mailto:mzemanko@nsf.gov)

### **Engineering (ENG)**

Janie M. Fouke  
Phone: (703) 306-1320  
E-mail: [jfouke@nsf.gov](mailto:jfouke@nsf.gov)

**Geosciences (GEO)**

Phillip R. Taylor  
Phone: (703) 306-1587  
E-mail: prtaylor@nsf.gov

**Mathematical & Physical Sciences (MPS)**

Marge Cavanaugh  
Phone (703) 306-1842  
E-mail mcavanau@nsf.gov

**Social, Behavioral and Economic Sciences (SBE)**

Cheryl Eavey  
Phone (703) 306- 1729  
E-mail ceavey@nsf.gov

**Office of Polar Programs (OPP)**

Linda E. Duguay  
Phone: (703) 306-1029  
E-mail: lduguay@nsf.gov

**OTHER PROGRAMS OF INTEREST**

The NSF *Guide to Programs* is a compilation of funding opportunities for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter. Beginning in fiscal year 1999, the NSF *Guide to Programs* only will be available electronically. Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the *GPG*.

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, available electronically on the NSF Web site at: <http://www.nsf.gov/>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees 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. Some programs may have special requirements that limit eligibility.

*Facilitation Awards for Scientists and Engineers with Disabilities* (NSF 91-54) 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. (For more information, see Section V.G.)

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090; FIRS at 1-800-877-8339.

## 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 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.

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.

## YEAR 2000 REMINDER

In accordance with NSF Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF-funded activity. Information concerning Year 2000 activities can be found on the NSF Web site at <http://www.nsf.gov/oirm/y2k/start.htm>.

## APPLICABLE CATALOG OF FEDERAL DOMESTIC ASSISTANCE (CFDA) NO.:

47.074 (BIO), 47.070 (CISE), 47.041 (ENG), 47.050 (GEO), 47.049 (MPS), 47.075 (SBE), 47.078 (OPP)

OMB No. 3145-0058

P.T. 04, 22, 34

K.W. 1010000, 1002000, 1004000, 0600000, 0501000

CFDA: 47.074 (BIO), 47.070 (CISE), 47.041 (ENG), 47.050 (GEO), 47.049 (MPS), 47.075 (SBE), 47.078 (OPP)

**NSF 99-60** (*Electronic Dissemination Only*)