Cyberinfrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce (CI-TEAM)

Program Solicitation

NSF 06-548
***Replaces Document* NSF 05-560**

National Science Foundation
Office of the Director
Office of Cyberinfrastructure
Directorate for Biological Sciences
Directorate for Computer and Information Science and Engineering
Directorate for Education and Human Resources
Directorate for Engineering
Directorate for Geosciences
Directorate for Mathematical and Physical Sciences
Directorate for Social, Behavioral, and Economic Sciences
Office of International Science and Engineering
Office of Polar Programs

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

June 05, 2006

for both Demonstration and Implementation Projects

REVISIONS AND UPDATES

The FY06 CI-TEAM program will fund **two** types of projects: *Demonstration Projects* at levels up to $250,000 total with durations of 1 to 2 years; and *Implementation Projects* funded at levels up to $1,000,000 total with durations of 2 to 3 years.

Note: Projects focusing primarily on new cyberinfrastructure resource and tool development or deployment are more appropriately directed toward other cyberinfrastructure funding opportunities.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Cyberinfrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce (CI-TEAM)

Synopsis of Program:

Information technology (IT)-enabled systems, tools, and services have had profound impact on the practice of science and engineering research and education. Integrated to create a national cyberinfrastructure, these systems, tools and services are enabling individuals, groups and organizations to advance science and engineering in ways that revolutionize *who can participate, what they can do*, and *how they do it*. To harness the full power of cyberinfrastructure, and the promise it portends for discovery, learning and

innovation across and within all areas of science and engineering, requires focused investments in the preparation of a science and engineering workforce with the knowledge and skills needed to create, advance and take advantage of cyberinfrastructure over the long-term.

The CI-TEAM program supports projects that position the national science and engineering community to engage in research and education activities promoting and leveraging cyberinfrastructure. CI-TEAM awards will:

- Prepare current and future generations of scientists, engineers, and educators to use, support, deploy, develop, and design cyberinfrastructure; and
- Foster inclusion in cyberinfrastructure activities of diverse groups of people and organizations, with particular emphasis on traditionally underrepresented groups.

The FY06 expanded CI-TEAM solicitation seeks **two** types of project proposals, both aimed at the preparation of a diverse, cyberinfrastructure-savvy science and engineering workforce. One type of proposal, the *Demonstration Project,* is exploratory in nature and may be somewhat limited in scope and scale. *Demonstration Projects* have the potential to serve as pathfinders to effective larger-scale implementation activities in the future. The other project type, the *Implementation Project*, is generally larger in scope or scale and draws on prior experience with the activities or the teams proposed. *Implementation Projects* are expected to deliver sustainable learning and workforce development activities that complement ongoing NSF investment in cyberinfrastructure.

Both types of projects consist of collaborations with expertise in multiple disciplines and partnerships between academic institutions of higher learning, secondary schools, government, industry, professional societies, other not-for-profit organizations, and international partners, as appropriate. Other key features of CI-TEAM projects involve leveraging existing or current development efforts in cyberinfrastructure technologies, open software standards, execution and evaluation plans, etc. Following merit review of the proposals received, NSF expects to select for support 8 to 16 *Demonstration Projects* at up to $250,000 total each and 6 to 8 *Implementation Projects* at up to $1,000,000 total each that together constitute a rich portfolio of cyberinfrastructure-related workforce development activities.

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

- 47.075 --- Social, Behavioral and Economic Sciences
- 47.078 --- Office of Polar Programs
- 47.049 --- Mathematical and Physical Sciences

- 47.079 --- International Science and Engineering (OISE)
- 47.050 --- Geosciences
- 47.041 --- Engineering
- 47.076 --- Education and Human Resources
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.080 --- Office of Cyberinfrastructure

Eligibility Information

- **Organization Limit:** The categories of proposers identified in the Grant Proposal Guide (GPG) are eligible to submit *Demonstration Project* proposals under this program solicitation. However, for *Implementation Projects*, the proposing organization of a non-collaborative project or the lead partner in a collaborative project must be a degree-granting, academic institution of higher learning located in the U.S., its territories or possessions. Eligible non-lead partners in collaborative *Implementation Project* proposals are those identified in the GPG.
- **PI Eligibility Limit:** Principal Investigators (PIs), co-PIs, other senior personnel or investigators involved in FY05 CI-TEAM *Demonstration Projects* funded by NSF are eligible to submit *Demonstration* or *Implementation Projects* to the FY06 CI-TEAM competition, but will be expected to comply with NSF's requirement to report results from prior funding. FY05 CI-TEAM grants are not a prerequisite for submission to the FY06 CI-TEAM competition in either category.
- **Limit on Number of Proposals:** An organization may submit only one proposal (either a CI-TEAM Implementation or Demonstration Project) as the lead organization in response to this solicitation. There is no limit to the number of proposals on which an organization may appear as a subawardee or as a non-lead organization.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 16 to 22 - Overall ranges are not simple additions of ranges given for Demonstration and Implementation Projects since award sizes may vary markedly by project type. Please see Section IV.
- **Anticipated Funding Amount:** $10,000,000 pending the availability of funds and quality of proposals.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements 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 Deadline Date(s)** (due by 5 p.m. submitter's local time):
  June 05, 2006
  for both Demonstration and Implementation Projects

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.

- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

The practice of science and engineering at the research frontier has changed markedly in recent years, owing in large measure to the impact of increasingly powerful and pervasive information technology (IT). Today, simulation and modeling are as important to discovery and innovation as are theory and experimentation. Advances in sensor technology and the availability of affordable mass data storage devices have enabled the collection, creation, and federation of large, complex datasets which in turn are revealing exciting new research and education opportunities. At the same time, pervasive networking technology is enriching collaborations and providing broad and increased access to a multitude of scientific resources. These advances in IT are also revealing transformational opportunities to promote and advance learning, to expand and make use of discoveries in human cognition, and to enable distributed learning through enhanced access and peer-to-peer technologies.

Integrated to create a national cyberinfrastructure, these IT systems, tools and services are enabling individuals, groups and organizations to advance science and engineering in ways that revolutionize *who can participate, what they can do*, and *how they do it*. In fact, ambitious cyberinfrastructure-related projects are already emerging in many science and engineering communities, including all domains served by NSF directorates and offices. These projects are building a cyberinfrastructure that links people, organizations, information, instrumentation and services on a global scale. While this cyberinfrastructure is providing the productivity enhancements we have come to expect with each new generation of IT, it is also empowering research communities to undertake bold new lines of inquiry. These may be founded on traditional cyberinfrastructure components such as supercomputers, clusters, and workstations, as well as emerging cyberinfrastructure elements such as observing and sensing systems, intelligent and remotely operable instrumentation, collaboratories, federated data archives, and digital libraries. (See www.nsf.gov/ci-team for websites detailing cyberinfrastructure projects and activities.)

To harness the full power of cyberinfrastructure, and the promise it portends for discovery, learning and innovation across and within all areas of science and engineering, requires sustained investments in the preparation of a science and

engineering workforce with the knowledge and skills needed to create, advance and take advantage of cyberinfrastructure over the long-term. The CI-TEAM program has been developed to help meet this need.

II. PROGRAM DESCRIPTION

This solicitation supports *Demonstration* and *Implementation Projects* aimed at positioning the national science and engineering community to more effectively engage in national and global research and education activities that promote and leverage cyberinfrastructure. CI-TEAM awards will:

- Prepare current and future generations of scientists, engineers, and educators to use, support, deploy, develop, and design cyberinfrastructure; and
- Foster inclusion in cyberinfrastructure activities, of diverse groups of people and organizations, with particular emphasis on traditionally underrepresented groups.

The preparation of a diverse science and engineering workforce with appropriate IT knowledge and skills is essential to inform the design, development, deployment, support, and widespread use of state-of-the-art cyberinfrastructure. This includes individuals interested in or pursuing IT careers as well as a broad spectrum of current and future scientists and engineers who will be key to the effective use of cyberinfrastructure and its impact in advancing science and engineering research and education.

A. Project Types

To achieve these goals, NSF intends to support a portfolio of **two** types of CI-TEAM projects: 1) *Demonstration Projects* and 2) *Implementation Projects*. A description of the similarities and differences between the project types follows.

All CI-TEAM *Demonstration* and *Implementation Projects* share certain key features:

- CI-TEAM goals to develop a diverse cyberinfrastructure workforce and broaden participation of underrepresented groups are clearly addressed by proposed activities;
- Projects are designed for wide replicability and potential scalability to a national level;
- Activities focus primarily on one or more cyberinfrastructure-related science and engineering workforce dimensions: training, education, advancement, and mentoring;
- Project teams are multidisciplinary with expertise in computer science, social science or education complementing disciplinary expertise to infuse robustness and usability into CI-TEAM outcomes;
- Significant impact, dissemination and outreach are built on strong science and engineering-focused partnerships among diverse organizations, including: K-20 academic institutions, not-for-profit organizations such as professional societies and museums; industry; federal, state, and local government agencies or organizations; or international partners, as appropriate;
- Existing or current development efforts in cyberinfrastructure technologies as well as other state-of-the-art NSF investments, both domestic and international, are leveraged to the extent possible (see http://www.nsf.gov/ci-team for a sampling of related cyberinfrastructure efforts and other investments);
- Open software standards are adhered to where appropriate and wherever possible; and
- Sound execution and evaluation plans are defined that offer effective project monitoring, management and spin-off opportunities for the future.

(Note: Projects focusing primarily on new cyberinfrastructure resource and tool development or deployment are more appropriately directed toward other cyberinfrastructure funding opportunities.)

Demonstration and *Implementation Projects*, however, differ in scope and scale in ways described below.

Demonstration Projects

The CI-TEAM program seeks *Demonstration Project* proposals that carry out and test the feasibility and effectiveness of preliminary, exploratory activities aimed at preparing a diverse science and engineering workforce with cyberinfrastructure knowledge and skills. New, multidisciplinary team collaborations and partnerships are encouraged. *Demonstration Projects* will seed the CI-TEAM program with new and creative activities, teams, or tool deployments that promise to serve as pathfinders to effective larger-scale implementation activities in the future. *Demonstration Project* design could show promise for future integration with or evolution into an *Implementation Project*. *Demonstration Projects* with outcomes that may be transferred across disciplines are also encouraged.

Implementation Projects

The CI-TEAM program also invites larger-scale *Implementation Project* proposals that expand, complement, or otherwise leverage previously tested and assessed activities with potential for successful application in the CI-TEAM program. Such activities may be proposed in concert with other more exploratory activities. The multidisciplinary team should have some history of prior collaboration with demonstrated track records. By building on prior experience with tried-and-true activities, teams or tools, *Implementation Projects* are expected to deliver sustainable learning and workforce development activities that complement ongoing NSF investment in cyberinfrastructure. *Implementation Projects* will assure an increase in the number and diversity of researchers, educators and students trained to utilize, integrate, and support cyberinfrastructure systems and tools in their research and education activities.

Implementation Projects must be implemented *over multiple scales or across multiple disciplines* to show continued prospects for replicability and scalability to a national level. For instance, scaled implementation may span geographies, organizations, cyberinfrastructure components, course curricula, etc. The long-term sustainability of *Implementation Projects* must be addressed in the project description.

B. Project Activity Ideas for CI-TEAM Projects

Many facets of cyberinfrastructure and its development and use in science and engineering are relatively new or emerging. Approaches to infusing cyberinfrastructure knowledge and skills into the workforce are similarly evolving. The following examples are *illustrative* of the types of activities that may be undertaken in a CI-TEAM *Implementation* or *Demonstration Project*. They are not meant to be comprehensive nor suggestive of specific projects.

- Mobilizing a community of learning or practice around existing or emerging cyberinfrastructure resources, tools or services;
- Training faculty in two-year or community colleges to use cyberinfrastructure effectively to promote and advance learning and discovery;
- Developing a new science & engineering curriculum founded on a set of courses to educate and train students in the *use of* cyberinfrastructure capabilities such as simulation, modeling, and data driven science;
- Devising new programs in partnership with collection managers and the community at large to develop and mature the career path for data scientists and digital librarians such as those focused on long-lived digital data collections;
- Instructing cyberinfrastructure professionals in the development, deployment and support of cyberinfrastructure services;
- Preparing individuals from groups traditionally underrepresented in science and engineering to participate more fully in the national research enterprise by using cyberinfrastructure resources, tools, or services;
- Engaging new communities, organizations, groups and/or individuals across disciplines, institutions, or continents, in science and engineering through the improved effectiveness of collaboratories;
- Establishing functional coordinating bodies and protocols to facilitate scheduling, access, and use of remote instrumentation for classroom use domestically and abroad;
- Reinforcing activities to learn how to use, advance, and create cyberinfrastructure with novel mentoring mechanisms;
- Exploring the complementary roles that for-profit and not for-profit organizations play in supporting and sustaining cyberinfrastructure and the cyberinfrastructure workforce; and
- Instituting training on best practices in safety, security, trust and ethics in cyberspace to complement cyberinfrastructure resource and tool use and development in other CI-TEAM activities.

Abstracts of CI-TEAM *Demonstration Projects* funded in FY05 can be found at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12782&org=OCI&from=fund.

Additional information on cyberinfrastructure can be found in the report of the *National Science Foundation Advisory Panel on Cyberinfrastructure* (http://www.cise.nsf.gov/sci/reports/atkins.pdf).

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide (GPG) are eligible to submit *Demonstration Project* proposals under this program solicitation. However, for *Implementation Projects*, the proposing organization of a non-collaborative project or the lead partner in a collaborative project must be a degree-granting, academic institution of higher learning located in the U.S., its territories or possessions. Eligible non-lead partners in collaborative *Implementation Project* proposals are those identified in the GPG.

Principal Investigators (PIs), co-PIs, other senior personnel or investigators involved in FY05 CI-TEAM Demonstration

Projects funded by NSF are eligible to submit Demonstration or Implementation Projects to the FY06 CI-TEAM competition, but will be expected to comply with NSF's requirement to report results from prior funding. FY05 CI-TEAM grants are not a prerequisite for submission to the FY06 CI-TEAM competition in either category.

An organization may submit only one proposal (either CI-TEAM Implementation or Demonstration Project) as the lead organization in response to this solicitation. There is no limit to the number of proposals on which an organization may appear as a subawardee or as a non-lead organization.

IV. AWARD INFORMATION

It is anticipated that 8 to 16 *Demonstration Project* awards and 6 to 8 *Implementation Project* awards will be made as either standard or continuing grants or cooperative agreements. Under this solicitation, individual *Demonstration Projects*, including all subawards and/or collaborative proposals, may request funding up to $250,000 total over a project duration of 1 to 2 years; individual *Implementation Projects*, including all subawards and/or collaborative proposals, may request funding up to $1,000,000 total over a project duration of 2 to 3 years. It is expected that between 16 and 22 project awards will be made, reflecting the topical mix, the relative numbers and quality of Demonstration and Implementation Projects submitted and total funding for this program estimated at $10,000,000 in FY06, subject to the availability of funds. (Note: the total number of projects expected to be awarded is not a simple sum of the estimated number ranges of *Demonstration* and *Implementation Projects* since award sizes vary significantly with project type.)

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

The following information supplements the standard Grant Proposal Guide (GPG) proposal preparation guidelines.

Project Description

The Project Description section for *Demonstration Projects* ***must be no more than 15 pages in length.***

The Project Description section for *Implementation Projects* ***must be no more than 18 pages in length*** including up to three pages elaborating a more complete management and collaboration plan.

The Project Description for either a *Demonstration or Implementation Project* should contain the following sections:

- Vision and goals, for *Demonstration Project* proposals — a description of the potential of the project proposed to be replicable and scalable to a more systemic level of effort; or for *Implementation Project* proposals — the actual multiple scales or application domains expected to be spanned;
- Implementation plan including a description of 1) the CI-TEAM activities in terms of how they draw on and differ from existing, similar approaches; 2) any existing or current development efforts in cyberinfrastructure investments these activities leverage; and 3) milestones;
- Management and collaboration plan that describes the complementary roles and contributions of each of the project PIs, co-PIs and other senior personnel in carrying out the implementation plan, as well as overall project management explaining coordination mechanisms across institutions and/or disciplines (e.g., regular meetings, tele- or video-conferencing, collaboration software, etc.). *Implementation proposals* must describe potential mechanisms and partnerships that will lead to the long-term sustainability of CI-TEAM project;
- Evaluation plan with clearly defined qualitative and quantitative metrics for workforce development (to the extent possible for *Demonstration Projects*) to be used to guide implementation as well as to assess the overall effectiveness of the project in achieving its goals of developing a diverse cyberinfrastructure workforce;

- Dissemination plan with estimates of the impact on students, faculty, and others reached, to ensure that lessons learned, both those leading to success and otherwise, are shared with the national community; and
- Budget requesting funds consistent with the scope and scale of the project activities. NSF will arrange a grantees meeting in the Washington, DC area. PI travel to one or more grantees meetings should be factored into the budget and should be consistent with the scope of the proposed project.

For activities involving cyberinfrastructure tools, the proposal should explain the existing user base as well as the user benefits and growth anticipated to result from proposed CI-TEAM activities. Open source software (including community development efforts) and distribution methods are strongly encouraged.

Proposal Cover Sheet

Proposals must identify the type of proposal submitted by inserting at the beginning of the title either "CI-TEAM Demonstration Project" or "CI-TEAM Implementation Project."

Proposers are reminded to identify the program announcement/solicitation number (06-548) 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 Deadline(s) (due by 5 p.m. submitter's local time):

June 05, 2006
for both Demonstration and Implementation Projects

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.

Additional Review Criteria:

In addition to the general criteria described above, peer reviewers and NSF staff will evaluate each proposal according to the CI-TEAM program goals:

- Preparing a diverse science and engineering workforce able to exploit, enhance, and promote *cyberinfrastructure* to advance science and engineering research and education; and
- Broadening the participation of underrepresented groups and organizations in *cyberinfrastructure* activities.

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. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc and/or panel review.

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 are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

Consistent with the requirements of OMB Circular A-16, *Coordination of Geographic Information and Related Spatial Data Activities*, and the Federal Geographic Data Committee, all NSF awards that result in relevant geospatial data must be submitted to Geospatial One-Stop in accordance with the guidelines provided at: www.geodata.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/.

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

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 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:

- Miriam Heller, Program Director, Office of the Director, Office of Cyberinfrastructure, 1145 S, telephone: (703) 292-7025, fax: (703) 292-9060, email: mheller@nsf.gov
- Manfred D. Zorn, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: mzorn@nsf.gov
- Janice Cuny, Program Director, Directorate for Computer & Information Science & Engineering, Division of Computer and Network Systems, 1175 N, telephone: (703) 292-8950, fax: (703) 292-9010, email: jcuny@nsf.gov
- Lee L. Zia, Lead Program Director (MATH), Directorate for Education & Human Resources, Division of Undergraduate Education, 835 N, telephone: (703) 292-5140, fax: (703) 292-9046, email: lzia@nsf.gov
- Robert L. Norwood, Program Director, Directorate for Engineering, Division of Engineering Education & Centers, 585 N, telephone: (703) 292-7079, email: rnorwood@nsf.gov
- Jill Leslie Karsten, Program Director for Diversity and Education, Directorate for Geosciences, 705 N, telephone: (703) 292-8500, fax: (703) 292-9042, email: jkarsten@nsf.gov
- Randal Ruchti, Program Director, Directorate for Mathematical & Physical Sciences, Division of Physics, 1015 N, telephone: (703) 292-7392, fax: (703) 292-9078, email: rruchti@nsf.gov
- Melinda Laituri, Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, 995 N, telephone: (703) 292-4995, fax: (703) 292-9068, email: mlaituri@nsf.gov
- Frank P. Scioli, Jr., Program Director (On-Detail to OD/OCI), Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 1145 S, telephone: (703) 292-8970, fax: (703) 292-9060, email: fscioli@nsf.gov
- Harold J. Stolberg, Regional Coordinator, Office of the Director, Office of International Science and Engineering, 935 N, telephone: (703) 292-8706, fax: (703) 292-9175, email: hstolber@nsf.gov
- Bernhard Lettau, Ocean & Climate System Program Manager, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8033, fax: (703) 292-9079, email: blettau@nsf.gov

For questions related to the use of FastLane, contact:

- Mary Daley, Management Operations Assistant, Office of the Director, Office of Cyberinfrastructure, 1145 S, telephone: (703) 292-8970, fax: (703) 292-9060, email: mdaley@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.

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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.

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- **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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