

CISE Computing Research Infrastructure (CRI)

PROGRAM SOLICITATION

NSF 11-536

REPLACES DOCUMENT(S):

NSF 08-570



National Science Foundation

Directorate for Computer & Information Science & Engineering
Division of Computer and Network Systems
Division of Computing and Communication Foundations
Division of Information & Intelligent Systems

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

October 25, 2011

October 23, 2012

Fourth Tuesday in October, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the NSF Proposal & Award Policies & Procedures Guide (PAPPG), [NSF 11-1](#), was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in [NSF 11-1](#) apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 18, 2011, must also follow the guidelines contained in [NSF 11-1](#).

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the [PAPP Guide Part I: Grant Proposal Guide \(GPG\) Chapter II.C.2.g \(xi\)](#) for further information about the implementation of these recommendations.

Data Management Plan: The PAPPG contains a clarification of NSF's long-standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

Postdoctoral Researcher Mentoring Plan: As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

Revision Notes:

The following revisions have been made:

1. Changed due date to October 25, 2011 and the fourth Tuesday in October thereafter
2. Eliminated the CI-ADDO-OP category
3. Change the maximum award size to \$1M for Institutional Infrastructure awards and \$3M for Community Infrastructure awards
4. Added a requirement for the PI to provide 3-5 descriptive keywords about the program in the Project Summary
5. Added language about supporting evidence needed for enhancement projects (II-EN and CI-ADDO-EN)
6. Provided a shorter, more concise list of related programs and updated the links to the related programs.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

CISE Computing Research Infrastructure (CRI)

Synopsis of Program:

The CISE Computing Research Infrastructure (CRI) program drives discovery and learning in the computing disciplines by supporting the creation, enhancement and operation of world-class computing research infrastructure. Further, through the CRI program CISE seeks to ensure that individuals from a diverse range of academic institutions, including minority-serving and predominantly undergraduate institutions, have access to such infrastructure.

The CRI program supports two classes of awards:

- **Institutional Infrastructure (II)** awards support the creation of new computing research infrastructure or the enhancement of existing computing research infrastructure to enable world-class research and education opportunities at the awardee and collaborating institutions .
- **Community Infrastructure (CI)** awards support the planning for computing research infrastructure, the creation of new computing infrastructure, or the enhancement of existing computing research infrastructure to enable world-class research and education opportunities **for broadly-based communities of researchers and educators that extend well beyond the awardee institutions** .

Cognizant Program Officer(s):

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

- Harriet G. Taylor, 1175, telephone: (703) 292-8950, email: htaylor@nsf.gov
- Almadena Y. Chtchelkanova, 1115, telephone: (703) 292-8910, email: achtchel@nsf.gov
- Mimi McClure, 1145, telephone: (703) 292-5197, email: mmcclure@nsf.gov
- Vijayalakshmi (Vijay) Atluri, 1125, telephone: (703) 292-8930, email: vatluri@nsf.gov

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 25 to 30 , with up to 20 Institutional Infrastructure awards and 10 Community Infrastructure awards in each competition. The majority of the Institutional Infrastructure (II) awards will be made in the \$200,000-\$750,000 range. However, a small number of II awards may be made in the \$750,000-\$1,000,000 range. The majority of the Community Infrastructure (CI) awards will be made in the \$500,000 - \$1,000,000 range. However, a very small number of CI awards may be made in the \$1,000,000 - \$3,000,000 range.

Anticipated Funding Amount: \$18,000,000 annually, subject to the availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

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

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

In each annual competition, an individual may participate in at most two proposals as PI, Co-PI, or Senior Personnel.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**

- Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
- Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):
 October 25, 2011
 October 23, 2012
 Fourth Tuesday in October, Annually Thereafter

Proposal Review Information Criteria

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

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

Since its inception, the National Science Foundation (NSF) has supported the development of research infrastructure in order to advance the frontiers of science and engineering. NSF supports research infrastructure in the small in the form of special-purpose tools for individual investigators and in the large in the form of shared-use facilities like telescopes, distributed sensor networks, and

supercomputers that serve national communities of researchers, educators and students. These research infrastructure investments enable an academic science and engineering research enterprise that continues to be among the world's best. Similarly, NSF's Directorate for Computer and Information Science and Engineering (CISE) has a tradition of supporting research infrastructure to enable transformative research at the frontiers of computing and to provide unique opportunities for current and future generations of computing researchers and educators.

II. PROGRAM DESCRIPTION

With its Computing Research Infrastructure (CRI) program, CISE drives discovery and learning in the computing disciplines through support for the creation and enhancement of world-class computing research infrastructure. Further, through the CRI program CISE seeks to ensure that individuals from a diverse range of academic institutions, including minority-serving and predominantly undergraduate institutions, have access to such infrastructure.

Examples of research infrastructure of interest to the program include, but are not limited to: systems of security and monitoring devices, linguistically annotated electronic language and vision corpora, spectrum and protocol analyzers, system testbeds, suites of robots, clusters of graphic processing units, software libraries and tools, networks of wireless and mobile devices, programmable network components, motion capture systems, Field Programmable Gate Array (FPGA)-based systems, data clusters, integrated systems of sensors, data repositories and visualization capabilities. These computing infrastructure resources (and others not listed here) are expected to provide unique and compelling research opportunities otherwise inaccessible to the CISE research and education community.

Cognizant of the diversity of research infrastructure needs in the computing community, the CRI program supports two classes of projects as defined below.

- **Institutional Infrastructure**

Each Institutional Infrastructure (II) award supports the creation of new computing research infrastructure or the enhancement of existing computing research infrastructure. The proposed research infrastructure must enable compelling new research and education opportunities **for the proposing PI or team of PIs and associated students and collaborators** (i.e., for individuals at the awardee and collaborating institutions). II proposals involving multiple investigators from one or more departments and/or institutions are welcome. II proposals that are led by or include 2-year, predominantly undergraduate, and/or minority-serving institutions are especially encouraged. II proposals may request up to \$1 million total for project durations not to exceed 3 years.

- **Community Infrastructure**

Each Community Infrastructure (CI) award supports the **planning** for computing research infrastructure, the **creation of new** computing infrastructure, or the **enhancement** of existing computing research infrastructure in order to provide compelling new research and education opportunities **for a broadly-based community of researchers and educators that extends well beyond the awardee institution(s)**. Furthermore, each CI award may support the operation of such infrastructure, ensuring that the awardee institution(s) is well-positioned to provide a high quality of service to community researchers and educators expected to use the infrastructure to realize their research and education goals. Since CI awards serve communities of researchers and educators, CI proposals must provide compelling evidence that a diverse community of investigators will find the proposed infrastructure valuable to their research and education endeavors.

Support for CI projects is provided in two award categories:

- CI Planning (CI-P) grants of up to \$100,000 for durations of up to 1 year to prepare for the submission of a CI-ADDO proposal
- CI Acquisition, Development, Deployment and Operations (CI-ADDO) grants of up to \$3 million for durations of up to 3 years to either a) create new computing research infrastructure or b) enhance existing computing research infrastructure. NSF will provide no more than \$250,000 per year for operating the infrastructure.

Organizations may submit CI-ADDO proposals without having received CI-P grants. The receipt of a CI-P grant does not guarantee support for a subsequent CI-ADDO proposal.

Projects that involve enhancements of either institutional or community infrastructure must show clear evidence of:

- success of the initial implementation,
- usage by a diverse population of researchers,
- need for and benefits of the enhancement, and
- community support for the enhancement.

[1] Throughout this solicitation the term "operations" is intended to include all aspects of supporting research infrastructure including management, maintenance, operations and user support.

III. AWARD INFORMATION

NSF expects to make the following types of award(s): Standard or Continuing Grants. Up to 20 Institutional Infrastructure awards and 10 Community Infrastructure awards in each competition.

The majority of the Institutional Infrastructure (II) awards will be made in the \$200,000-\$750,000 range. However, a small number of II awards may be made in the \$750,000-\$1,000,000 range. The majority of the Community Infrastructure (CI) awards will be made in the \$500,000 - \$1,000,000 range. However, a very small number of CI awards may be made in the \$1,000,000 - \$3,000,000

range.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

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

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

In each annual competition, an individual may participate in at most two proposals as PI, Co-PI, or Senior Personnel.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

The following information SUPPLEMENTS (not replaces) the guidelines provided in the NSF Grant Proposal Guide (GPG) and NSF Grants.gov Application Guide.

Proposal Titles: Proposal titles must begin with an acronym that indicates the type of CRI proposal being submitted. Select an acronym from the following list:

II-NEW: Institutional Infrastructure proposals requesting support for new computing research infrastructure

II-EN: Institutional Infrastructure proposals requesting support to enhance existing computing research infrastructure

CI-P: Community Infrastructure Planning

CI-ADDO-NEW: Community Infrastructure Acquisition, Development, Deployment and Operations proposals requesting support to create new computing research infrastructure

CI-ADDO-EN: Community Infrastructure Acquisition, Development, Deployment and Operations proposals requesting support to enhance existing computing research infrastructure

The acronym should be followed with a colon, then the title of your project. For example, if you are submitting a proposal to enhance existing institutional infrastructure, then your title would be **II-EN: Title**.

Project Summary:

- The project summary should start with a section labeled "**Keywords:**" in which the PI provides 3-5 high-level keyword descriptors for the project. Include descriptors of the CISE sub-discipline research that the infrastructure enables. You may also include a basic descriptor of the type of infrastructure. These keywords will help in classifying your proposal during for review.

The summary should then have clear sections that:

- describe the overall project, personnel, potential research benefits and benefits to CISE communities,
- discuss the **intellectual merit** of the project, and
- detail potential **broader impacts** of the project.

The **intellectual merit** and **broader impacts** sections should be clearly labeled in the Project Summary.

Project Description: The preparation instructions for Institutional Infrastructure and the two types of Community Infrastructure proposals are different. PIs are encouraged to read the following instructions carefully when preparing their proposals.

Institutional Infrastructure Proposals

Within the **15 pages** allocated for the Project Description, describe the

- proposed computing research infrastructure and its estimated lifetime, noting whether it is new infrastructure to be created or existing infrastructure to be enhanced;
- compelling new research and education opportunities that will result from the availability of the proposed infrastructure;
- researchers, educators, and students (including affiliated institutions) who will benefit from the proposed infrastructure creation or enhancement, including the synergies in their interests;
- awardee institution(s) commitment to operate and maintain the infrastructure for its estimated useful life; and
- a detailed project management plan, with timeline, to create and deploy the new or enhance the existing research infrastructure.

If the proposed activity is for the enhancement of existing infrastructure (II-EN), in addition to describing the new research and education opportunities afforded by the proposed enhancement also provide evidence of :

- prior research and education contributions the infrastructure enabled and the researchers, educators and students it served. Evidence of prior contributions may include innovative research results, refereed publications and theses that used the infrastructure (identifying those without co-authors from the proposing institutions), use by courses, courseware developed, software tool development, dissemination and use statistics, technology transfer, other government or industry support,
- outreach to a diverse population of researchers,
- community satisfaction with the resource and community support for the proposed enhancement, and
- institutional plans to provide long-term sustainability of the infrastructure.

Community Infrastructure Proposals

For CI Proposals requesting **Planning** grants, within the **15 pages** allocated for the Project Description, describe the:

- computing research infrastructure concept, noting whether it is new infrastructure to be created or existing infrastructure to be enhanced, and provide an estimate of its cost to deploy and operate,
- compelling new research and education opportunities envisioned as being enabled by the infrastructure, and
- steps you will take to identify the consensus needs of the research and education community to be served by the proposed infrastructure, including the process you plan to follow to identify the major characteristics and features of the infrastructure, its useful lifetime, and its cost to create/enhance and operate.

For CI Proposals requesting **Acquisition, Development, Deployment and Operations** grants, within the **20 pages** allocated for the Project Description, describe the:

- proposed computing research infrastructure and its expected lifetime, noting whether it is new infrastructure to be created and operated or existing infrastructure to be enhanced and operated,
- compelling new research and education opportunities enabled by the proposed infrastructure. Describe the steps you took to identify the research and education opportunities enabled by the infrastructure and provide evidence that a diverse community of users plan to use the capabilities provided,
- quality of service commitment to the relevant research and education community,
- means by which user satisfaction will be evaluated and used to refine and improve subsequent infrastructure operations,
- plans for outreach to ensure that a broad community of users is engaged,
- qualifications of the PIs and the project team to manage the creation or enhancement and operations of the research infrastructure in support of its users, and
- a detailed project management plan, including a timeline, that outlines all steps to be undertaken to acquire, develop, and/or operate the research infrastructure, and identify the parties responsible for each major task.

If the proposed activity is for the enhancement of existing infrastructure (CI-ADDO-EN), in addition to describing the new research and education opportunities afforded by the proposed enhancement also provide evidence of :

- prior research and education contributions the infrastructure enabled and the researchers, educators and students it served. Evidence of prior contributions may include innovative research results, refereed publications and theses that used the infrastructure (identifying those without co-authors from the proposing institutions), use by courses, courseware developed, software tool development, dissemination and use statistics, technology transfer, other government or industry support,
- outreach to a diverse population of researchers,
- community satisfaction with the resource and community support for the proposed enhancement, and
- community plans to provide long-term sustainability of the infrastructure.

If the proposed infrastructure is related to previously NSF-funded infrastructure, describe the extent to which the previously funded infrastructure will be integrated with the new infrastructure. Describe how funds remaining from earlier NSF grants for related infrastructure will be integrated with the requested award.

CI ADDO proposals should also include a well-reasoned budget justification that clearly distinguishes the costs to 1. acquire,

develop and deploy the new or enhanced infrastructure; and 2. operate the proposed infrastructure. (Note that NSF will support operations at levels not to exceed \$250,000 each year.)

Supplementary Documents: In the Supplementary Documents Section, provide a list of PIs, Co-PIs, Senior Personnel, paid Consultants, Collaborators and Postdocs to be involved in the project. This list should be numbered and include (in this order) Full name, Organization(s), and Role in the project, with each item separated by a semi-colon. Each person listed should start a new numbered line. For example:

1. Mary Smith; XYZ University; PI
2. John Jones; University of PQR; Senior Personnel
3. Jane Brown; XYZ University; Postdoc
4. Bob Adams; ABC Inc.; Paid Consultant

PIs from predominantly undergraduate institutions should also include a Research in Undergraduate Institutions (RUI) Impact Statement and Certification of RUI Eligibility in this Section. See the [RUI website](#) for further information.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Budget Preparation Instructions:

For II and CI-ADDO projects, the CRI program supports:

- the acquisition and/or development of new software tools, equipment, testbeds, resources, platforms, etc;
- the enhancement (through acquisition and/or development) of existing software tools, equipment, testbeds, resources, platforms, etc;
- travel expenses necessary for coordination of multi-institutional projects;
- technical personnel essential to the successful design, acquisition, development, and deployment of the proposed research infrastructure;
- travel expenses to ensure project participation in one PI meeting per year in the Washington, DC region; and
- postdocs, graduate and/or undergraduate students to participate in the design, acquisition and/or development of the proposed research infrastructure.

For CI-ADDO projects ONLY, CRI supports:

- support for professional staff critical to the operation of the infrastructure, including providing effective user support;
- postdocs, graduate or undergraduate students to participate in the operation (including providing user support) and assessment of the infrastructure as long as these activities do *NOT* constitute research;
- outreach and participation activities like workshops or training activities that broaden participation and prepare researchers, educators and students to use the proposed infrastructure effectively; and
- assessment activities that evaluate project outcomes.

The CRI program will *not* provide support for the following items:

- general-purpose personal computing equipment, office equipment, software, or databases
- individual research enabled by the infrastructure.

C. Due Dates

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

October 25, 2011

October 23, 2012

Fourth Tuesday in October, Annually Thereafter

D. FastLane / Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of 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 solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

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. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general

technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. 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 the reviewer 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, original, or potentially transformative 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?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

Additional Solicitation Specific Review Criteria

Within the context of the Intellectual Merit and Broader Impacts criteria, reviewers will be asked to consider the following issues when preparing their reviews:

For II proposals

- Does the proposal provide convincing evidence that the proposed infrastructure will result in compelling new research and education opportunities?
- Comment on the extent to which individuals at underserved institutions may benefit from the infrastructure provided.
- Does the proposing institution(s) provide a convincing case of their commitment to maintain and operate the infrastructure for its useful life?
- Is the project management plan, including timeline, costs, and personnel, realistic?

For CI-P proposals

- Does the proposal document the potential community involvement in the planning process?
- Comment on the national need for and validity of the research infrastructure being explored.

For CI-ADDO proposals

- Comment on the research and educational value of the research infrastructure described. Does the proposal provide convincing evidence that the research infrastructure will result in compelling new research and education opportunities?
- Does the proposal provide convincing evidence that a diverse community of users plans to use the capabilities provided?
- Have the PIs convincingly demonstrated that the project team has the skills necessary to acquire, develop, and/or operate community research infrastructure so as to provide a high level of service and support for a broadly-based community of users?
- Is the project management plan, including timeline, costs, and personnel, realistic?
- To what extent does the proposal convincingly describe the means by which user satisfaction will be evaluated and used to refine and improve subsequent infrastructure services and operations?
- If the new infrastructure is related to previously funded NSF infrastructure, is the rationale for the new infrastructure and the

- integration plan for old and new components, convincing?
- If the proposal describes plans to enhance and/or operate existing infrastructure, comment on the extent to which
 - the proposal builds a convincing case that the existing infrastructure has enabled compelling research and education opportunities. Evidence of this may include innovative research results, refereed publications and theses that used the infrastructure (note those without co-authors from the proposing institution(s)), use by courses, courseware developed, software tool development, dissemination and use, technology transfer, and other government or industry support; and
 - the PIs convincingly demonstrated that they have provided a high level of user support for a broad-based research and education community.

NSF staff also 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 and Selection Process

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

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's 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 Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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 administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award 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 (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. 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. Such reports provide information on activities and findings, project participants (individual and organizational), 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. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- Harriet G. Taylor, 1175, telephone: (703) 292-8950, email: htaylor@nsf.gov
- Almadena Y. Chitchelkanova, 1115, telephone: (703) 292-8910, email: achtchel@nsf.gov
- Mimi McClure, 1145, telephone: (703) 292-5197, email: mmcclure@nsf.gov
- Vijayalakshmi (Vijay) Atluri, 1125, telephone: (703) 292-8930, email: vatluri@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

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

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

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

Related Programs:

NSF provides additional funding opportunities for the computing community via the following programs and their solicitations:

Discovery Research Programs

CISE Cross-Cutting Programs, http://nsf.gov/funding/pgm_summ.jsp?pims_id=13451&org=IIS&sel_org=IIS&from=fund

Computer and Network Systems: Core Programs, http://www.nsf.gov/funding/pgm_summ.jsp

[pims_id=12765&org=CNS&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12765&org=CNS&from=home)

Information and Intelligent Systems: Core Programs, http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13707&org=IIS&from=home

Computing and Communication Foundations: Core Programs, http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503220&org=CCF&from=home

Cyber-enabled Discovery and Innovation (CDI), <http://www.nsf.gov/crssprgm/cdi/>

Cyber-Physical Systems (CPS), http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503286&org=CISE

Expeditions in Computing, http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf07592

Faculty Early Career Development (CAREER), http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214&org=CISE

Education and Workforce Development Programs

Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (TUES), http://nsf.gov/funding/pgm_summ.jsp?pims_id=12759&org=DGE&from=home

Discovery Research K-12 (DR-K12) http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=500047&org=EHR&sel_org=EHR&from=fund

Computing Education for the 21st Century (CE21), http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503582&org=CNS&from=home

Research Experiences for Teachers (RET) in Engineering and Computer Science, http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5736&org=CISE&from=home

Graduate Research Fellowships (GRF), http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6201&org=DGE&from=home

Integrative Graduate Education and Research Training (IGERT), http://nsf.gov/funding/pgm_summ.jsp?pims_id=12759&org=DGE&from=home

Research Experiences for Undergraduates (REU) Sites and Supplements, http://nsf.gov/funding/pgm_summ.jsp?pims_id=5517&org=NSF&sel_org=XCUT&from=fund

Research Infrastructure Programs

Major Research Instrumentation Program (MRI), http://nsf.gov/funding/pgm_summ.jsp?pims_id=5260&org=NSF&sel_org=XCUT&from=fund

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center) : (703) 292-5111

- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 Send an e-mail to: nsfpubs@nsf.gov
 or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (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 the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
 Reports Clearance Officer
 Division of Administrative Services
 National Science Foundation
 Arlington, VA 22230

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