

# Software Development for Cyberinfrastructure (SDCI)

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## Program Solicitation

NSF 07-503

### *Replaces Document(s):*

NSF 04-555



National Science Foundation

Office of Cyberinfrastructure

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

January 22, 2007

due date

## REVISION NOTES

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In furtherance of the President's Management Agenda, NSF has identified programs that will offer proposers the option to utilize Grants.gov to prepare and submit proposals, or will require that proposers utilize Grants.gov to prepare and submit proposals. Grants.gov provides a single Government-wide portal for finding and applying for Federal grants online.

In response to this program solicitation, proposers may opt to submit proposals via [Grants.gov](http://Grants.gov) or via the [NSF FastLane](#) system.

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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#### Program Title:

Software Development for Cyberinfrastructure (SDCI)

#### Synopsis of Program:

**The purpose of the Software Development for Cyberinfrastructure (SDCI) program is to develop, deploy, and sustain a set of reusable and expandable software components and systems that benefit a broad set of science and engineering applications. SDCI is a continuation of the NSF Middleware Initiative (NMI) in an expanded context appropriate to the current expanded vision of cyberinfrastructure.**

**This program supports software development across three major sectors: system software and tools for High Performance Computing (HPC) environments; software promoting NSF's strategic**

vision for digital data; and software in the form of middleware capabilities and services to support distributed resource sharing and virtual organizations. SDCI funds software activities for enhancing scientific productivity and for facilitating research and education collaborations through sharing of data, instruments, and computing and storage resources. The program requires open source software development.

**Cognizant Program Officer(s):**

- Kevin Thompson, Program Director, 1145 S, telephone: (703) 292-8962, fax: (703) 292-9060, email: [sdci@nsf.gov](mailto:sdci@nsf.gov)
- Christopher Greer, telephone: (703) 292-8970, email: [sdci@nsf.gov](mailto:sdci@nsf.gov)
- Jose Munoz, telephone: (703) 292-8970, email: [sdci@nsf.gov](mailto:sdci@nsf.gov)

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

- 47.080 --- Office of Cyberinfrastructure

**Award Information**

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**Anticipated Type of Award:** Standard Grant or Continuing Grant

**Estimated Number of Awards:** 10 to 20

**Anticipated Funding Amount:** \$14,000,000 subject to the availability of funds in FY 2007.

**Eligibility Information**

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**Organization Limit:**

Proposals may only be submitted by the following:

- Academic Institutions located in the U.S.: U.S. universities and colleges located in the U.S.
- 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: 1**

One proposal allowed per PI or co-PI.

**Proposal Preparation and Submission Instructions**

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**A. Proposal Preparation Instructions**

- **Letters of Intent:** Not Applicable
- **Full Proposals:**

- Full Proposals submitted via FastLane: 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](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/bfa/dias/policy/docs/grantsgovguide.pdf>)

## 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(s)** (due by 5 p.m. proposer's local time):

January 22, 2007

due date

## Proposal Review Information Criteria

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**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

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

**Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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# I. INTRODUCTION

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Software permeates cyberinfrastructure. Fully functional and performing software is essential to realizing the promises of cyberinfrastructure in transforming the ways in which scientific research and education are conducted. NSF's Cyberinfrastructure Vision for 21st Century Discovery (see [www.nsf.gov/od/oci](http://www.nsf.gov/od/oci)) conveys a vision, a mission, and a set of principles for the next five years predicated on NSF's leadership role in the development and support of a comprehensive cyberinfrastructure essential to 21st century advances in science and engineering research and education. Central CI elements addressed in the CI vision document are: High Performance Computing (HPC); Data, Data Analysis, and Visualization; Cyber-services and Virtual Organizations; and Learning and Workforce Development. Among NSF's goals and strategies laid out in this vision document are a set of software centric directives:

- Support the development and maintenance of robust systems software, programming tools, and programming environments needed to close the growing gap between peak performance and sustained performance on actual research codes, and to make the use of HPC systems, as well as novel architectures, more productive and more accessible.
- Support state-of-the-art software innovation in data management and distribution systems, including digital libraries, repositories and archives, as well as educational environments that are expected to contribute to many of the scientific breakthroughs of the 21st century.
- Support the continued development, expansion, hardening and maintenance of end-to-end software systems – user interfaces, workflow engines, data management, analysis and visualization tools, collaborative tools, and other software integrated into complete science and engineering systems and organizations via middleware – to bring the full power of a national cyberinfrastructure to communities of scientists and engineers.

These tenets form the basis for NSF's program in Software Development for Cyberinfrastructure (SDCI) and leads to three focus areas for SDCI: software for HPC systems; software for digital data management; and middleware supporting the formation and operation of virtual organizations.

The FY2007 SDCI solicitation supports the development and maintenance of software for: HPC systems in the areas of debugging, fault tolerance, and performance tuning; digital data in the areas of documentation, protection, and reliable preservation; and middleware in the areas of cybersecurity, workflow, instrument support, monitoring, testing, and user interfaces and portals.

**Each proposal should clearly identify and justify the focus area to which it is being submitted, as described in the proposal preparation instructions.**

# II. PROGRAM DESCRIPTION

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The three focus areas of this announcement are described below:

## 1. High Performance Computing (HPC) Software

This section involves the development of software tools and systems designed for improved productivity and performance of HPC applications and environments. These tools are designed to provide improvements in

ease of use, improved performance and insight into how applications are utilizing the high-end resource. Any tools or approaches must be sensitive to the tens-of-thousands to hundreds-of-thousands of components expected to exist in petascale and near-petascale HPC systems. Successful tools will address deep-memory hierarchies, multi-core architectures and heterogeneous/hybrid systems and ideally be architecture agnostic. Applications scientists and engineers will benefit from the development of new tools and innovative approaches to debugging, performance analysis, and performance optimization.

Focus areas in Software for HPC Systems for the FY2007 SDCI solicitation are as follows:

- **Debugging** Innovative solutions are required in the area of debugging the tens-of-thousands to hundreds-of-thousands cores and threads expected in the new generation of high-end systems. In addition, innovative solutions that address debugging these systems remotely are of interest.
- **Fault Tolerance** The new generation of systems involving tens-of-thousands to hundreds-of-thousands of cores, memories and communication interfaces will result in situations where applications will have to address how to continue to function in the presence of faults. Innovative solutions/approaches, ideally architecture agnostic, to fault-tolerance that scales to tens-of-thousands of components are sought.
- **Performance Tuning** The new generation of systems with its unprecedented number of components and very deep memories are challenging when attempting to improve application performance. Novel tools/approaches that would assist the application developer in understanding and providing insight as to where bottlenecks exist are required if we are to fully exploit the benefits afforded by the new generation architectures.

All proposals in this focus area will have titles that begin with "SDCI HPC:".

## 2. Software for Digital Data

This section addresses software that promotes acquisition, discovery, access, analysis, and preservation. Focus areas for tools and services for digital data appropriate for the FY2007 SDCI solicitation, mapped to strategic goals for digital data, are as follows:

- **Documentation/Metadata** Tools for automated/facilitated metadata creation/acquisition, including linking data and metadata; Tools to enable ontologies discovery, assessment, comparison, integration, and generation of new composite ontologies.
- **Security/Protection** Tools for data authentication, tiered/layered access systems for data confidentiality/privacy protection, replication tools to ensure data protection across varied storage systems/strategies, rules-based data security management tools, and assurance tools to test for digital forgery and privacy violations.
- **History/Provenance/Attribution** Tools for data tracking and preserving lineage information (data provenance), author attribution, and authentication.

All proposals in this area will have titles that start with "SDCI Data:".

## 3. Middleware

Focus areas in middleware, each mapped to software elements of cyber-services and virtual organizations in NSF's strategic vision, for the FY2007 SDCI solicitation include:

- **Cybersecurity** Middleware addressing authentication, authorization, and accounting needs in distributed environments, especially grid and inter-campus environments.
- **Workflow** Workflow and orchestration tools.
- **Instrument Access** Middleware tools and components supporting remote instruments as first class members of cyberinfrastructure.
- **System Monitoring/Management/Testing** Middleware for monitoring and management of integrated systems and networks, and systems for testing code used in distributed environments.
- **User Interfaces and Portals** Middleware to improve access to, and usability of, distributed environments based on portal technologies.

Proposals in this area will have titles that begin with "SDCI NMI:".

## Required Characteristics for All SDCI Proposals

In all three focus areas, common characteristics are required for SDCI proposals:

- Identification of multiple application areas in science or engineering where the software is needed, a description of the value of the work in the context of a missing capability required by the domain fields, and specific examples of how the use of the tool will have an impact on science and engineering research.
- A clear description of how the proposed approach compares to alternative or existing approaches (including other commercial and research solutions). Proposals that could be supported by other programs at NSF or at other agencies should be submitted to those programs. Investigators are encouraged to contact the program with questions about appropriateness for this program prior to sending in an application.
- The project plan must include milestones with a proof-of-concept demonstration of the key software components within the first twelve months (for two-year awards) or 18 months (for three-year awards).
- Tangible metrics used to measure the success of the software developed, especially the quantitative and qualitative definition of "working prototype" against which that milestone will be judged, and the steps necessary to take the software from prototype status to production use.
- A compelling discussion of the software's potential use by broader communities, preferably via use cases developed in concert with relevant domain scientists.
- Identification of the open source license to be used.

Strong preference will be shown for efforts that provide near-term benefit to a broad user base in the NSF community.

### Proposal Categories: (A) New Development and (B) Improvement and Support

In addition to the focus areas, each proposal will be categorized according to (A) New Development or (B) Improvement and Support.

#### A. New Development

Creation of a new software tool either from scratch or loosely derived from a pre-existing code base will be considered New Development. All proposals for development of new software may not exceed \$500,000 per year in requested funds.

Proposals for new development are expected to cite any related and existing software tools and components with similar functionality, and make a compelling case for the need for this new development work in that context.

Proposals addressing new development will have titles that also include the word "New".

#### B. Software Improvement and Support

NSF recognizes the need to also support the improvement and support of existing software with a tangible user base among the NSF community. Projects in this category are of sufficient size and complexity that funding requirements may not exceed \$1 million per year. Work must focus on community-driven enhancements that are documented by user requirements and applied to existing deployed software and services. Maintenance and support functions related to the software system are also relevant for award activities. Such projects address the improvement of software with a track record of production use and impact on domain sciences and engineering.

Proposals addressing improvement and support of existing software will

have titles that also include the word "Improvement".

**See Section V, Proposal Preparation and Submission Instructions, for further guidance on proposal titles.**

### **Special Award Conditions**

All awards made in the SDCI solicitation will be subject to the following conditions:

- For two-year awards, NSF requires a working prototype to be successfully demonstrated before the 12 month mark of award activities, and the software's open source license to be listed by the Open Source Initiative (see [www.opensource.org](http://www.opensource.org)) as an approved open source license. Where applicable, these milestones must be documented in the Year 1 Annual report before Year 2 spending is authorized.
- For three-year awards, NSF requires a working prototype to be successfully demonstrated before the 18 month mark of award activities, and the software's open source license to be listed by the Open Source Initiative (see [www.opensource.org](http://www.opensource.org)) as an approved open source license. Where applicable, these milestones must be documented in the Year 2 Annual report before Year 3 spending is authorized.
- All awards are required to use NMI Build and Test services, or an NSF designated alternative, to support their software development and testing. Details of the NMI Build and Test facility can be found at <http://nmi.cs.wisc.edu/>.
- Awardees are expected to participate in an Annual PI meeting with travel costs supported by the award.

### **III. AWARD INFORMATION**

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The SDCI program will fund 10-20 software development projects at \$50,000 - \$1,000,000 a year for 2-3 years as standard or continuing grants, subject to award conditions described above.

### **IV. ELIGIBILITY INFORMATION**

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#### **Organization Limit:**

Proposals may only be submitted by the following:

- Academic Institutions located in the U.S.: U.S. universities and colleges located in the U.S.
- 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: 1

One proposal allowed per PI or co-PI.

## Additional Eligibility Info:

When a consortium of eligible organizations submits a proposal, it must be submitted as a single proposal with one organization serving as the lead and all other organizations as subawardees. Organizations ineligible to submit to this program solicitation may not receive subawards. If they are part of the proposed project team, their participation is expected to be supported by non-NSF sources.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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**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](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](mailto:pubs@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/bfa/dias/policy/docs/grantsgovguide.pdf>). 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 [pubs@nsf.gov](mailto:pubs@nsf.gov).

This information supplements guidance in the GPG or Grants.gov Application Guide.

### Proposal Titles

Proposals must identify the focus area in the title. HPC software related proposal titles must start with "SDCI HPC:" The titles of data related software proposals must start with "SDCI Data:" Middleware related proposal titles must start with "SDCI NMI:".

If the proposal targets creation of new software, the title must be appended with "New". For example, a proposal to create a new multithreaded debugger for HPC systems might be titled, "SDCI HPC New: the MT-DEBUG Debugging System".

If the proposal targets improvement and maintenance of an existing software tool or system, the title must be appended with "Improvement". For example, a proposal to enhance an existing and popular software system called Grid Virtual Authentication Widgets might be titled, "SDCI NMI Improvement: the Grid Virtual Authentication Widget System".

### Budget



Follow the instructions in the GPG or the NSF Grants.gov Application Guide for preparing the budget. The budget must include costs for attendance by one or more project personnel at an annual PI meeting to be held at the NSF facility in Arlington, VA.

### **Additional Criteria to Address for New Software Development Proposals**

Projects in the New Development category should address the following criteria:

- The extent to which the value of the work is described in the context of a missing capability required by science and engineering, and potential impact of the missing capability across a broader segment of the NSF community.
- Clarity in a comparison of the proposed approach to alternative or existing approaches (including other commercial and research solutions).
- A project plan including a proof-of-concept demonstration of the key software components within the first 12 to 24 months.
- Tangible metrics described to measure the success of the software developed, and the steps necessary to take the software from prototype status to production use.

### **Additional Criteria to Address for Software Improvement and Support Proposals**

Projects in the Improvement and Support category should address the following criteria:

- The extent to which the existing software system is already deployed and used by the NSF research and education community.
- Clarity in the description of proposed enhancements and their relation to identified user requirements moving forward.
- If appropriate, justification for proposed resources needed to support and maintain the existing code base.
- A project plan including user interaction, community-driven approach, and a timeline of new feature releases.
- Tangible metrics described to measure the success of the software developed and supported.
- The degree to which the proposal enhances the robustness and usability of the software.

## **B. Budgetary Information**

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**Cost Sharing:** Cost sharing is not required by NSF in proposals submitted to the National Science Foundation.

## **C. Due Dates**

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

January 22, 2007

due date

## **D. FastLane/Grants.gov Requirements**

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- **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](mailto: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. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: <http://www.grants.gov/CustomerSupport>. 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](mailto: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**

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Proposals received by NSF are assigned to the appropriate NSF program and, if they meet NSF proposal preparation requirements, for review. 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 with the proposer.

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

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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 judgements.

#### **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:**

Projects in the New Development category will be evaluated with careful attention to the following:

- The extent to which the value of the work is described in the context of a missing capability required by science and engineering, and potential impact of the missing capability across a broader segment of the NSF community.
- Clarity in a comparison of the proposed approach to alternative or existing approaches (including other commercial and research solutions).
- A project plan including a proof-of-concept demonstration of the key software components within the first 12 to 24 months.
- Tangible metrics described to measure the success of the software developed, and the steps necessary to take the software from prototype status to production use.

Projects in the Improvement and Support category will be evaluated with careful attention to the following:

- The extent to which the existing software system is already deployed and used by the NSF research and education community.
- Clarity in the description of proposed enhancements and their relation to identified user requirements moving forward.
- If appropriate, justification for proposed resources needed to support and maintain the existing code base.
- A project plan including user interaction, community-driven approach, and a timeline of new feature releases.
- Tangible metrics described to measure the success of the software developed and supported.
- The degree to which the proposal enhances the robustness and usability of the software.

## **B. Review and Selection Process**

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Proposals submitted in response to this program solicitation will be reviewed by Adhoc Review 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 date of receipt. 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

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### A. Notification of the Award

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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

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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 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 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/general\\_conditions.jsp?org=NSF](http://www.nsf.gov/awards/managing/general_conditions.jsp?org=NSF). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards 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](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm).

### C. Reporting Requirements

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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.

Failure to provide the required annual or final project reports 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 following additional reporting requirements apply to awards made in SDCI:

For two-year awards, NSF requires a working prototype to be successfully demonstrated before the 12 month mark of award activities, and the software's open source license to be listed by the Open Source Initiative (see [www.opensource.org](http://www.opensource.org)) as an approved open source license. Where applicable, these milestones must be documented in the Year 1 Annual report before Year 2 spending is authorized.

For three-year awards, NSF requires a working prototype to be successfully demonstrated before the 18 month mark of award activities, and the software's open source license to be listed by the Open Source Initiative (see [www.opensource.org](http://www.opensource.org)) as an approved open source license. Where applicable, these milestones must be documented in the Year 2 Annual report before Year 3 spending is authorized.

All awards are required to use NMI Build and Test services, or an NSF designated alternative, to support their software development and testing within the first 12 months of award activities, and to document that process in the 1st year annual report. Details of the NMI Build and Test facility can be found at <http://nmi.cs.wisc.edu/>.

## VIII. AGENCY CONTACTS

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General inquiries regarding this program should be made to:

- Kevin Thompson, Program Director, 1145 S, telephone: (703) 292-8962, fax: (703) 292-9060, email: [sdci@nsf.gov](mailto:sdci@nsf.gov)
- Christopher Greer, telephone: (703) 292-8970, email: [sdci@nsf.gov](mailto:sdci@nsf.gov)
- Jose Munoz, telephone: (703) 292-8970, email: [sdci@nsf.gov](mailto:sdci@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).
- Priscilla L. Bezdek, Program and Technology Specialist, 1145 S, telephone: (703) 292-8962, fax: (703) 292-9060, email: [pbezdek@nsf.gov](mailto:pbezdek@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](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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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, MyNSF (formerly the Custom News Service) is an information-delivery system 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 or the user's Web browser each time new publications are issued that match their identified interests. MyNSF also is available on NSF's Website at <http://www.nsf.gov/mynsf/>.

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>.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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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 40,000 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 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: [pubs@nsf.gov](mailto:pubs@nsf.gov)
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- **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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