High Performance Computing System Acquisition: Enhancing the Petascale Computing Environment for Science and Engineering

PROGRAM SOLICITATION
NSF 11-511

REPLACES DOCUMENT(S):
NSF 08-573

National Science Foundation

Office of Cyberinfrastructure

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

March 07, 2011

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.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

High Performance System Acquisition: Enhancing the Petascale Computing Environment for Science and Engineering

Synopsis of Program:

The NSF's vision for Cyberinfrastructure in the 21st Century includes enabling *sustained* petascale computational and data-driven science and engineering through the deployment and support of a world-class High Performance Computing (HPC) environment. For the past decade the NSF has provided the open science and engineering community with state of the art HPC assets ranging from loosely coupled clusters, to large scale instruments with many thousands of computing cores communicating via fast interconnects. Previous solicitations, as exemplified by the multi-pronged Track Two acquisitions, have provided more than two petaflops (10^{15} floating point operations per second) of compute power on real applications, that consume large amounts of memory, and work with very large data sets. These resources have been made available through the TeraGrid, the world's largest, most powerful and comprehensive distributed cyberinfrastructure for open science. In addition to the Track Two acquisitions, the ongoing Track One program promises to deliver a petaflop of *sustained* power capable of tackling some of the most challenging scientific problems across multiple science and engineering domains.

HPC Resource Providers - those organizations willing to acquire, deploy and operate HPC resources in service to the science and engineering research and education community - play a key role in the provision and support of a national Cyberinfrasructure. With this solicitation, the NSF requests proposals from organizations willing to serve as HPC Resource Providers within Extreme Digital (XD), the successor to TeraGrid, and who propose to acquire and deploy new, innovative petascale HPC systems and services.

Competitive HPC systems will:

- Expand the range of data intensive computationally-challenging science and engineering applications that can be tackled with XD HPC services;
- Introduce a major new innovative capability component to science and engineering research communities:
- Provide an effective migration path to researchers scaling data and code beyond the campus level;
- Incorporate reliable, robust system software and services essential to optimal sustained performance;
- Efficiently provide a high degree of stability and usability by January, 2013; and
- Complement and leverage existing XD capabilities and services.

Benchmarks will be a key factor in system selection. Two types of benchmarks are required: NSF provided benchmarks and proposer selected benchmarks. The NSF provided benchmarks, which are posted on NSF web-site NSF 06-05 are designed to capture the salient attributes of those science and engineering applications which will place the most stringent demands on the overall system to be provisioned. Proposer provided benchmarks should focus on the innovative aspect of the proposal .

Cognizant Program Officer(s):

- Irene Qualters, Program Director, telephone: (703) 292-2339, fax: (703) 292-9060, email: iqualter@nsf.gov
- Barry I. Schneider, Program Director, telephone: (703) 292-7383, fax: (703) 292-9060, email: bschneid@nsf.gov

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

- 47.080 --- Office of Cyberinfrastructure

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1

Anticipated Funding Amount: $30,000,000 A total of up to $30,000,000, subject to availability of funds. Project durations should be for up to 4 years. An acquisition associated with the upgrade of an existing system is permissible. Each award will support the acquisition and deployment of hardware, software, and the personnel costs associated with the acquisition and deployment of the proposed system, including acceptance testing. Each proposal may be for an acquisition that occurs in one step near the beginning of the award period or for an acquisition that is deployed in phases during the award period. Up to $5,000,000 of the proposed award may be specific to the innovative capability. User support and operating costs of up to $6,000,000 per annum for each deployed HPC system will be provided in a separate funding action. There is a possibility of a renewal acquisition award, four years after the original award, pending availability of funds and the quality of the proposal submission.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- U.S. institutions of higher education and Federally Funded Research and Development Centers are eligible to apply as Resource Providers. It is recognized that FFRDCs may be positioned to make unique contributions to the HPC environment important to academic researchers. Hence for the purposes of this solicitation, NSF will consider acquiring and deploying HPC systems at FFRDC sites. However, proposing organizations must assure that open access to the HPC systems deployed will be provided to researchers from the broad range of science and engineering fields supported by NSF.

PI Limit:

None Specified

Limit on Number of Proposals per Organization: 1

An organization may submit only one proposal but may be a sub-awardee on other proposals responding to this solicitation.

Collaborative projects may **only** be submitted as a single proposal in which a single award is being requested. The involvement of partner organizations should be supported through sub-awards administered by the submitting organization.

Limit on Number of Proposals per PI:

None Specified

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:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

  March 07, 2011

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: Additional award conditions apply. Please see the full text of this solicitation for further information.

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

TABLE OF CONTENTS

I. INTRODUCTION

Many research communities are operating at the confluence of theoretical, experimental and computational science and engineering. Examples of scientists and engineers whose research require terascale and petascale HPC computational and data resources include: climate scientists developing high resolution unified climate and weather models with fidelity at national and regional levels; biomolecular researchers developing reliable multiscale models for macromolecular folding, biochemical binding and reaction mechanisms, macromolecular pathways, and supramolecular cellular processes; physicists, engineers and behaviorial scientists engaged in hazard analysis and management through coupling of ensemble simulations and behavioral models; astrophysicists investigating Einstein's Theory of General Relativity building beyond the ability of observational astronomy; particle physicists investigating the fundamental building blocks of matter; aerospace engineers exploring wind turbine aerodynamics as well as coupled aeroacoustical , structural and aerodyanmic simulations.

Science and engineering research and education enabled by state-of-the-art HPC tools also have a direct bearing on the Nation's competitiveness and security. If investments in HPC are to have long-term impact on basic research problems of national need, then HPC resources must deliver high performance capability to a wide range of science and engineering applications and workflows.

By 2012, academic researchers will have access to a rich mix of HPC systems that:

- deliver sustained performance in the 10s of teraflops to >1 petaflop range on a variety of science and engineering codes

capable of generating and analyzing petabyes of data
- are integrated into a national cyberinfrastructure environment; and,
- are supported at national, regional and/or campus levels.

In this scenario, it is likely that NSF will directly support within XD, several systems delivering sustained performance in the 50 to 500 teraflops range across an increasingly broad range of science and engineering research applications matched with comparable data capabilities. In addition, NSF is expected to directly support one system capable of exceeding a petaflops of sustained performance on the most computationally-challenging and data-intensive research codes.

II. PROGRAM DESCRIPTION

The purpose of this solicitation is to generate proposals from Resource Provider organizations who are committed to the delivery of world leading High Performance Computing (HPC) resources through the XD environment described in the *Introduction*. This competition emphasizes the provision of system and services that deliver high levels of performance for many different types of science and engineering applications while also introducing significant innovation which will expand the value of HPC to the science and engineering community.

Competitive HPC acquisitions will:

- Expand the range of data intensive computationally-challenging science and engineering applications that can be tackled with XD HPC services;
- Introduce a major new innovative capability component to science and engineering research communities:
- Provide an effective migration path to researchers scaling data and code beyond the campus level;
- Incorporate reliable, robust system software and services essential to optimal sustained performance;
- Efficiently provide a high degree of stability and usability by January, 2013; and
- Complement and leverage existing XD capabilities and services.

For the purposes of this solicitation, an acquisition may include: *computing hardware*, including processors, caches (if present) and main memory, inter-connects, I/O sub-system(s); *local on-line storage* of sufficient size to support science and engineering research applications that use the full extent of the computing hardware; *archival storage* of a size appropriate to a system of the scale proposed; a wide-area *network connection*; any other hardware typical of a modern supercomputing system; *system software* including, one or more operating systems, one or more file systems, a set of compilers and run-time libraries, software libraries that support access to the full memory model of the system proposed including one that offers a standard MPI interface, standard operating system and mathematical libraries, debugging and program development tools, system administration and job scheduling software, user accounting software, any other software typical of a modern supercomputing system; either dedicated nodes or small satellite systems that provide for interactive access, job preparation and staging, system management and/or remote visualization; any additional hardware or software associated with the innovative aspects of the acquisition.

For the 2011 proposal submission deadline, NSF is interested in receiving innovative proposals for production XD HPC resources capable of at least a petaflop. In addition the resource must introduce a major new innovative capability, such as

- A data-intensive, high-performance computing capability suitable for new science and engineering communities as well as existing.
- An innovative, power efficient, highly usable, high-performance computing capability with sustained performance for a broad range of science and engineering applications and application frameworks.
- An innovative high performance computing capability which expands the boundaries of the current TeraGrid research community, for example, by the introduction of domain specific capabilities or support for dynamic interactive research workflows across XD resources.

The submission of benchmark results or estimated benchmark results is required as part of each proposal. The ability of proposed systems to meet any estimated benchmark results included in proposals will be made a requirement in subsequent awards, with funding contingent on meeting the estimated benchmark performance (see *Section VII.B. Award Conditions* of this solicitation for more information). Two types of benchmarks are required, projected performance on the standard set of benchmarks posted at NSF 06-05 and projected performance on benchmarks of the proposer's own choosing. The proposer selected benchmarks should demonstrate innovative capability in at least one of the three categories of resources listed above.

Detailed information on the proposal format is provided in *Section V., Proposal Preparation and Submission Instructions*.

It is anticipated that NSF will receive questions about the solicitation from prospective proposers between the release of the solicitation and the deadline for proposals. Answers to questions that may be of general interest to prospective proposers will be posted on a "Frequently Asked Questions" page accessible through OCI webpage. Prospective proposers are encouraged to check this page periodically for updates.

The system and services deployed as a result of this solicitation,will become part of the portfolio of resources supported by NSF for shared use by the national science and engineering research and education community through XD. Accordingly, the proposal should leverage and complement the capabilities currently provided by the existing infrastructure, resources and services. Allocations for use of the system will be made through the Large and Medium Resource Allocation Committees (LRAC and MRAC) or their successors. It is anticipated that the system or services deployed will be made available to users as part of XD successor to TeraGrid (for more information on Teragrid, see http://www.teragrid.org/).

III. AWARD INFORMATION

Anticipated Type of Award: Cooperative Agreement.

Estimated Number of Awards: 1, to be made in September of the same year of the proposal deadline, subject to availability of funds.

Anticipated Funding Amount: Total of $30,000,000 in FY2011, subject to availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- U.S. institutions of higher education and Federally Funded Research and Development Centers are eligible to apply as Resource Providers. It is recognized that FFRDCs may be positioned to make unique contributions to the HPC environment important to academic researchers. Hence for the purposes of this solicitation, NSF will consider acquiring and deploying HPC systems at FFRDC sites. However, proposing organizations must assure that open access to the HPC systems deployed will be provided to researchers from the broad range of science and engineering fields supported by NSF.

PI Limit:

None Specified

Limit on Number of Proposals per Organization: 1

An organization may submit only one proposal but may be a sub-awardee on other proposals responding to this solicitation.

Collaborative projects may **only** be submitted as a single proposal in which a single award is being requested. The involvement of partner organizations should be supported through sub-awards administered by the submitting organization.

Limit on Number of Proposals per PI:

None Specified

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/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 nsfpubs@nsf.gov.

Exceptions to guidelines in the GPG or NSF Grants.gov Application Guide follow.

- The page limit for the Project Description section of the proposal is ***30 pages.***
- There is no page limit for the Budget Justification section.
- Certain information other than that described in the GPG should be submitted as Supplementary Documents (see below for details).
- Collaborative efforts may **only** be submitted as a single proposal, in which a single award is being requested. The involvement of partner organizations should be supported through sub-awards administered by the proposing Resource Provider organization.

In addition to the required sections described in the GPG or NSF Grants.gov Application Guide, the Project Description must include the following eight sections:

- **System Specification**
- **Performance and Innovation for Science and Engineering Applications**
- **System Reliability and Usability**
- **Implementation, Project Management, and Risk Mitigation**
- **Quality of the Physical Infrastructure**
- **Plan for Operations, including User Support and Training**
- **Integration of Research and Education**
- **Broadening Participation**

Information to be provided in each section is described below. ***In the following descriptions, the term "system" is intended to refer to the entire resource being proposed.***

System Specification

Specify the detailed design of the system to be acquired and deployed. Include a detailed description of any aspects of the proposed system that are likely to influence the performance of science and engineering research codes. Parameters to be considered include total number of processors, the architecture of the nodes that make up the system, speed and architecture of individual processors, number of processors sharing the same access to memory, amount of memory, size and number of caches (if present), inter-processor and inter-node bandwidth and latency, communications topology, amount of secondary storage, amount of archival storage, I/O sub-system, file system(s), operating system(s), compiler(s), debugging tools, performance measurement tools, system administration tools.

Describe in detail the system aspects that are associated with the innovative capability of the proposal. Identify system attributes and components that constitute the proposed innovative capability, including storage, data management, visualization, middleware, tools or application software stacks, whether vendor supplied or open. Identify components common to Teragrid as well

as components unique to this resource. Identify how the innovative capability will be integrated.

Describe how the compute nodes, local disk, and longer term mass storage systems will be integrated.

Describe any vendor-supplied hardware or software support for measuring application and system performance.

Describe any visualization aspects of the system.

Describe how the system complements, leverages, integrates to, and extends existing TeraGrid and TeraGrid node technologies, capabilities, resources and services.

Describe any anticipated challenges associated with implementing the capabilities proposed.

Performance and Innovation for Science and Engineering Applications

Describe the types of science and engineering research challenges that drive the choice of the system design. Describe the expected impact of the system on science and engineering. Describe the science and engineer research challenges that drive the selection for the innovative capability. Describe the expected impact of the new science and engineering enabled by the introduction of the specific new innovation capability of the system.

Describe in detail how the system integration to TeraGrid/XD will bring additional value to specific science and engineering research challenges.

Provide a detailed analysis of the projected performance of the proposed system on a benchmark suite representative of science and engineering applications. This analysis should include actual results or estimated results for (a) the following benchmarks from the set that have been used in prior years under this solicitation and described in NSF 06-05: the High-Performance Computing Challenge benchmarks, updated version 1.4.1, and updated versions of WRF, PARATEC, MILC and HOMME application benchmarks; (b) an additional set of benchmarks identified by the proposing organization as best able to characterize the innovative capability of the resource being proposed. The system performance on an appropriate set of performance benchmarks will be a factor in the selection of the awards. Achievement of benchmark performance projections may be made an award condition. ***The actual results or estimated results of any benchmarks used must be submitted in the "Supplementary Documents" section of the proposal.***

The benchmarks provided by NSF should be run "as is." Minor changes in code in order to get the benchmarks to compile and/or run are permitted but should be described in the proposal. In addition, the modified version of the benchmark source code or execution scripts must be posted to a secure ftp site hosted by the proposing organization and accessible to NSF staff on the day following the proposal deadline date. In addition, at the discretion of the proposing organization, the benchmarks provided by NSF may also be run in a form in which the source code has been optimized by the proposer or vendor. If an optimized form of one or more of the NSF benchmarks is run, and/or if benchmarks other than those provided by NSF are used in addition to the NSF benchmarks, then detailed descriptions of the benchmark or code modifications, the results of the benchmark run, and copies of the version of the source code and execution scripts that were used in running the benchmark, must also be made available at the same secure ftp site on the day following the proposal deadline date. Any libraries with which the benchmarks were linked should be supplied to the HPC Resource Provider as part of the project requirements.

Benchmarks may be run on existing or prototype systems of the same design as proposed, or estimated by well-justified extrapolation from analogous systems.

In addition, proposers must provide benchmarks which explicitly address the new innovative capability. The choice of applications should be justified in terms of their scientific merit and their ability to demonstrate the potential of the innovative capability. The features of applications influencing the design and configuration of the proposed innovative capability should be fully explained with respect to how the innovation expands the reach of XD to new science and engineering research and communities.

If one of the benchmarks specified by NSF or by the proposing organization fails to run or cannot be run, or is not expected to be runnable on the proposed system, a description of the reasons for this must be included. Any estimated benchmark performance results should be based on a well-justified extrapolation from analogous systems. It is anticipated that demonstrated ability to achieve any benchmark results or other measures of performance provided in the proposal, whether actual or estimated, will be required as a performance metric for formal acceptance of the delivered system in an award.

Describe the time required to boot the full system from a cold start; the maximum amount of main memory that will be available to users; and, the time required to exchange the contents of this portion of main memory with local disk storage (both load and store).

System Reliability and Usability

Describe the availability of system software and tools to effectively use the capabilities of the system. Depending on the type of resource being proposed, system software features of particular importance may include the operating system or systems, the file system or systems, compilers, message-passing libraries, other libraries (including standard system and mathematical libraries), debugging tools, application tuning tools, performance monitoring tools, system administration and resource management, job scheduling and accounting, networking software, middleware, data management and workflow orchestration tools. For the types of science and engineering research challenges that drive the choice of system design, describe usability aspects of the system from the perspective of both new and existing TeraGrid researchers and educators. Describe which types of system data will be transparently and dynamically visible directly from XD interfaces.

Describe the job mix that the Resource Provider expects to represent the usage of the system for science and engineering research applications, as well as jobs associated with system operation and maintenance. This should include applications that scale to a large fraction of the system, as well as smaller jobs, and should include a mix of durations. Include data considerations. It is anticipated that one of the performance requirements included in the award document will be that, in production mode, when averaged over one month, 96% of jobs submitted to the system should complete without having to be resubmitted as a result of a failure in the hardware or system software, including failures as a result of a compiler failing to correctly implement code that complies with the relevant language standard. Include an analysis of the reliability of the proposed production resource and the reasons that the proposed system can be expected to meet this performance requirement.

The award instrument will include a performance requirement on the availability of the system. NSF requires that, when averaged over a month, production resources should be unavailable as a result of scheduled and unscheduled maintenance no more than 5% of the time. Provide an analysis of the reasons that the proposed system can be expected to meet this performance requirement.

Implementation, Project Management, and Risk Mitigation

Provide a detailed implementation plan and corresponding metrics for developing and/or acquiring and deploying the proposed system, including the innovative capability. A detailed month-by-month schedule must be provided. Explicit metrics associated with the innovative capability must be included along with justification of the metrics selection.

The system acquired will be integrated into the XD. Within this context, describe which elements of the proposed system will be integrated into the TeraGrid successor, XD, (http://www.teragrid.org/) and what steps such integration will require. This description should be based on the current TeraGrid architecture.

Provide details on the sub-contract(s) with the relevant vendor(s) that describe the contractual terms of any substantial acquisition of hardware, software or services.

Describe the availability of experts to address any system integration problems that arise as the system is deployed. This expertise may be provided by the proposing Resource Provider and/or by other vendor, academic or government partners. Proposers should make clear their previous associations, if any, with these partners. The breadth of knowledge, depth of interaction, and technical abilities of partners will be considered in the review process. This knowledge and expertise is particularly important in supporting advanced programming or usage paradigms (e.g. compilers for parallel environments, problem solving environments, distributed computing), tools (e.g. performance visualization, parallel debuggers) and system elements (e.g. parallel file systems).

Describe user access to the system during the deployment phase and prior to system acceptance, including during testing.

Describe the experience of the proposing organization in the management of awards of this scale and the resources that would be available to manage an award. If the proposal involves a substantial acquisition, describe the experience of the proposing organization in the management of large sub-contracts to vendors for the acquisition of HPC systems. Describe the resources that would be available to manage any such sub-contract issued under an award made as a result of this solicitation.

Provide a detailed risk mitigation plan, identifying both technical and management risks as well as strategies to mitigate such risks. Include risks specific to the innovative capability such as adoption or sustainability.

Quality of the Physical Infrastructure

Describe the physical facility or facilities that will house the proposed system and any schedule implications of the provision of computer-ready space, including floor space, power, cooling, fire suppression, and any other emergency equipment, for the system and its supporting hardware. Include a description of the physical security that will be provided. Include a description of the expected power and heat budgets of the proposed system and explain how these will be managed. Describe the expected impacts of power interruptions and how these will be managed. Please provide an analysis of the implications of a sudden loss of power to, or catastrophic failure of, either the computing, storage or primary cooling systems and describe what emergency systems will be required to minimize damage to personnel and equipment.

Describe the external network connectivity between the proposed system and national networks.

High-performance applications are expected to produce many terabytes of data. Describe how these data will be handled, how data integrity will be maintained, what backup and contingency procedures and schedules, if any, will be provided and how will they be implemented.

Plan for Operations, including User Support and Training

Provide a plan for user support that includes a description of the anticipated requirements of the science and engineering research community, a description of how resources will be allocated, and any other operational details likely to have an impact on user access or usage of the proposed system. Describe the number and anticipated qualifications of the types of personnel that will be involved with the provision of user support. In addition, describe the user training opportunities that will be made available. Describe the expected availability of dedicated time on the system for both science and engineering applications and systems testing, and what fraction of system resources will be consumed in moving users on and off the system, or reconfiguring it for dedicated use.

Describe the experience of the proposing organization in operating production systems, including any experience in operating in a physically and distributed environment. Include a description of whether operational support was provided on a 24/7 basis or was provided on a more limited basis. Please describe the number and type of users, the types of computation performed, and the nature of the user support provided. Describe the processes used to evaluate management performance, determine user needs, and evaluate user satisfaction.

Describe the qualifications of the Principal Investigator(s) with regard to her or his ability to manage a project of this size and complexity, and, in proposals for production resources, to manage a resource with a large number of external users.

Provide an analysis of the annual operating costs of the proposed system for duration of the award, including the cost of providing user support. Detailed operating cost estimates should include any necessary maintenance contracts. Operating cost estimates should also include the cost of power and physical security, the cost of network connectivity from the location(s) of the system to the Teragrid, and costs associated with leasing machine room space, if necessary. Provide an estimate of the costs associated with the number of FTEs necessary to maintain 24/7 operations of the proposed system. Provide an estimate of the costs associated with the number of FTEs necessary to provide effective user support. Estimate the costs and personnel required to maintain operation of the system within the TeraGrid and address any issues anticipated with supporting the current TeraGrid core software stack (see http://www.teragrid.org/ for details) or any other aspects of participating in the TeraGrid. Describe services leveraged from TeraGrid/XD.

Include a more detailed explanation of the budget for user support and operating costs ***in the Supplementary Documents section of the proposal (this should not exceed 5 pages)***. ***Information provided will be used to help NSF assess the operating cost-performance attributes of the proposed system.***

Describe any other factors that are anticipated to have an impact on the Total Cost of Ownership of the proposed system.

Integration of Research and Education

Please describe any components of the project that are designed to foster integration of research and education. Please see Section VI.A *NSF Merit Review Criteria,* below.

Broadening Participation

Please describe any components of the project that are designed to broaden opportunities for and enable participation of all citizens - women and men, underrepresented minorities and persons with disabilities. Describe any complementary and leveraged aspects of existing TeraGrid projects. Please see Section VI.A *NSF Merit Review Criteria,* below.

Proprietary information

Proposals containing patentable ideas, trade secrets, privileged or confidential commercial or financial information, disclosure of which may harm the proposer, should be clearly marked where appropriate in the proposal and labeled with the following legend:

"The following is (proprietary or confidential) information that (name of proposing organization) requests not be released to persons outside the Government, except for purposes of review and evaluation."

Note that proposals submitted to this solicitation will be reviewed by a group of experts that include people who are not U.S. Government personnel.

For further information please refer to the Grant Proposal Guide at
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg

Supplementary Documents

In addition to other required supplementary documents, proposals should include the following sections as Supplementary Documents :

- Actual or estimated performance benchmark results as described in Section V.A. *System Performance on Science and*

Engineering Applications of this solicitation. This section should not be used to continue discussion or analysis of the merits of the resource provider, vendor or vendors, or system.
- Detailed Projected Operating Costs as described in Section V.A. *Plan for Operations, including User Support and Training* of this solicitation. This ***should not exceed 5 pages***.
- A list of all institutions and companies involved in the project, together with their roles within the project and the levels of funding.
- A single, alphabetically ordered list of all people, in the academic or professional computing community, who have collaborated with (within the last 48 months), or have been a Ph.D. advisee or advisor of, any of the personnel involved in the proposed project. In this list, please include, next to the name of each conflicted individual, that individual's institution or company and the name of the project member with whom he or she has the conflict of interest. It is not necessary to list, as collaborators, personnel who are employees of an institution or company involved in the project.
- **Letters of endorsement should not be included in proposals.** Letters of commitment from individuals who are described in the Project Description as involved in the project in a senior capacity but who are not members of the lead proposing organization, or from representatives of institutions or organizations collaborating with the lead institution, are allowable. As described in the Grant Proposal Guide, Section II.C.2.j, such letters of commitment should be included in the Supplementary Documents section and do not count toward overall page limits. If letters of endorsement are included, NSF may choose to return the proposal without review.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Each proposal should be for the development phase including any acquisition costs as well as the deployment phase of the project. The proposal amount should total no more than $30,000,000 for up to 4 years. An acquisition associated with the upgrade of an existing system is permissible. Each award will support the acquisition and deployment of hardware, software and associated personnel costs, including acceptance testing. Detailed budgetary information should be provided in the Budget Justification section of the proposal.

Each proposal may be for an acquisition that occurs in one step near the beginning of the award period or for an acquisition that is deployed in phases during the award period.

Up to $5,000,000 of the proposed award may be specific to the innovative capability.

User support and operating costs of up to $6,000,000 per year, after acceptance for the proposed HPC system will be provided in a separate funding action.

Detailed budgetary information should be provided in the Budget Justification section of the proposal.

There is a possibility of a renewal acquisition proposal and award, four years after the original award, pending availability of funds and the quality of the proposal submission. In the third year of operation, the awardee may submit a renewal proposal for an additional acquisition. During the subsequent annual review, the HPC resource provider's achievements and future plans will be evaluated comprehensively. This in-depth review will consist of an ad hoc review of the renewal proposal and a formal on-site review, involving external reviewers who will produce a written report to NSF. If the HPC resource provider is successful in passing the third-year review, the resource provider will be eligible to submit a renewal acquisition proposal for up to four years, commencing at the beginning of the fifth year.

C. Due Dates

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

  March 07, 2011

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. 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. 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 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, 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.

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.

Additional Review Criteria:

Proposals for this solicitation will also be subject to the additional review criteria described below. These criteria parallel specific sections in the Project Description.

- **Meeting the Needs of the Challenging Science and Engineering Applications.** How well does the resource proposed match the known and anticipated requirements of the science and engineering research and education community for HPC resources and services? Will the innovative capability stimulate new research and education? Will the innovative aspects attract both existing and new science and engineering communities? Do the proposer supplied benchmarks convincingly demonstrate the value of the innovative capability? Will the proposed system and services complement the existing TG/XD resources? Can the proposed resource provide the necessary capability required to generate new, breakthrough, science and engineering discoveries? Where benchmark results have been estimated, are these estimates credible?
- **System Reliability and Usability**. Are the system and the operation of the system likely to provide a robust, reliable, high-productivity computational environment for new and existing XD users? What is the commitment of the vendor or vendors to meet the agreed performance goals and to provide post-acquisition support? Does the environment in which the system will be embedded include adequate capability for the remote analysis of output from high-end computations? Does the system, operations and support plan expand TeraGrid/XD capabilities for researchers and educators? Will existing TeraGrid/XD users be able to easily migrate to/from this system? Will the resource attract new research communities?
- **Implementation, Project Management and Risk Mitigation**. Is there an adequate procedure for ensuring that the proposed resource will be available for use by the science and engineering research and education community? Does the proposing organization have the capability to manage the award and any associated sub-contracts? Does the PI have the capability to manage the project? Is the PI's time commitment sufficient to ensure success of the project? Is the detailed implementation plan for acquisition and deployment adequate and realistic? Is the implementation of the innovative capability sufficiently detailed? Are the metrics appropriate to the outcome defined for the innovative component? Are the plans for integration into the TeraGrid and the associated costs reasonable? Does the proposing organization and its partners have the expertise to meet any challenges likely to be encountered while deploying the complete system (including data storage, communications and core software environment) and bringing it to production status? Has there been a reasonable assessment of potential risks and does the proposal include an adequate risk management strategy?
- **Quality and Availability of the Physical Infrastructure**. Are the physical facilities described by the proposing organization adequate to accommodate the system proposed?
- **Effective User Support.** What are the qualifications and experience of the PI and the proposing organization in regard to managing a production resource for national use and providing effective user support? Are they tightly integrated to TG/XD user services? Has user support for the innovative capability been adequately considered?

- **Total Cost of Ownership.** Are the budget and roster of personnel for operations and user support adequate and reasonable? Do they highly leverage the common services of TG/XD? Assess the total cost of ownership of the proposed system. Is this reasonable in light of the advances in science and engineering likely to result?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Site Visit Review.

In addition to panel and/or mail review, a subset of proposals may be subject to site visit review. If site reviews are used it is anticipated that these would occur in the February or March following the proposal deadline.

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.

Special Award Conditions:

Awards made as a result of this competition will include performance requirements and metrics for the proposed systems. If appropriate, an awardee will include terms and conditions in any subcontract agreement to address schedule and performance expectations and the impact of delays in delivery.

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.

Additional reporting requirements apply, will be negotiated with the Resource Provider prior to award, and will be incorporated into the special terms and conditions of the award.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Irene Qualters, Program Director, telephone: (703) 292-2339, fax: (703) 292-9060, email: iqualter@nsf.gov
- Barry I. Schneider, Program Director, telephone: (703) 292-7383, fax: (703) 292-9060, email: bschneid@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Crystal R. Aikens, telephone: (703) 292-4562, email: caikens@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.

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 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: 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