Cyber-Enabled Discovery and Innovation (CDI)

Program Solicitation

NSF 07-603

National Science Foundation

Directorate for Biological Sciences

Directorate for Computer & Information Science & Engineering

Directorate for Education & Human Resources

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

Office of Cyberinfrastructure

Office of International Science and Engineering

Office of Polar Programs

Letter of Intent Due Date(s) ***(required):***

October 30, 2007 - November 30, 2007

August 30, 2008 - September 30, 2008

August 30 - September 30, Annually Thereafter

Preliminary Proposal Due Date(s) ***(required)*** (due by 5:00 p.m. proposer's local time)***:***

Each preliminary proposal must uniquely correspond to a Letter of Intent - see instructions.

December 07, 2007 - January 08, 2008

October 04, 2008 - November 04, 2008

October 4 - November 4, Annually Thereafter

Full Proposal Submission Window Date(s) (due by 5:00 p.m. proposer's local time)***:***

By invitation only, based on review of preliminary proposal - see instructions.

March 28, 2008 - April 29, 2008

January 27, 2009 - February 27, 2009

January 27 - February 27, Annually Thereafter

REVISION NOTES

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 or via the NSF FastLane system. In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Cyber-Enabled Discovery and Innovation (CDI)

Synopsis of Program:

Cyber-Enabled Discovery and Innovation (CDI) is NSF's bold five-year initiative to create *revolutionary* science and engineering research outcomes made possible by innovations and advances in computational thinking. Computational thinking is defined comprehensively to encompass computational concepts, methods, models, algorithms, and tools. Applied in challenging science and engineering research and education contexts, computational thinking promises a profound impact on the Nation's ability to generate and apply new knowledge. Collectively, CDI research outcomes are expected to produce paradigm shifts in our understanding of a wide range of science and engineering phenomena and socio-technical innovations that create new wealth and enhance the national quality of life.

CDI seeks ambitious, transformative, multidisciplinary research proposals within or across the following three thematic areas:

- **From Data to Knowledge:** *enhancing human cognition and generating new knowledge from a wealth of heterogeneous digital data;*
- **Understanding Complexity in Natural, Built, and Social Systems:** *deriving fundamental insights on systems comprising multiple interacting elements;* and
- **Building Virtual Organizations:** *enhancing discovery and innovation by bringing people and resources together across institutional, geographical and cultural boundaries*.

With an emphasis on bold multidisciplinary activities that, through computational thinking, promise radical, paradigm-changing research findings, CDI is unique within NSF. Accordingly, investigators are encouraged to come together in the development of far-reaching, high-risk science and engineering research and education agendas that capitalize on innovations in, and/or innovative use of, computational thinking. CDI projects are expected to build upon productive intellectual partnerships involving investigators from academe, industry and/or other types of organizations, including international entities.

Congruent with the three thematic areas, CDI projects will enable transformative discovery to identify patterns and structures in massive datasets; exploit computation as a means of achieving deeper understanding in the natural and social sciences and engineering; simulate and predict complex stochastic or chaotic systems; explore and model nature's interactions, connections, complex relations, and interdependencies, scaling from sub-particles to galactic, from subcellular to biosphere, and from the individual to the societal; train future generations of scientists and engineers to enhance and use cyber resources; and facilitate creative, cyber-enabled boundary-crossing collaborations, including those with industry and international dimensions, to advance the frontiers of science and engineering and broaden participation in STEM fields.

Two types of CDI awards will be supported as a result of the first (FY 2008) CDI competition:

- Type I awards will require efforts up to a level roughly comparable to: summer support for two investigators with complementary expertise; two graduate students; and their collective research needs (e.g. materials, supplies, travel) for three years.
- Type II awards will require larger (than Type I) efforts up to a level roughly comparable to: summer support for three investigators with complementary expertise; three graduate students; one or two senior personnel (including post-doctoral researchers and staff); and their collective research needs (e.g. materials, supplies, travel) for four years. The integrative contributions of the Type II team should clearly be greater than the sum of the contributions of each individual member of the team.

In subsequent years, subject to availability of funds, funding opportunities will be provided for three classes of awards, Types I and II as defined above, and Type III as defined below:

- Type III awards will require the engagement of larger (than Type II) multidisciplinary teams, roughly comparable to multiple senior investigators with complementary expertise, multiple graduate students, several senior personnel, and their collective research needs (e.g. materials, supplies, travel) for up to five years. As for Type II awards, the integrative contributions of the Type III team should be clearly greater than the sum of the contributions of each individual member of the team.

Cognizant Program Officer(s):

- Sirin Tekinay, CISE/CCF, telephone: (703) 292-8080, email: cdi@nsf.gov
- Thomas Russell, MPS/DMS, telephone: (703) 292-8080, email: cdi@nsf.gov
- Eduardo Misawa, ENG/CMMI, telephone: (703) 292-8080, email: cdi@nsf.gov

Drs. Tekinay, Russell, and Misawa are being assisted by a multidisciplinary team of Program Officers drawn from throughout NSF. CDI team members include: Kile Baker (GEO/ATM), Charles Bouldin (MPS/DMR), Maria Burka (ENG/CBET), Arlene de Strulle (EHR/DRL), Cheryl Eavey (SBE/SES), Anne Emig (OD/OISE), Anne-Francoise Lamblin (BIO/DBI), D. Terence Langendoen (SBE/BCS), Mary Lou Maher (CISE/IIS), Peter McCartney (BIO/DBI), Barbara Olds (EHR/OAD), Abani Patra (OD/OCI), Wayne Patterson (OD/OISE), Diana Rhoten (OD/OCI), William Wiseman (OD/OPP) and Eva Zanzerkia (GEO/EAR).

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.078 --- Office of Polar Programs
- 47.079 --- Office of International Science and Engineering
- 47.080 --- Office of Cyberinfrastructure

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 30 - In FY 2008, the number of Type I and Type II awards will be determined based on the results of separate review processes. There will be no Type III awards in FY 2008. In FY 2009 and beyond, subject to availability of funds, awards of Type I, II and III will be made based on the results of separate review processes.

Anticipated Funding Amount: $26,000,000 Pending availability of funds, a minimum of $26,000,000 will be available in FY 2008 for proposals submitted in response to this solicitation.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and colleges: U.S. universities and two- and four-year colleges (including community colleges)
- 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, subject to Grant Proposal Guide (GPG) guidelines.

Proposals that capitalize upon productive intellectual partnerships involving investigators from academe, industry and/or other types of organizations, including international entities, are encouraged. Partnerships between academe and other types of organizations, both foreign and domestic, promise the identification of compelling research challenges, and the more effective transformation of discoveries into innovations that create wealth and other societal impacts. While NSF will consider supporting CDI activities undertaken by SBIR-eligible organizations through subawards, other for-profit entities and international partners must support their participation in CDI projects from other funding sources.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

An individual may participate as Principal Investigator, co-Principal Investigator or Senior Personnel in at most two letters of intent, preliminary proposals, and full proposals in each annual competition. Any individual whose biographical sketch is provided as part of the proposed activity will be considered Senior Personnel in the activity. If a person appears on more than two preliminary or full proposals, all preliminary or full proposals in which that individual is participating will be returned without review.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **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.
  - 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

- **Letter of Intent Due Date(s)** ***(required):***

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- **Full Proposal Submission Window Date(s)** (due by 5:00 p.m. proposer's local time)***:***

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  March 28, 2008 - April 29, 2008

  January 27, 2009 - February 27, 2009

  January 27 - February 27, Annually Thereafter

Proposal Review Information Criteria

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

Award Administration Information

Award Conditions: Standard NSF award conditions apply

Reporting Requirements: Standard NSF reporting requirements apply

TABLE OF CONTENTS

I. INTRODUCTION

Our everyday lives have been transformed by the impact of computation and communication. This impact can be observed in the national economy where information technology has contributed in significant and numerous ways to growth in productivity, and to a plethora of new products and services. For example, advances in computing have led to improvements in healthcare diagnoses, access and delivery, in education where learning is increasingly mediated by information technologies, and in science and engineering where the conduct of research is being revolutionized by an increasingly pervasive and sophisticated cyberinfrastructure. There has also been an impact at a conceptual level. Applying computing to problem-solving has led to, and continues to engender, the development of new ways of conceptualizing, analyzing and solving problems, particularly problems related to complex systems where more traditional research tools afford only limited progress.

Motivated by compelling research challenges across the science and engineering frontier, NSF has been making investments in computational science and engineering research, education, and infrastructure for many years. The potential of an increasingly powerful and functionally-complete cyberinfrastructure to advance science and engineering discovery and learning recently culminated in the creation and initial implementation of the agency's *Cyberinfrastructure Vision for 21st Century Discovery*.

Recognizing that contemporary advances in computational capabilities – most notably algorithms, architectures, data storage, languages, manipulation and visualization, networking, processing power, software systems, and a growing community of experienced computational scientists and engineers – place us on the threshold of a transformation in our understanding of the world around us, NSF has formulated a bold new initiative called Cyber-Enabled Discovery and Innovation (CDI). All NSF directorates and programmatic offices are participating.

II. PROGRAM DESCRIPTION

The Cyber-Enabled Discovery and Innovation (CDI) initiative has been designed to yield *revolutionary* science and engineering research outcomes made possible by innovations and advances in computational thinking. Computational thinking is defined comprehensively to encompass computational concepts, methods, models, algorithms, and tools. Applied in challenging and compelling science and engineering research and education contexts, computational thinking promises a profound impact on the Nation's ability to generate and apply new knowledge. In addition, the challenge of applying computational thinking to very difficult problems in science and engineering will stimulate further advances in computational thinking.

Collectively, CDI research outcomes will produce paradigm shifts in our understanding of a wide range of science and engineering phenomena and socio-technical innovations that create new wealth and enhance the national quality of life. CDI investigators are expected to generate groundbreaking multidisciplinary research and education outcomes across biological sciences, computer and information sciences, education, engineering, geosciences, mathematical sciences, physical sciences, and social, behavioral, and economic sciences. The development and creative use of computational thinking to enable discovery and innovation on all fronts of science and engineering is likely to stimulate advances that collectively accelerate development of an increasingly powerful cyberinfrastructure.

With an emphasis on bold, multidisciplinary activities that, through computational thinking, promise radical, paradigm-changing science and engineering outcomes, CDI is unique within NSF. Accordingly, investigators are encouraged to come together in the development of far-reaching, high-risk research and education agendas that capitalize on innovations in, and/or innovative use of, computational thinking to create new knowledge and societal impact far beyond today's capabilities. CDI projects will build upon productive intellectual partnerships involving investigators from academe, industry and/or other

types of organizations, including international entities.

A **competitive** CDI proposal will:

- Describe an ambitious research and/or education agenda that, through computational thinking, promises paradigm-shifting advances in more than one field of science or engineering;
- Provide a compelling rationale for how innovations in, and/or innovative use of, computational thinking will yield the desired project outcomes; and,
- Draw on productive intellectual partnerships that capitalize upon knowledge and expertise synergies in multiple fields or sub-fields of science or engineering, and/or in multiple types of organizations, including academic, for-profit, and not-for-profit entities, both foreign and domestic.

Projects that make straightforward use of existing computational concepts, methods, models, algorithms, and tools to significantly advance only one field of science or engineering should be submitted to an appropriate NSF program in that field instead of to CDI.

Motivated by transformative science and engineering research opportunities, CDI seeks bold research and education proposals within or across the following three thematic areas:

- **From Data to Knowledge:** *enhancing human cognition and generating new knowledge from a wealth of digital data*

  An abundance of digital data riches promise a profound impact in both the quality and rate of discovery and innovation in science and engineering, as well as in other societal contexts. Worldwide, researchers are producing, accessing, analyzing, integrating and storing massive amounts of digital data daily, through observation, experimentation and simulation, as well as through the creation of collections of digital representations of tangible artifacts and specimens. Modern experimental and observational instruments generate and collect large sets of data of varying types (numerical, video, audio, textual, multi-modal, multi-level, multi-resolution) at increasing speeds. Often, the data users are not the data producers, and they thus face challenges in harnessing data in unforeseen and unplanned ways. In many science or engineering applications, for example, in mesoscale weather prediction or critical infrastructure protection applications, the ability to gather, organize, analyze, model, and visualize large, multi-scale, heterogeneous data sets in rapid fashion is often crucial.

  New methods are required that create knowledge and understanding from an abundance of digital data across the science and engineering frontier, and that accelerate the transformation of knowledge into new products and services that stimulate economic growth as well as other societal benefits. Driven by compelling science and engineering research and education opportunities, new efforts to support the complex tasks of data analysis and discovery must be explored.

  The massive scale and often dynamic nature of science and engineering data dictate that relevant computational technologies be fast, flexible, and capable of operating at multiple levels of abstraction. Data of different types often must be synthesized into a single model that permits an emphasis on data meaning rather than on the forms in which the data were originally represented. Models may dynamically incorporate information via data assimilation and machine learning. Alternative models may be compared in exploratory data analysis. A key component of developing or parameterizing a model is often an inverse problem: deducing system properties and structures, parameter values, or underlying principles from data. Inverse problems are commonly non-unique or in some way ill-posed, so that the data may not determine a unique model, and selection of the best model may require careful optimization. Ultimately, the value of a model depends on the major challenge of validation against "ground truth"; feedbacks between mathematical, computational, and application-domain analyses, each influencing the next step in the others, are vital to real-world insight.

  Analysis of large data sets, both real-time and offline, demands scalable algorithms whose computational complexity grows as slowly as possible with the scale of the data. Research may require the development of novel algorithms that, for example, can discern and exploit parametric, geometric, and topological properties of data, as well as the development of novel data mining and dimension reduction methodologies that can expose the knowledge underlying science and engineering data. Some of the important ways of extracting information from data include data aggregation and annotation, pattern recognition, perturbation and sensitivity analysis, real-time manipulation, filtering and estimation, spectral graph analysis, statistical analysis, and stochastic simulation. New visualization methods can enhance human cognition, allowing scientists, engineers, researchers, educators, and students to detect and comprehend previously indiscernible abstract concepts, patterns, and important exceptions amidst vast data. Approaches informed by knowledge of human cognition and perception can amplify individuals' capability to perceive, understand, synthesize and reason about complex and often dynamic data. In some science and engineering domains, innovative technologies may also need to address the data confidentiality, privacy, security, provenance, and regulatory issues that often impact the use of data.

Ambitious CDI projects in this area will allow investigators to confirm the expected and reveal the unexpected in multiple science or engineering domains. Under this theme, CDI seeks proposals for multidisciplinary efforts focused on the development and evaluation of new approaches to data mining, data federation, knowledge extraction and knowledge representation, and visualization in demanding scientific and engineering applications. New approaches in computational thinking applied in the context of From Data to Knowledge will support collaboration and teamwork, often among people of diverse backgrounds and levels and areas of expertise. Projects should promise to communicate the results of research findings in ways that both deepen and broaden their impact in a wide variety of application domains.

- **Understanding Complexity in Natural, Built, and Social Systems:** *deriving fundamental insights on systems comprising multiple interacting elements*

Identifying general principles and laws that characterize complexity and capture the essence of complex systems is one of the major challenges of 21st century science and engineering. Complex systems are more than just complicated; they display distinct characteristics not encountered in "simple" systems, such as multi-scale interactions, emergent behavior, pattern formation, and self-organization, and they are often inherently stochastic or operate in unpredictable settings. Nonlinear couplings and feedbacks across multiple processes and scales typify these systems. They are not amenable to reductionism; finding constructs that persist through the dynamics is fundamental, and involves a major role for innovative computational experimentation. As well as advancing science and engineering, the understanding of complexity will enable the design, synthesis, and control of novel complex engineered systems. Furthermore, it will facilitate intervention in and analysis of complex natural and social systems. This theme therefore promotes the exploration and modeling of natural interactions, connections, complex relations, and interdependencies, scaling from sub-particles to galaxies, from subcellular to biosphere, and from the individual to the societal, across time, in order to understand, mimic, synthesize, and exploit complex systems.

The functionalities offered by computational thinking allow “experiments” to take place entirely in cyberspace. In many situations, simulation through computation is the only feasible approach to a systematic investigation of realistic complex scientific phenomena, or is essential to the scientific basis for and design of "traditional" experiments. Key challenges include accuracy and resolution, efficiency, perturbation analysis, uncertainty, stochasticity, validation against “ground truth”, long-term dynamics, and predictive modeling. Simulations and computational experiments in mainstream and informal education can engage students and the public in the excitement of scientific and engineering discovery.

Much of the understanding of complexity will come from mathematical and statistical modeling and analysis, based on both theoretical and empirical studies. Mimicking and synthesizing systems will exploit a wide variety of techniques. Complexity often requires advances in numerical methods for differential, algebraic, and discrete systems. Other approaches include agent-based modeling, neural networks, and dynamically interactive human-in-the-loop calculations. An important consideration for large systems is that scalable methods and tools be available in the working environments of scientists, engineers, and STEM educational researchers.

- **Building Virtual Organizations:** *enhancing discovery and innovation by bringing people and resources together across institutional, geographical and cultural boundaries*

A far-reaching computational concept that is finding growing use as a method of promoting innovation in the practice and outcomes of research and education is that of the Virtual Organization (VO). VOs built upon cyberinfrastructure to link teams of people and resources distributed across institutional and geographic boundaries are increasingly essential for science and engineering discovery, learning and innovation. Accordingly, CDI investigators are encouraged to come together in the design, development, and assessment of VOs, integrating different disciplinary perspectives that together advance our ability to build and leverage the computational and organizational potential of VOs as new modalities of scientific and engineering practice. Through support of projects in this theme, multidisciplinary and potentially international research and education teams will create more systematic knowledge about the intertwined social and technical issues of effective VOs, changing both the practice and the outcomes of science and engineering research and education. This effort will result in a more principled understanding of the design and implementation of VOs needed to achieve the flexibility and agility to respond to new and emerging challenges in an increasingly competitive knowledge-based economy. VOs will be explored as a primary vehicle for broadening participation in not just research but also exciting inquiry-based STEM education, with the potential to reach students at all levels and the public at large. VOs are not just about cyberinfrastructure; they are also about the people, i.e., researchers, teachers, and students, using them.

Advances in VOs bring together domain needs with computational thinking, including algorithm development, systems operations, organizational studies, social computing, and interactive design. Unlike traditional “bricks and mortar” research institutions, VOs provide flexible boundaries, memberships, and lifecycles, which can be tailored to particular research problems, users and learner needs or tasks of any community.

With the appropriate science-driven, cyber-based platforms, protocols and applications, VOs may create linkages among facilities, computational tools, databases, and new user partnerships to vastly improve effective utilization of large and expensive experimental tools. Ubiquitous remote access to experimental tools, observational instruments, simulation systems, collaborations, and globally dispersed mentors can overcome traditional institutional boundaries, thus not only blending but expanding both informal and formal research and educational opportunities and experiences.

New definitions of presence through innovative approaches to communication, interaction, and location are needed to create VOs that facilitate discovery and innovation. VOs can be adapted for specific and special needs to increase the participation and collaboration of many underrepresented communities in such networks, including communities with disabilities and communities with diverse linguistic abilities. A key challenge is to extend small collaborations of individual departments or institutions to encompass wide-ranging, globally networked activities, resources, and groups.

Beyond computational, simulation, and visualization skills, 21st century scientists, engineers and technicians working in cyber-enabled environments will need experiential training in new modes of distributed communication, collaboration, and cognition. VOs can provide education and training for novice- to expert-level participants, reaching beyond the classroom to reach the full diversity of the potential workforce and aid its development. In addition, VOs can offer new institutional and conceptual opportunities for formal and informal learning. These new environments will change how teacher and learner roles are constructed, content is delivered, knowledge is produced and performance is assessed, and how the public is engaged in learning and discovery.

All three themes are inter-related. Realistic modeling and accurate, efficient solution of models are becoming possible for ever more complex phenomena, which defy understanding by other means. Such models and increasingly sophisticated scientific observations are described in terms of data of unprecedented scale, from which insight must be extracted through more ingenious techniques than before. Attacking these problems also requires larger organizations, often both geographically dispersed and intellectually diverse; empowerment of such groups is central to this transformation. Accordingly, proposals in one theme, or that cross two or more of the three themes, are encouraged.

In order to realize the full potential of cyber-enabled discovery and innovation, CDI will contribute to the preparation of a workforce trained in computational thinking, with broad participation that ensures inclusion of students and faculty from historically underrepresented populations, minority-serving institutions, and institutions serving students with disabilities. Effective multi-sector or international collaborations will involve true intellectual partnerships in which successful outcomes depend on the unique contributions of all partners. They also engage junior researchers and students in the collaboration, taking advantage of cyber environments to prepare a well-grounded and globally-engaged workforce.

For additional information about CDI, including frequently asked questions, see http://www.nsf.gov/crssprgm/cdi . Examples of motivating science and/or engineering research and education opportunities can also be found there. This list is provided for the purposes of illustration only; it is neither exhaustive, nor indicative of preference regarding research areas.

III. AWARD INFORMATION

Two types of CDI awards will be supported in the first year (FY2008) of CDI:

- Type I awards require efforts up to a level roughly comparable to: summer support for two investigators with complementary expertise; two graduate students; and their collective research needs (e.g. materials, supplies, travel) for three years.
- Type II awards require larger (than Type I) efforts up to a level roughly comparable to: summer support for three investigators with complementary expertise; three graduate students; one or two senior personnel (including post-doctoral researchers and staff); and their collective research needs (e.g. materials, supplies, travel) for four years. The integrative contributions of the Type II team should clearly be greater than the sum of the contributions of each member of the team.

In subsequent years (FY2009 and beyond), subject to availability of funds, funding opportunities will be provided for three classes of projects, Types I and II as defined above, and Type III as defined below:

- Type III awards require the engagement of larger (than Type II) multidisciplinary teams, roughly comparable to multiple senior investigators with complementary expertise, multiple graduate students, several senior personnel, and their collective research needs (e.g. materials, supplies, travel) for up to five years. As for Type II awards, the integrative contributions of the Type III team should be clearly greater than the sum of the contributions of each member of the team.

In FY 2008, the number of Type I and Type II awards will be determined based on the results of separate review processes; there will be no Type III awards. In FY 2009 and beyond, subject to availability of funds, awards of Type I, II and III will be made based on the results of separate review processes.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and colleges: U.S. universities and two- and four-year colleges (including community colleges)
- 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, subject to Grant Proposal Guide (GPG) guidelines.

Proposals that capitalize upon productive intellectual partnerships involving investigators from academe, industry and/or other types of organizations, including international entities, are encouraged. Partnerships between academe and other types of organizations, both foreign and domestic, promise the identification of compelling research challenges, and the more effective transformation of discoveries into innovations that create wealth and other societal impacts. While NSF will consider supporting CDI activities undertaken by SBIR-eligible organizations through subawards, other for-profit entities and international partners must support their participation in CDI projects from other funding sources.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

An individual may participate as Principal Investigator, co-Principal Investigator or Senior Personnel in at most two letters of intent, preliminary proposals, and full proposals in each annual competition. Any individual whose biographical sketch is provided as part of the proposed activity will be considered Senior Personnel in the activity. If a person appears on more than two preliminary or full proposals, all preliminary or full proposals in which that individual is participating will be returned without review.

Additional Eligibility Info:

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent*(required):*

Submission of a Letter of Intent (LoI) is required. LoIs must be submitted via FastLane consistent with the general guidelines described in NSF's Grant Proposal Guide. The receipt of LoIs assists NSF in planning for the review process, including the timely identification and recruitment of appropriate reviewers. Accordingly, investigators are strongly encouraged to provide information that is as accurate as possible.

Only ONE LoI should be submitted for each proposed project. If a collaborative project is being developed, the corresponding investigators should decide which member of the proposing team will submit the LoI. LoIs need not be submitted by Sponsored Project Offices.

To submit an LoI, enter FastLane and click on “Proposals, Awards and Status”. Click on “Proposal Functions” and then “Letters of Intent”. Search for and select the CDI program solicitation. Then click on “Create” under “LOI Action” to prepare and submit your LoI.

A CDI LoI must include text in each of three sections as indicated below.

- Please include a project title that begins with “CDI-Type I:” *or* “CDI-Type II:”, dependent on the type of project being proposed.
- In the Synopsis section (not to exceed 2500 characters), include a summary of the activities being proposed; a list of the PI(s), co-PI(s) and Senior Personnel, and their organizational affiliations; and, provide an estimate of the total project budget.
- In Other Comments, identify the CDI theme (the most relevant, even if the proposed work cuts across more than one), and up to 3 key words from the following list that best describe the major disciplines of the multidisciplinary research and education being proposed: Biology; Education; Computer Science/Information Science; Engineering; Environmental Sciences; Geosciences; Mathematical Sciences; Physical Sciences; Polar Sciences; Social, Behavioral and Economic Sciences, plus, at the project team’s discretion, one key word of the project team’s choosing.

On receipt of the LoI, NSF will respond by providing an LoI ID number. ***Please save this number; you must refer to it when submitting a preliminary proposal.***

Preliminary Proposals*(required):*

Preliminary proposals must be submitted via FastLane and must adhere to the font type and size, as well as margin and spacing requirements, specified for full proposals in NSF’s Grant Proposal Guide.

Preliminary Proposal Preparation Instructions

Cover Sheet: Select the CDI program solicitation number from the Program Announcement/Solicitation pull down menu. Go to the Unit Selection Lists section. Ignore the “Divisions” selection box; ignore the “Select Division” button. Go straight to the “Programs” selection box, and select the most relevant CDI theme, even if the proposal cuts across more than one theme. The theme you choose will be added to the “Current List of selected NSF Units”. Then click “Go Back”, click “Remainder Cover Sheet” to get to that section. Provide a short informative title for the proposed CDI project. To assist NSF staff in sorting preliminary proposals for review, for the FY 2008 competition preliminary proposal titles should begin with “CDI-Type I:” or “CDI-Type II:”. FastLane allows one PI and at most four Co-PIs to be designated. Additional lead personnel should be designated as non co-PI, Senior Personnel. Check the box indicated for preliminary proposal. If your project involves international partners, check the international activities box and list the countries involved.

A. **Project Summary (1-page limit):** At the top of this page enter the title of the CDI project, beginning with “CDI-Type I:” or “CDI-Type II:”, the name of the PI and the lead institution. Provide a summary description of the CDI project, including its transformative research and education goals, and the innovations in, and/or innovative use of, computational thinking being proposed. In separate statements, provide a succinct summary of the intellectual merit and broader impacts of the proposed project. ***Preliminary proposals that do not address the intellectual merit and broader impacts of the proposed project in separate statements will be returned without review.***

B. **Table of Contents**: For all proposals submitted, a Table of Contents is automatically generated and cannot be edited.

C. **Project Description (6-page limit):** The project description contains the following items.

   List of Participants (1-page limit): Include departmental and institution/organization affiliation of all principal investigators and other senior personnel expected to have an important role in the project.

   Description (5-page limit): Describe the scope of the project, including:

   the research and/or education agenda that promises paradigm-shifting advances in more than one field of science or engineering;

   a compelling rationale for how innovations in, and/or innovative use of, computational thinking will yield the desired project outcomes; and,

   a description of the intellectual partnership on which the project is based.

D. **References Cited (1-page limit):** Cite references relevant to the research and education plan.

E. **Biographical Sketches:** A maximum of 10 biographical sketches may be included. Additional individuals may be included in the List of Participants, Section(C).1. Prepare the standard 2-page biographical sketches in accordance with NSF's Grant Proposal Guide. In choosing what to include, emphasize information that will be helpful for understanding the strengths, qualifications, and specific impact each individual brings to the proposed CDI project.

   Current and pending support information is not required for preliminary proposals.

F. **Budget (1-page limit):** The estimated ***total*** project budget and budget justification should be included.

G. **Single copy documents**: ***Preliminary proposals that do not provide the following information will be returned without review.***

   Include a single copy document with the following format: "LOI-*LoI ID number*, PI Last Name, PI First Name, Institution, Project Title".

   Provide the following information in the "List of Personnel, Collaborators and Affiliates" module of FastLane.

   Project Personnel. List all Senior Personnel in the project. A corresponding biographical sketch should be provided in E. above for all individuals included on this list. For each person, provide the last name, first name, and institution/organization.

   Collaborators/Individuals with Conflicts of Interest. Provide the names of all persons, participants and affiliates with potential conflicts of interest as specified in NSF's Grant Proposal Guide. For each member of Senior Personnel, include all co-authors/editors and collaborators (within the past 48 months) and all graduate advisors and advisees. In addition, list all subawardees who would receive funds through the CDI award.

   No other items or appendices are to be included. Information pertaining to "Current and Pending Support", and "Facilities, Equipment and Other Resources" is not required for preliminary proposals and should not be included. ***Preliminary proposals containing items other than those required above will not be reviewed or considered for NSF funding.***

   Following merit review of preliminary proposals, a smaller number of proposers will be invited to submit full proposals. ***Full proposals will be accepted only if invited by NSF. Unsolicited full proposals will be returned without review.***

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 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.

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

Additional Full Proposal Preparation Instructions:

Note that no change in CDI award Type will be permitted between preliminary proposal and full proposal submission. Any deviations from the research team cited in the preliminary proposal, deviations from the scope of the preliminary proposal, or deviations from the preliminary proposal budget by more than 10%, must be approved by NSF prior to full proposal submission.

Coordination Plan (3-page limit, in addition to the usual 15-page limit for project description): Each proposal must contain a coordination plan, which includes 1) the specific roles of the PI, co-PIs, other senior personnel and paid consultants at all institutions involved, 2) how the project will be managed across institutions and disciplines, 3) identification of the specific coordination mechanisms that will enable cross-institution and/or cross-discipline scientific integration (e.g., yearly workshops, graduate student exchange, project meetings at conferences, use of the grid for videoconferences, software repositories, etc.), and 4) pointers to the budget line items that support these coordination mechanisms.

Exclusive of the coordination plan, the project description must be no longer than 15 pages.

B. Budgetary Information

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

C. Due Dates

Letter of Intent Due Date(s) *(required):*

October 30, 2007 - November 30, 2007

August 30, 2008 - September 30, 2008

August 30 - September 30, Annually Thereafter

Preliminary Proposal Due Date(s) *(required)* (due by 5:00 p.m. proposer's local time)***:***

Each preliminary proposal must uniquely correspond to a Letter of Intent - see instructions.

December 07, 2007 - January 08, 2008

October 04, 2008 - November 04, 2008

October 4 - November 4, Annually Thereafter

Full Proposal Submission Window Date(s) (due by 5:00 p.m. proposer's local time)***:***

By invitation only, based on review of preliminary proposal - see instructions.

March 28, 2008 - April 29, 2008

January 27, 2009 - February 27, 2009

January 27 - February 27, Annually Thereafter

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

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

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. 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 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

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?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria:

In responding to the standard NSF review criteria, reviewers will be asked to place emphasis on the following CDI objectives:

The proposal should define a bold multidisciplinary research agenda that, through computational thinking, promises paradigm-shifting outcomes in more than one field of science and engineering. **Projects that make straightforward use of existing computational concepts, methods, models, algorithms and tools to significantly advance only one discipline should be submitted to an appropriate program in that field instead of to CDI.**

The proposal should provide a clear and compelling rationale that describes how innovations in, and/or innovative use of, computational thinking will lead to the desired project outcomes.

The proposal should draw on productive intellectual partnerships that capitalize upon knowledge and expertise synergies in multiple fields or sub-fields in science or engineering and/or in multiple types of organizations.

Reviewers will also be asked to provide an evaluation of whether the proposed project has the potential for extraordinary outcomes, such as, revolutionizing entire disciplines, creating entirely new fields, or disrupting accepted theories and perspectives as a result of taking a fresh, multi-disciplinary approach. Special emphasis will be placed on proposals that promise to enhance competitiveness, innovation, or safety and security in the United States.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by 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

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 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. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from 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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

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

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.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Sirin Tekinay, CISE/CCF, telephone: (703) 292-8080, email: cdi@nsf.gov
- Thomas Russell, MPS/DMS, telephone: (703) 292-8080, email: cdi@nsf.gov
- Eduardo Misawa, ENG/CMMI, telephone: (703) 292-8080, email: cdi@nsf.gov

For questions related to the use of FastLane, contact:

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

For questions relating to Grants.gov contact:

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

  Drs. Tekinay, Russell, and Misawa are being assisted by a multidisciplinary team of Program Officers drawn from throughout NSF. CDI team members include: Kile Baker (GEO/ATM), Charles Bouldin (MPS/DMR), Maria Burka (ENG/CBET), Arlene de Strulle (EHR/DRL), Cheryl Eavey (SBE/SES), Anne Emig (OD/OISE), Anne-Francoise Lamblin (BIO/DBI), D. Terence Langendoen (SBE/BCS), Mary Lou Maher (CISE/IIS), Peter McCartney (BIO/DBI), Barbara Olds (EHR/OAD), Abani Patra (OD/OCI), Wayne Patterson (OD/OISE), Diana Rhoten (OD/OCI), William Wiseman (OD/OPP) and Eva Zanzerkia (GEO/EAR).

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, 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

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

  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

The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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