KDI: Knowledge and Distributed Intelligence in the Information Age

Proposal Solicitation NSF 98-55

- **KNOWLEDGE NETWORKING**
- **LEARNING AND INTELLIGENT SYSTEMS**
- **NEW COMPUTATIONAL CHALLENGES**

DEADLINES:

April 1, 1998:	**Letter of Intent.**
May 11, 1998:	**noon local time, for Knowledge Networking (KN) Full Proposals.**
May 12, 1998:	**noon local time, for New Computational Challenges (NCC) Full Proposals.**
May 13, 1998:	**noon local time, for Learning and Intelligent Systems (LIS) Full Proposals.**

Next proposal deadline will be *February 1, 1999,* Full Proposals

Note: For proposals encompassing more than one KDI component, the deadline is determined by the primary component, indicated by the choice of organizational unit -- KDI/KN, KDI/LIS, KDI/NCC -- at the top of the cover sheet in FastLane.

NATIONAL SCIENCE FOUNDATION

Introduction

The recent growth in computer power and connectivity has changed the face of science and engineering. The future promises continued acceleration of these changes. The challenge today is to build upon the fruits of this revolution.

This rise in power, connectivity, content, and flexibility is so fundamental that it is dramatically reshaping relationships among people and organizations, and quickly transforming our processes of discovery, learning, exploration, cooperation, and communication. It permits us to study vastly more complex systems than was hitherto possible and provides a foundation for rapid advances in understanding of learning and intelligent behavior in living and engineered systems. Today's challenge is to realize the full potential of these new resources and institutional transformations. Knowledge and Distributed Intelligence (KDI) is a Foundation-wide effort designed to catalyze this next step.

Aims of the Knowledge and Distributed Intelligence Activity

NSF aims to achieve, across the scientific and engineering communities, the next generation of human capability to generate, gather, model, and represent more complex and cross-disciplinary scientific data from new sources and at enormously varying scales; to transform this information into knowledge by combining, classifying, and analyzing it in new ways; to deepen our understanding of the cognitive, ethical, educational, legal, and social implications of new types of interactivity; and to collaborate in sharing this knowledge and working together interactively.

The anticipated payoffs of KDI research include:

- Deep, far-reaching scientific discovery
- Increases in scientific productivity, and in the timeliness and quality of the results
- Increased ability to handle problems of greater complexity, scale, and structure
- The creation of new scientific and engineering communities to exploit novel discoveries
- Enhancements in science and engineering education through development of richer learning tools, technologies, and environments, and more universal access to richer resources and tools
- Enhanced understanding of the processes and results of learning and applications thereof
- A more complete understanding of the fundamental processes of distributed intelligence in natural and artificial systems and their application
- An understanding of the legal, ethical, and societal implications of the increased capability to gather and access information
- Enhanced ability to communicate and transfer new understanding and technological innovations to society
- Advances in statistical data reduction, data visualization, data mining, and data organization for retrieval so as to utilize vast stores of data
- Improved methods for expressing, computing with, and evaluating different types of uncertainties in real-world data

Three Foci of KDI: KN, LIS, and NCC

To achieve the aims of KDI, proposals are solicited from individuals or groups for research that is inherently multidisciplinary[*] or that, while lying within a single discipline, has clear impact on at least one other discipline.

In FY 1998, KDI will have three foci: Knowledge Networking (KN); Learning and Intelligent Systems (LIS); and New Computational Challenges (NCC). This document describes the three KDI foci, and serves as a solicitation for proposals in all three areas. We anticipate that research on many important problems will span the foci of KN, LIS, and NCC, and proposals that do so are most welcome.

KN will focus on attaining new levels of knowledge integration, information flow, and interactivity among people, organizations, and communities.

[*] Throughout we will use “multidisciplinary” to include “interdisciplinary” and “cross-disciplinary.”

LIS will emphasize research that advances basic understanding of learning and intelligence in natural and artificial systems and supports the development of tools and environments to test and apply this understanding in real situations.

NCC will emphasize new computational approaches to frontier science and engineering problems as well as problems involving data intensive computations and simulations.

More detailed information about the three foci and their particular emphases for FY 1998 follows.

KNOWLEDGE NETWORKING (KN)

Introduction

Knowledge Networking research aims to build the scientific bases for attaining new levels of interactivity and flow of information and knowledge among people, organizations, and communities. Thus, it will enable scientists, engineers, and other members of society to act in concert to address ever more complex scientific and societal problems.

The goals of Knowledge Networking (KN) are (1) to understand the fundamental processes through which knowledge is created, communicated, validated, and valued in distributed systems of information, both natural and engineered, and (2) to improve the technical, social, educational, and economic performance of knowledge generation and use, collaborative computation, and remote interaction.

KN will support multidisciplinary research on developing and employing the next generation of communication networks, associated information repositories, collaborative technologies, and knowledge management techniques to gather, create, distribute, use, and evaluate knowledge in new and secure ways. This explicitly includes research on the human, behavioral, social, and ethical dimensions of knowledge networking.

The objectives of Knowledge Networking are:

- To enhance communication across disciplines, languages, and cultures

- To improve the processing and integration of knowledge from different sources, domains, and non-text media types

- To increase the effectiveness of teams, organizations, classrooms, or communities that work together across distances or over time

- To deepen understanding of the ethical, legal, and social implications of new developments in connectivity

Proposals should address one or more of these objectives.

Research Emphases for FY 1998

In FY 1998, KN will emphasize three broad areas of knowledge networking: foundational research; prototype development and research; and ethical, social, and behavioral research. These areas are described more fully below. The examples given below are meant to be illustrative, not limiting.

Foundational Research

The foundations for KN require basic research on organizing, distilling, securing, and collectively acting upon information through dynamic distributed processes; methods for building and linking complex data structures, computations, and knowledge processes; and tools for navigating, gathering, and displaying widely scattered and disparate information. These foundations focus on transforming information into knowledge and broadly disseminating that knowledge. The usage of these tools in transforming and disseminating scientific knowledge will depend critically on the participation of scientists and engineers working in the specific knowledge domains of their expertise and on the processes of scientific research in those domains.

Processes and Dynamics of Distributed Intelligence

- Computational aspects of distributed intelligence: dynamic task allocation, interaction, coordination, process and organization representation, collective learning, consistency management, protocol, negotiation

- Cognition by groups, teams, and organizations

- Dynamics, adaptation and evolution of knowledge networks with particular attention paid to the utilization of domain specific knowledge and processes

- Pathologies in large-scale distributed knowledge systems, such as malicious agents, viruses, overload, "knowledge storms"

Managing Heterogeneity and Achieving Interoperability

Computational and organizational foundations for coupling models, knowledge, functionality, and human activities across scientific disciplines and within different branches of individual disciplines, including:

- Managing heterogeneity and interoperability in dimensions such as syntax, semantics, scale, and structure

- Composition of distributed models and activity

- The use of discipline-specific scientific information and processes in the design of knowledge interoperability criteria within and between disciplines

Computational Infrastructure, Tools and Environments

- Secure and efficient network and communications infrastructures for interactivity, including approaches to resource-limited and real-time interactivity

- Security, validation, authentication, and credibility of information

- Large-scale remote data acquisition, distributed data analysis, experiment and sensor control, and simulation; especially interactive and real-time aspects

- Distributed knowledge: sharable ontologies, processes for distributed classification and taxonomy, collaborative knowledge construction, representation and filtering tools, digital libraries and repositories across disciplines and application domains, and translation of representations

Prototype Development and Research

KN requires basic research and the accumulation of experience in creating, using, and understanding the performance of domain-specific prototype knowledge networks.

- Constructing and using working prototypes of domain-specific, multidisciplinary knowledge networks and collaboratories. Of specific interest are prototypes and experiments that are *compatible* across networks and disciplines, *accessible* to outside communities, and *inclusive* of disaggregated or virtual teams and members of very different disciplines

- Studies of the physical, behavioral, and organizational design of knowledge networks and electronic collaborative work environments, including organizational and decision-making processes and problems specific to individual scientific disciplines

- Development of engineering tools and methods for designing, reproducing, and extending knowledge networks

- Empirical studies of knowledge networks as arenas for scientific experimentation, data gathering, analysis, and decision making

Ethical, Social and Behavioral Research on Knowledge Networks

Knowledge networks create new patterns of information flow, interaction, and organization that require basic research into their social, political, ethical, and economic characteristics. Normative and empirical research are needed to address complex problems raised by the new technologies envisioned under KN.

Knowledge Dissemination and Sustainable Use of Knowledge Networks

- Cognitive and social processes of creating, developing, maintaining, and dismantling knowledge networks

- Intellectual property, privacy, confidentiality and credibility of information and of participants in knowledge networks

- Adapting knowledge networks to human needs, preferences, and abilities, including cognitive, cultural, economic, and educational differences in the access, use, and benefit from knowledge networks

Social Integration and Impacts of Knowledge Networking

- New methodologies, metrics, and investigations of the scientific, technical, economic, and human performance capabilities and the social, organizational, and economic impacts of knowledge networks

- Ethical, social, political, legal, and economic processes that influence the creation, use, ownership, and governance of knowledge networks

- Creation, distribution, life course, and other characteristics of "knowledge capital"

LEARNING AND INTELLIGENT SYSTEMS (LIS)

Understanding and Enhancing the Ability to Learn and Create

Introduction

Efforts to understand the nature of learning and intelligence, and the realization of these capacities in the human mind, are among the most fundamental activities of science. The goal of LIS is to stimulate research that will advance and integrate concepts of learning and intelligence emerging from theoretical and experimental work in a variety of disciplines, including education, cognitive science, computer science, neuroscience, engineering, social science, and physical science. Accordingly, LIS encompasses studies of learning and intelligence in a wide range of systems, including (but not limited to) the nervous systems of humans or other animals; networks of computers performing complex computations; robotic devices that interact with their environments; social systems of human or non-human species; and, formal and informal learning situations. LIS also includes research that promotes the development and use of learning technologies across a broad range of fields. Development of new scientific knowledge on learning and intelligent systems, and its creative application to education and learning technologies, are integral parts of this solicitation.

There are two parallel and compelling reasons for focusing on the general area of learning and intelligent systems:

First, there has been a convergence of techniques and ideas addressing questions in cognitive science and behavior of intelligent systems. For example, there has been a growing use of neural networks, pattern recognition, visualization, simulation, nonlinear dynamical systems analysis, and probabilistic and statistical learning theory in these fields. As another example, researchers in many disciplines -- including biochemistry, biophysics, neuroscience, and cognitive science -- are studying how the nervous system changes as a result of experience, at levels ranging from individual synapses, to neural circuits, to brain systems subserving complex perceptual and cognitive functions. Although concepts and methods differ across levels of analysis, a growing integration across levels is creating fruitful theoretical frameworks and rich bodies of data for advancing our understanding of learning and intelligent systems.

Second, as our knowledge and understanding of learning, intelligent systems, and information technologies grows, so does the need to integrate and apply this understanding within a broad social context. Research on associated technologies and systems can and has enabled better understanding of learning and cognition and has led to better classroom practice. Integrating research with prototyping in these critical areas promises rapid advances in both theory and application.

For information regarding proposals funded by LIS in FY 1997 see http://www.ehr.nsf.gov/lis/award97.htm

Research Emphases for FY 1998

The research emphases for LIS in FY 1998 are essentially the same as in FY 1997. Specifically, LIS seeks projects that propose:

1. To identify, investigate, and model the ways natural and artificial systems operate in order to arrive at unifying principles that explain:

- How learning and intelligent behavior occur in humans, in other natural systems, and in artificial systems

- The types of learning tasks and decision making that are best suited for each

- The kinds of information and decisions each characteristically produces or creates

- The impact of interactions among alternative interactive learning environments, social contexts and experiences

2. To enhance the ability of students and researchers to learn and to create by developing a comprehensive set of learning and research tools, methods and technologies that use biological, behavioral, cognitive, linguistic, social, and educational concepts with interactive, collaborative, and multisensory technologies, and are accessible to people with varied abilities, knowledge, and expectations.

3. To further basic research designed to develop fundamental knowledge concerning the nature of learning and intelligence in natural or artificial systems, and to apply such knowledge in a variety of situations such as education, learning technologies, design of robotic devices and smart instrumentation, and networks of computer systems.

NEW COMPUTATIONAL CHALLENGES (NCC)

Introduction

New Computational Challenges (NCC) focuses on research and tools to discover, model, simulate, display, and understand complex systems or complicated phenomena; to control resources or deal with massive volumes of data in real time, particularly distributed resources or data; to represent, predict, and design complex systems; and to understand their behaviors. NCC builds on the success, but broadens the scope, of prior NSF efforts such as the Grand Challenge initiatives.

NCC aims to enable wide scientific collaboration and effective management of complex systems. This will require significant advances in hardware and software to handle multiple representations, scales, and structures; to enable distributed collaboration among disparate communities; and to facilitate real-time interactions and control.

Many phenomena are too complicated to understand in detail from simple observation or by reduction to isolated components and often require the coupling of disciplinary scientists and engineers and those involved in enabling methods and technologies in order to produce new ways to approach previously intractable problems. The very structure of the problem --- its mathematical, logical, or computational form --- may change as scale, level of resolution, or granularity changes. Many important problems require multiple data types, qualitative information, feedback during the computation to steer it, and a variety of numerical and symbolic computations. Advances in raw computing power have outpaced the effectiveness of existing tools and the degree to which they will scale to large numbers of distributed systems. The development of meaningful simulations that combine disparately structured models into new types of simulations is critical. While understanding complex phenomena is obviously important, predicting their behavior and potentially controlling or changing it, and doing so in real time, alter the fundamental nature of the problem and introduce enormous challenges across a broad spectrum of science and engineering research.

Research Emphases for FY 1998

As noted in the introduction, many scientific and engineering problems are encompassed by new challenges in computation. For Fiscal Year 1998, NCC will emphasize only two of these: (1) scientific and engineering problems involving interactions between phenomena at different scales or structures, and (2) problems requiring a dynamic interplay between computations and data. Proposals that address these two problems or that use them to motivate advances in enabling computational technologies are welcome. In subsequent years, the focus of NCC may be broadened to include other computational challenges in addition to the two chosen for emphasis in FY 1998.

- **Problems of Scale and Structure**

Problems involving multiple scales in space or time occur throughout engineering and science. Examples include inferring macroscopic properties of a material from its microstructure; turbulence, which plays a critical role in fluid flows as varied as mixing of fuel and air in combustion engines, airflow around an airplane, and blood flow in the heart; scaling of flow in porous media from the pore level to the field level, which has important applications to oil recovery and environmental issues; and fluid circulation in the oceans and the atmosphere. The brain, a dynamic, highly-connected, multi-level organization, involves both scale and structure.

An overlapping set of complex computational problems are those concerning phenomena that arise from interactions among large numbers of relatively simple objects or elements. Examples include the complex perceptual and cognitive phenomena that arise from interactions among neurons in the brain; the behavior of the immune system in responding to antigens; social behaviors in animals ranging from insects to humans; human economic and social activities; and, the operation of distribution networks such as power grids and communication systems.

- **Interplay Between Computations and Data**

Better understanding of complex phenomena now requires a dynamic interplay between computations and data, often in real time. Most simulations are entirely initial-value in style: guess at a start, compute, see what happens, then change the guess. Simulations that could adapt to intermediate results or changing data would greatly reduce the number of iterations. In addition, some problems require this adaptive interplay for effective solution. These include command-control problems such as air traffic control, dispatch systems, radar and sonar identification, and other recognize-and-respond problems. Resource management and process control problems, especially with time constraints, are also of this kind.

Data-mining problems are of a different nature. Here the idea is to discover "unusual" items in a large dataset. Examples arise in seismology, high-energy physics, astronomy, credit card fraud, and management and protection of networked resources such as databases or computers.

Another kind of problem is combining different kinds of data. There are difficulties in validating data, assessing the effects of individual errors and their combinations, and in representing and visualizing data; practical methods for a multiplicity of large-scale datasets are needed.

Understanding of complex phenomena often depends on mapping different kinds of data against each other. Examples include tracking any time evolution or spatial evolution of phenomena against a spatial database (GIS, satellite and other map data), such as agricultural data, erosion and floods, epidemics, and other ecological/environmental phenomena; and mapping measurements of a behavior against measurements of physiological change, e.g., speech or vision against brain activity.

The examples given in the preceding paragraphs are meant to be illustrative and not limiting.

KDI Review Criteria

All proposals are subject to the guidelines and review criteria described in the newly revised NSF Grant Proposal Guide (GPG), **NSF 98-2**. For a description of NSF program activities, refer to: Guide to Programs, **NSF 97-150**. Single copies of these publications are available at no cost from the NSF Publications Clearinghouse (301) 947-2722, or via E-mail (Internet: pubs@nsf.gov), and they can be found on the NSF Website, http://www.nsf.gov.

The new NSF general review criteria specified in GPG for proposals submitted to NSF after October 1st, 1997 are: (1) What is the intellectual merit of the proposed activity? and (2) What are the broader impacts of the proposed activity? Under these broad criteria, for this solicitation, reviewers, to the extent they are qualified to make judgments, will consider the following questions:

I. Intellectual Merit

- To what extent does the proposed activity suggest and explore creative original concepts?

- What is the potential and general impact of the project on the science being addressed?

- Is there potential multidisciplinary synergism among the various research components? What is the potential multidisciplinary impact of the research?

- How well conceived and organized is the proposed activity?

- What is the potential of the project to make new advances, mobilize new human resources, or lead to fundamental changes in methodology?

- How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.)

- Is there sufficient access to resources needed for the project?

- In the case of group proposals, is there an effective management/leadership plan and what is the evidence that the team can work together?

II. Broader Impacts

- How well does the proposed activity advance discovery and understanding while promoting teaching, training, and learning? Is the training of students and researchers integrated into the project?

- How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?

- To what extent will the proposed activity enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?

- Do the concepts and methodologies being developed have the long term potential for applicability to real world problems including research and development in education?

- How effective are the plans for dissemination of the results across several science and engineering disciplines, educational communities, and/or application groups?

KDI Proposal Submission and Review Process

Who May Submit

Proposals submitted on behalf of individuals or groups in response to this solicitation will be accepted from colleges, universities, and other nonprofit research institutions in the United States. Multi-institutional arrangements are permitted and partnerships with industry are encouraged.

How to Submit

Letter of Intent

To help plan for the review process for KDI proposals, a short electronic message of intent to submit a proposal should be sent prior to **April 1, 1998 to kdiletin@nsf.gov**. The message (at most two pages, in unencoded ASCII text) should indicate as specifically as possible the subject and a short description of the anticipated research, the focus (or foci) you judge to be most closely related to the project (i.e., one or more of KN, LIS, and NCC), and a list of the probable participants and their institutional affiliations.

Proposals

KDI proposals are required to be submitted electronically using the NSF FastLane system for electronic proposal submission and review, available through the World Wide Web on the FastLane Home Page at http://www.fastlane.nsf.gov Instructions for preparing and submitting a standard NSF proposal via FastLane are located at http://www.fastlane.nsf.gov/a1/newstan.htm.

In order to use NSF FastLane to prepare and submit a proposal, you must use a browser that supports multiple buttons and file upload (e.g., Netscape 3.0 and above for Windows, UNIX, or Macintosh). In addition, Adobe Acrobat Reader is needed to view and print forms. Adobe Acrobat Exchange 2.0 or above, Adobe Acrobat Distiller 2.0 or above, or Adobe Acrobat 3.X (which includes Adobe Exchange and Adobe Distiller) is needed for creating PDF files. To access the FastLane Proposal Preparation application, your institution needs to be a registered FastLane institution. A list of registered institutions and the FastLane registration form are located on the FastLane Home Page. To register an organization, authorized organizational representatives must complete the registration form. Once an organization is registered, PINs for individual staff are available from the organization's sponsored projects office.

For questions or problems concerning submitting a KDI proposal via FastLane, please contact a FastLane User Support person at electronic mail: flprop@nsf.gov or phone: (703) 306-1142 (If you reach the automated attendant, please dial extension 4686).

It is advisable to submit your proposal before the day of the deadline to avoid the possibility of encountering a queue.

The submission must follow GPG guidelines, with the following additions and exceptions to the guidelines:

On the cover page you must enter NSF 98-55 as the program solicitation number and you must enter KDI/KN, KDI/LIS, or KDI/NCC, as the NSF organization to consider this proposal. In case the proposal is at the intersection of several KDI foci, choose the primary one and indicate in the Project Description the overlap.

The following makes up the Project Description file to be uploaded to FastLane:

1) Project Summary

2) A project description of up to 15 single-spaced pages. The description should indicate the roles of the senior investigators on the project.

3) For each PI or co-PI, up to 2 additional pages to describe results of prior NSF support focusing only on those results relevant to the proposed project.

4) An additional section, up to 2 pages, that describes and justifies specifically a) the plans for dissemination of the results and b) the institutional commitment as to space and equipment.

5) For projects with a three year budget exceeding $1.0 million (optional for projects with smaller budgets), an additional page describing realistic performance goals for each year.

6) For projects involving more than one university department, or more than one organization, an additional 1-page description of the project management plan. Subcontracts may be used in multi-institutional proposals.

Full proposals must be received at NSF no later than 11.59.59 P.M. EST, May 8, 1998.

A hard copy of NSF Form 1207 (Cover Sheet) with original signatures must be received by 5:00 P.M. EST, May 22, 1998. The Cover Sheet should be sent to the following address:

Proposal Number ___________________
Solicitation No. NSF 98-55
NATIONAL SCIENCE FOUNDATION PPU
4201 WILSON BLVD.
ARLINGTON, VA 22230

All proposals will undergo review by a panel or panels specially constituted for the KDI theme. Ad hoc mail reviews will be employed where additional disciplinary expertise is necessary.

Inquiries

Questions of a general nature regarding KDI (submission, review and award processes, award sizes, general requirements, etc.) should be submitted via e-mail to kdi@nsf.gov. Specific topical questions on one of the three KDI focus areas should be e-mailed to the respective address:

KN: kn@nsf.gov
LIS: lis@nsf.gov
NCC: ncc@nsf.gov

Additional detailed information on KDI in general, as well as KN, LIS, and NCC can be obtained from *http://www.nsf.gov/kdi*. In particular, lists of reports, studies, and workshop proceedings, as well as motivating scientific problems relevant to these foci can be accessed at this website.

Award Information

Under this announcement, NSF solicits proposals for any funding amount up to $1.0 million per year for up to three years, and expects to make grants at a wide variety of award sizes and durations. NSF expects to fund approximately 60 to 75 standard three year research awards under KDI, depending on the quality of submissions and the availability of funds. In exceptional cases, awards for up to five years may be considered if the justification and promise are compelling. All awards will be made as grants subject to specified reporting procedures. Approximately $50 million will be available for KDI in FY 1998.

A second KDI competition will be held in FY 1999, subject to availability of funds. An updated solicitation, which may include revised research emphases or adjustments to submission and review procedures, will be released in advance of this competition.

Grant Administration

Awards made as a result of this announcement are administered in accordance with the terms and conditions of NSF GC-1, "Grant General Conditions," or FDP-III, "Federal Demonstration

Partnership General Terms and Conditions," depending on the grantee organization. Copies of these documents are available at no cost from the NSF Publications Clearinghouse (301) 947-2722, or via e-mail pubs@nsf.gov (Internet). More comprehensive information is contained in the NSF Grant Policy Manual (NSF 95-26, July 1995), for sale through the Superintendent of Documents, Government Printing Office, Washington, DC 20404. The telephone number at GPO is (202) 783-3238 for subscription information.

Reporting Requirements

Upon completion of the project, a Final Project Report (NSF Form 98A), including Part IV Summary, will be required. NSF will send the form with Part I information preprinted to the Principal Investigator (Project Director) approximately one month prior to the grant's expiration date. Applicants should review the sample form in the GPG prior to proposal submission so that appropriate tracking mechanisms are included in the proposal plan to ensure that complete information will be available at the conclusion of the project.

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

Additional Information

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research related programs and activities described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Privacy Act and Public Burden. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate programs. See Systems of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995). Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Gail McHenry, Reports Clearance Officer, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial (703) 306-0090; for FIRS, 1-800-877-8339.

CFDA: CFDA #47.041, 47.049, 47.050, 47.070, 47.074, 47.075, 47.076, 47.078

OMB: 3145-0058
P.T.: 04, 18, 35, 36, 38
KW.: 0414007, 0503000, 0607004, 0607070,
0706000, 0710015, 404000, 410000, 414000,
1002030, 1004000, 1010000, 1016000

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