

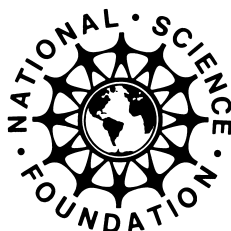
LARGE SCIENTIFIC AND SOFTWARE DATA SET VISUALIZATION

Program Announcement
NSF 99-105

DEADLINE DATE: JULY 6, 1999



NATIONAL SCIENCE FOUNDATION



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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Name: Large Scientific and Software Data Set Visualization

Short Description/Synopsis of Program:

This program will support research to improve our ability to understand large data sets, simulation results, and software systems. It encourages use of these improved methods on data sets from experiments and simulations of real scientific interest and on large software systems.

This initiative focuses on two specific areas.

1. Very large visualizations. The overall goal is to develop general, extensible methods that enable understanding of very large (multi-gigabyte to terabyte) data sets from simulations, experiments, and data collections from the natural and social world. Subtopics of particular interest include interactive exploration of very large data sets; processing and presentation of real-time data from high-bandwidth sources; access and visualization of distributed data sets; extraction of features and behaviors, including uncertainty, for study; and building scalable software systems for visualization. Applicants should have at least 100 gigabytes of data or simulation output available for visualization.
2. Visualization as a tool for assisting software robustness and usability. The overall goal is to provide new techniques and tools for program understanding and development. Subtopics of particular interest include on-line and *a posteriori* visualization of program state; performance measurement and visualization; new depictions of program behaviors; and use of visualization in program development, debugging, and performance analysis. Applicants should be doing research work in graphical programming tools and similar topics.

Investigators for the very large visualization portion of this program should have a demonstrated history of successful cooperative work and research progress in the area of information visualization. Investigators on the software visualization thrust should have experience working with users of programming tools. Innovative educational applications of visualization tools and techniques to convey more effectively than is presently possible the understanding of complex systems and processes would be welcome, but not required.

Cognizant Program Officer(s):

Computer and Information Science and Engineering (CISE): Dr. Charles Koelbel, Room 1122, Division of Advanced Computational Infrastructure and Research, 703-306-1962, ckoelbel@nsf.gov

Biological Sciences (BIO): Dr. Paul Gilna, Room 615, Division of Biological Infrastructure, 703-306-1469, pgilna@nsf.gov

Engineering (ENG): Dr. Clifford Astill, Room 545, Division of Civil and Mechanical Structures, 703-306-1361, castill@nsf.gov

Geosciences (GEO): Dr. Clifford Jacobs, Room 775, Division of Atmospheric Sciences, 703-306-1521, cjacobs@nsf.gov

Mathematical & Physical Sciences (MPS): Dr. James Rosenberger, Room 1025, Division of Mathematical Sciences, 703-306-1883, jrosenbe@nsf.gov

Social, Behavioral and Economic Sciences (SBE): Dr. Mark Weiss, Room 995, Division of Social, Behavioral and Economic Research, 703-306-1758, mweiss@nsf.gov.

Applicable Catalog of Federal Domestic Assistance (CFDA) No.: 47.070, 47.074, 47.041, 47.050, 47.049, 47.075

ELIGIBILITY

- ◆ Limitation on the categories of organizations that are eligible to submit proposals:

Proposals may be submitted only by U.S. universities and U.S. non-profit research institutions not part of the United States government on behalf of individual investigators or small groups of investigators.

- ◆ PI eligibility limitations: **None**
- ◆ Limitation on the number of proposals that may be submitted by an organization:

Only one proposal may be submitted by a Principal Investigator and he/she may only collaborate in one other proposal as a co-Investigator.

AWARD INFORMATION

- ◆ Type of award anticipated: **3-year Standard Grant**
- ◆ Number of awards anticipated in FY 99: **12-18 awards**
- ◆ Amount of funds available: **Approximately \$10 million will be available in FY 1999**
- ◆ Anticipated date of award: **September 1999**

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

- ◆ **Proposal Preparation Instructions**
 - Letter of Intent requirements: **None**
 - Preproposal requirements: **None**
 - Proposal preparation instructions: **Standard NSF Grant Proposal Guide instructions**
 - Supplemental proposal preparation instructions: **None**
 - Deviations from standard (GPG) proposal preparation instructions: **None**
- ◆ **Budgetary Information**
 - Cost sharing/matching requirements: **None**
 - Indirect cost (F&A) limitations: **None**
 - Other budgetary limitations: **None**
- ◆ **FastLane Requirements**
 - FastLane proposal preparation requirements: **FastLane use optional**
 - FastLane point of contact: **Lillian Ellis, phone 703-306-1970, e-mail lellis@nsf.gov or Nicola Bell, phone 703-306-1927, e-mail nbell@nsf.gov.**

◆ **Deadline/Target Dates**

- Full Proposal Deadline **July 6, 1999**

PROPOSAL REVIEW INFORMATION

- ◆ Merit Review Criteria: **Standard National Science Board approved criteria**

AWARD ADMINISTRATION INFORMATION

- ◆ Grant Award Conditions: **Grant General Conditions (GC-1) or Federal Demonstration Partnership III (FDP-III)**
- ◆ Special grant conditions anticipated: **None anticipated**
- ◆ Special reporting requirements anticipated: **None**

INTRODUCTION

The National Science Foundation (NSF) announces a research initiative on large-scale visualization for scientific data sets and for assisting software development. The term "visualization" in this context is not restricted to the creation of graphical screen displays. The presentation of information to the ears, or the fingers, or even the nose, may be appropriate; researchers should be creative as to the best way to enable human beings to appreciate the information on their display. Fundamental studies quantifying the advantages and disadvantages of these methods for conveying information to the user will also be considered. The goal of the research should be to enable effective understanding of large and complex data sets.

Despite enormous scientific advances in the past few decades, the difficulty of handling and understanding massive amounts of data still hampers scientific progress. Similarly, the lack of good methods for summarizing and understanding program behavior retards software development. Scientific visualization has been remarkably effective in providing this understanding in the past. As the recent President's Information Technology Advisory Committee draft report (<http://www.hpcc.gov/ac/>) says, "The spectacular advances in computing power and new display technologies can provide a deeper understanding of information and data."

However, traditional methods are reaching their limits; as the same report notes, "major improvements must be made to ... user interfaces to computing systems and electronically represented information...". Application of relatively new technologies such as multi-resolution imaging and hardware geometry calculation are not enough to solve the next generation of visualization problems. We need innovative approaches and fundamental breakthroughs to ensure continued progress. Mathematical, statistical, and other methodologies for finding or testing coherent patterns in large sets of data are important, as well as computer science technologies for displaying those patterns.

In addition to advancing the state of the art in computational science, this program will enable research in other sciences. In particular, multidisciplinary teams are highly encouraged in this program. For example, a computer science group might team with groups from the biological sciences to produce visualizations of biodiversity in a geographic area. A team from applied mathematics, statistics, and economics might present and analyze images of capital flows on Wall Street. A team from computer science, biology, and engineering might focus on visualizations of parts interaction in an artificial limb design. During severe weather situations, improved forecast accuracy would have societal payoffs if weather forecasters could visualize, in real time, massive amounts of observed and model simulation data. While we hope that similar visualization techniques will apply to a variety of problems, we also recognize the importance of applying those techniques to real situations and the need for specialized techniques in some circumstances.

PROGRAM DESCRIPTION

In spite of enormous advances of computer hardware and data processing techniques in recent decades, the amazing and still little-understood ability of human beings to "see the big picture" and "know where to look" when presented with visual data is still well beyond the computer's analytic skills. This fact underscores the importance of data visualization, and hence of this program.

Computer graphics and visualization is an active research area with applications to many parts of computer and computational science and engineering. Graphics algorithms are both interesting in their own right and useful as tools for other disciplines. Scientific visualization both presents the results of large-scale simulations and relies on numerical, symbolic, and geometric algorithms. Handling and efficiently moving image data is a challenging technical problem, which is closely related to manipulating other types of data. This interaction between the visualization and the application research will continue and expand. Many scientific and engineering areas are now seeing a major swing from experiments to simulation and modeling. Visualization is essential for making the results of these enormous calculations accessible to the users. Meanwhile, increasingly large and elaborate experiments, high-bandwidth remote sensing equipment, and merging of smaller data sets is producing data collections of unprecedented size. For example, a century-long high-resolution climate model simulating the atmospheric, ocean, cryosphere, and biosphere will produce data sets of nearly a terabyte in the aggregate. Even a single-disciplinary simulation like turbulence modeling can produce gigantic data sets, such as a CFD turbulence study on a large structured mesh or a molecular dynamics simulation with many time steps. Summarization and visualization is required to understand such masses of information. Our ability to develop reliable software is hindered by our

inability to understand large software systems. The ability to visualize the behavior of such systems can help reduce software fragility. New visualization techniques can also help with problems such as computer access for those with limited sight or those who can not devote full attention to the interface screen. Moreover, the processes of generating, merging, and representing data introduce uncertainty and error. Examples include lossy compression, measurement errors, and discrete approximations of continuous phenomena. The representation and visualization of uncertainty due to data quality or model inadequacy is a critical need.

Past advances in visualization research have been critical for both scientific progress and societal impact. For example, the invention of the geometry-engine approach to object drawing has stimulated a substantial industry in graphic hardware and permitted high-quality simulations for training staff in both the economy in general and the military services in particular. Discoveries in multi-resolution algorithms have dramatically improved our methods for calculating with and understanding many kinds of data. In addition, the insight that produced algorithm visualization (such as the visualization of sorting algorithms) helps with education throughout the computer science community. Other areas of research have also contributed to the methods available: for example, the dot-plot technique from biology has been applied to software analysis. The visualization community has been the source of some of the most insightful and innovative computational ideas of the past few decades.

Nevertheless, critical national progress in the use of large databases and large modeling calculations is blocked by our lack of knowledge on how to best display the results from searching enormous data sets, exploring high-dimensional data, or evaluating big simulations. This affects applications as varied as searching the human genome database or simulating combustion in gasoline engines. They include large scale and high-precision climate modeling, mechanical design of devices as diverse as airplane wings and nanorobots, astronomical models, brain mapping from neuroimaging data sets, mining warehouses of economic data, and biological molecule understanding. Nor is the problem limited to the physical, biological, and social sciences. A constant complaint of software developers is that the complexity of modern programs is overwhelming, particularly when combined with the complexity of modern parallel hardware where the programs run. Even the display of high-dimensional data is not at a satisfactory stage. Such data are common in economics and the social and behavioral sciences as well as in other sciences. In all cases, the limiting factor is human understanding of massive amounts of data.

A variety of computer and computational science research advances is needed to help with these national goals. In some areas, industrial progress is helping; in fact, the most advanced visualizations today are probably in the entertainment industry, but few of these are relevant to scientific and engineering needs. However, industry is providing higher-resolution and lighter display techniques, as well as virtual reality devices. More important for NSF are modeling the behavior of the systems we need to visualize and providing interactive control of the visualization process. We need better algorithms, able to do 3-D and time-varying visualizations acceptably fast on many new problems; algorithms for summarizing and extracting data from large data sets or results of calculations; methods to represent and visualize uncertainty and to combine and display data or calculations having different uncertainties; algorithms to manipulate and visualize high-dimensional data; and the software tools and languages needed to make programming of visualizations easier.

Research topics in this area include modeling complex systems, understanding human perceptual abilities, implementing elements of intelligent design, extracting scientific features from very large data sets, and distinguishing real features from artifacts. The continued rise in computer speeds and the explosion in the use of remote sensing have presented new opportunities and challenges in displaying data. As the number of data points to be displayed far exceeds anything the human eye can individually recognize, we need new methods of analyzing and selecting what is to be shown and how. We also need to exploit the new high-bandwidth networks to permit people to view immense amounts of data remotely.

There are two specific themes to be supported by this program:

1. Very large visualizations. The overall goal is to develop general, extensible methods that enable understanding of very large (multi-gigabyte to terabyte) data sets from simulations, experiments, and data collections from the natural and social world. Subtopics of particular interest include interactive exploration of very large data sets; processing and presentation of real-time data from high-bandwidth sources; access and visualization of distributed data sets; extraction of features and behaviors for study, including uncertainty; and building scalable

software systems for visualization. Applicants should have at least 100 gigabytes of data or simulation output available for visualization.

2. Visualization as a tool for assisting software robustness and usability. The overall goal is to provide new techniques and tools for program understanding and development. Subtopics of particular interest include on-line and a posteriori visualization of program state; performance measurement and visualization; new depictions of program behaviors; and use of visualization in program development, debugging, and performance analysis. Proposals should include research in graphical programming tools and similar topics.

Investigator teams for the very large visualization portion of this program should include members with a demonstrated history of successful cooperative work and research progress in the area of information visualization. Investigators on the software visualization thrust should have experience working with users of programming tools. In any case, the investigators should have strong ties to users of the visualized data.

Although use of FastLane is not mandatory, it is highly encouraged. Because of the nature of this announcement, many PIs may want to submit color images, animations, or audio clips as part of their proposal. This can be done in conjunction with a FastLane proposal in two ways:

1. Inclusion of the graphics in the proposal's PDF file. If this is used, the image must be printable on a color laser or ink-jet printer of 600dpi resolution. (This method can only be used to submit static images.)
2. Putting the files on a related web or FTP site. If this is used, the body of the proposal must clearly indicate the URL where the files can be obtained. Note that, since the proposal may be read in hardcopy form, clickable hyperlinks are not sufficient—the URL must (also) appear in text form. Standard formats such as GIF, JPEG, MPEG, and WAV should be used for the files.

Ancillary material such as videotapes, CDs, or audio tapes *are not* allowed and will not be sent to reviewers.

ELIGIBILITY

Proposals may be submitted only by U.S. universities and U.S. non-profit research institutions not part of the United States government on behalf of individual investigators or small groups of investigators. Synergistic collaboration among researchers and collaboration or partnerships with industry or government laboratories is encouraged when appropriate. A Principal Investigator may submit only one proposal and he/she may collaborate in at most one other proposal as a co-Investigator. Proposals involving more than one institution must be submitted as a single administration package from one of the institutions involved. Due to the limited availability of funds, prospective applicants are strongly urged to contact one of the program officers listed in this document for guidance.

AWARD INFORMATION

NSF expects to make awards for performance over a period of 3 years. NSF expects the sizes of awards to range from \$125K/year to \$1M/year, depending on team size and scope of work.

Awards are expected to be made in September 1999.

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions.

Proposals submitted in response to this program announcement should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide* (GPG), NSF 99-2. The complete text of the GPG (including electronic forms) is available electronically on the NSF Web site at: <<http://www.nsf.gov/>>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

Proposers are reminded to identify the program announcement number (NSF 99-105) in the program announcement/solicitation block on the NSF Form 1207, "*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.

B. Proposal Due Dates.

For paper submission of proposals, the paper copies of the proposal **MUST** be received by 5:00 PM, ET, July 6, 1999. Copies of the proposal must be made and submitted to NSF according to the normal procedures for paper proposals identified in the GPG.

For electronic submission of proposals via FastLane, the proposal **MUST** be submitted by 5:00 PM, ET, July 6, 1999. Copies of the signed proposal cover sheet must be submitted in accordance with the instructions identified below.

Submission of Signed Cover Sheets. For proposals submitted electronically via the NSF FastLane Project, the signed proposal Cover Sheet (NSF Form 1207) should be forwarded to the following address and received by NSF by July 13, 1999:

National Science Foundation
DIS – Fastlane Cover Sheet
4201 Wilson Blvd.
Arlington, VA 22230

A proposal may not be processed until the complete proposal (including signed Cover Sheet) has been received by NSF.

C. FastLane Requirements.

The NSF FastLane system is available for electronic preparation and submission of a proposal through the Web at the FastLane Web site at <<http://www.fastlane.nsf.gov>>. The Sponsored Research Office (SRO or equivalent) must provide a FastLane Personal Identification Number (PIN) to each Principal Investigator (PI) to gain access to the FastLane "Proposal Preparation" application. PIs that have not submitted a proposal to NSF in the past must contact their SRO to be added to the NSF PI database. This should be done as soon as the decision to prepare a proposal is made.

In order to use NSF FastLane to prepare and submit a proposal, the following are required:

Browser (must support multiple buttons and file upload)

- Netscape 3.0 or greater
- Microsoft Internet Explorer 4.01 or greater

PDF Reader (needed to view/print forms)

- Adobe Reader 3.0 or greater

PDF Generator (needed to create project description)

- Adobe Acrobat 3.01 or greater
- Aladdin Ghostscript 5.10 or greater

A list of registered institutions and the FastLane registration form are located on the FastLane Web page.

For paper submission of proposals, the delivery address **must clearly identify the NSF announcement or solicitation number** under which the proposal is being submitted.

For electronic submission of proposals, the cover page should identify the **DIV of ADVANCED COMPUT INFRA & RESEARCH** as the organizational unit to receive the proposal. This can be done by clicking the "Add Organizational Unit" button, which can be found on the Cover Sheet Screen within the FastLane Proposal Preparation Module, and selecting the item from the pull-down menu.

PROPOSAL REVIEW INFORMATION

A. Merit Review Criteria.

Review of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program officers charged with the oversight of the review process. NSF invites the proposer to suggest at the time of submission, the names of appropriate or inappropriate reviewers. Special care is taken to ensure that reviewers have no immediate and obvious conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority serving institutions, adjacent disciplines to that principally addressed in the proposal, etc.

Proposals will be reviewed against the following general merit review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

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 learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Integrating Diversity into NSF Program, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- are 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. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

B. Merit Review Process.

Most of the proposals submitted to NSF are reviewed by mail review, panel review, or some combination of mail and panel review. These proposals will be reviewed by a combination of mail and panel reviews.

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Reviewers will be asked to formulate a recommendation to either support or decline each proposal. A program officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. In most cases, proposers will be contacted by the program officer after his or her recommendation to award or decline funding has been approved by his or her supervisor, the division director. This informal notification is not a guarantee of an eventual award. NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals in this category. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used by the program. The interval ends when the division director accepts the program officer's recommendation.

In all cases, after final programmatic approval has been obtained, the recommendation then goes 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 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 an 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 Officer does so at its own risk.

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 Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator.

B. Grant Award Conditions.

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant 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 grant conditions, such as Grant General Conditions (NSF GC-1)* or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

* These documents may be accessed electronically on NSF's Web site at: <<http://www.nsf.gov/>>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The GPM may be ordered through the GPO Web site at: <<http://www.gpo.gov/>>.

C. Reporting Requirements.

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after expiration of a grant, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented a new electronic project reporting system, available through FastLane, which permits electronic submission and updating of project reports, including information on: project participants (individual and organizational); activities and findings; publications; and, other specific products and contributions. Reports will continue to be required annually and after the expiration of the grant, but PIs will not need to re-enter information previously provided, either with the proposal or in earlier updates using the electronic system.

Effective October 1, 1998, PIs are required to use the new reporting format for annual and final project reports. PIs are strongly encouraged to submit reports electronically via FastLane. For those PIs who cannot access FastLane, paper copies of the new report formats may be obtained from the NSF Clearinghouse as specified above. NSF expects to require electronic submission of all annual and final project reports via FastLane beginning in October, 1999.

D. New Awardee Information.

If the submitting organization has never received an NSF award, it is recommended that the organization's appropriate administrative officials become familiar with the policies and procedures in the NSF *Grant Policy Manual* which are applicable to most NSF awards. The "Prospective New Awardee Guide" (NSF 97-100) includes information on: Administration and Management Information; Accounting System Requirements and Auditing Information; and Payments to Organizations with Awards. This information will assist an organization in preparing documents that NSF requires to conduct administrative and financial reviews of an organization. The guide also serves as a means of highlighting the accountability requirements associated with Federal awards. This document is available electronically on NSF's Web site at: <<http://www.nsf.gov/cgi-bin/getpub?nsf97100>>.

CONTACTS FOR ADDITIONAL INFORMATION

General inquiries should be made to the **Large Scientific and Software Data Set Visualization Program**, preferably by e-mail to pd_largedata@nsf.gov. General inquiries can also be made to any of the cognizant program officers listed above. Questions related to use of FastLane, contact Lillian Ellis, Administrative Officer, telephone 703-306-1970, e-mail lellis@nsf.gov or Nicola Bell, Program Assistant, telephone 703-306-1927, e-mail nbell@nsf.gov.

OTHER PROGRAMS OF INTEREST

The NSF Guide to Programs is a compilation of funding opportunities for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter. Beginning in fiscal year 1999, the NSF Guide to Programs only will be available electronically. Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG.

Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF Bulletin, available electronically on the NSF Web site at: <<http://www.nsf.gov/home/ebulletin>>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. 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 subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

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

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 regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

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; 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 review process; to applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of 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 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.

YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at <http://www.nsf.gov/oirm/y2k/start.htm> .

OMB# 3145-0058

NSF 99-105 Electronic Dissemination Only

CFDA# 47.070, 47.074, 47.041, 47.050, 47.049, 47.075