Theoretical Foundations 2007 (TF07)

Program Solicitation
NSF 07-525

Replaces Document(s):
NSF 06-542

National Science Foundation

Directorate for Computer & Information Science & Engineering
Division of Computing and Communication Foundations

Submission Window Date(s):

January 19, 2007 - February 19, 2007

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.

The following sections have undergone extensive revision:

Synopsis of Program, SECTIONS I. INTRODUCTION AND II. PROGRAM DESCRIPTION.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Theoretical Foundations (TF07)
Program Solicitation

Synopsis of Program:

One of the defining features of the new CISE organization is the introduction of *clusters*; cohesive units formed by combining several (partial) programs that share a common theme and/or have significant overlap.

The TF cluster is broadly concerned with problems of information processing that fall within the extremes of purely theoretical studies and applications within disciplines. Research and education projects sponsored by the cluster bring advanced capabilities from computer science, scientific computing, communication theory, signal processing theory, numerical/geometrical/symbolic modeling/analysis and optimization theories and techniques, mathematics, and application areas to bear on fundamental problems throughout science and engineering.

The TF cluster encompasses the research areas covered by the former programs: communications research, numeric symbolic graphic computation, signal processing, and theory of computing. For the foreseeable future, TF will continue to encourage the submission of proposals from the research communities that were served formerly by these programs. The cluster also encourages investigators to include in their proposals innovative curricula or educational materials to help advance the training of new experts in the cognate areas served by TF.

Cognizant Program Officer(s):

- John H. Cozzens, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: jcozzens@nsf.gov
- Robert Grafton, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: rgrafton@nsf.gov
- Eun Park, Program Director, 1115 N, telephone: (703) 292-8910, email: epark@nsf.gov
- William Steiger, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: wsteiger@nsf.gov
- Sirin Tekinay, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: stekinay@nsf.gov

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 60 to 75

Approximately 15 small awards at $60,000/year or less will be made. For example, projects by new faculty may require NSF support for only one student or for summer salary. Most small awards will go to (or preference will be given to) PI's who have not previously been a PI or coPI on an NSF award.

Up to 55 awards will be made with an average grant size of $125,000/year for durations up to three years.

Up to 5 awards of up to $500,000/year for well-integrated projects of larger scope are anticipated.

Anticipated Funding Amount: $30,000,000 for awards made in this competition, contingent upon the availability of funds.

Eligibility Information

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

An investigator may participate as PI, co-PI or Senior Personnel in at most one proposal in response to this solicitation.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - 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

- **Submission Window Date(s):**

  January 19, 2007 - February 19, 2007

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria apply.

Award Administration Information

Award Conditions: Standard NSF award conditions apply

Reporting Requirements: Standard NSF reporting requirements apply

TABLE OF CONTENTS

I. INTRODUCTION

The Theoretical Foundations (TF) cluster supports basic research into the central issues underlying information science and technology. The cluster is broadly concerned with problems and questions that range from purely theoretical studies, on the one hand, to applications within various fields of science and technology, on the other. Projects sponsored by TF bring to bear advanced capabilities from Computer Science and other disciplines, in the study of fundamental problems throughout science and engineering.

II. PROGRAM DESCRIPTION

The TF cluster comprises six disciplinary areas: Communications; Numerical Computing and Optimization; Computational Geometry; Symbolic and Algebraic Computation; Signal Processing; and, the Theory of Computing. It supports research and education within the purview of these areas, as described below, as well as activities that bridge the boundaries.

The cluster emphasizes the integration of research and education in all areas of interest. Principal investigators range from researchers beginning their careers, to teams of senior investigators working on novel directions within a multi-disciplinary mode. Collaborations between computer scientists, engineers, mathematicians, statisticians, and other scientists are welcomed because they have the potential to strengthen the foundations of Computer Science and Engineering.

Communications Research:

The cluster seeks advances in theory and techniques, as well as supporting software and hardware, for the efficient representation, transmission and reception of digital and analog information over a variety of channels (e.g., wireline, mobile multi-antenna wireless, optical, and biological channels.) Topics of interest include:

- *Core theory:* contributions in communication theory, information theory. Impact of mobility, and traffic. Capacity and performance of communication systems. Non-traditional noise models. Network coding, multiuser coding, source and channel coding. Modulation and coding techniques exploiting the time, frequency and spatial dimensions of channels. MIMO channels, multiuser communications. Cryptology. Quantum information and communications.

- *Fundamental algorithms:* Multicast, broadcast, geocast techniques. Communication algorithms working across network layers.
- *Applications:* based on new theoretical foundations, Wireless communications. Efficient transceiver design. Multi-sensory input to the wireless and mobile communication systems. Distributed sensor systems and networks. Cooperative communications.

Fundamental research efforts should aim at re-defining the reference framework for communications, in addition to cross layer research.

Theory of Computing:

Theoretical Computer Science is about understanding the nature of computation - its inherent power and its limitations. "Computation" is meant in a broad sense to include mathematical models of computation, human-designed computing on real computers, and what might be called natural computing, that is, computing occurring in nature or inspired by natural processes. A central set of issues involves the development of tools, techniques, and paradigms for efficient computation.

Specific areas of interest include but are not limited to: design and analysis of algorithms (probabilistic, approximation, sublinear, parallel/distributed, on-line, etc.); data-structures; computational complexity; randomness and derandomization; cryptography; discrete and computational geometry; games, economics, and auctions; combinatorics, combinatorial optimization, algorithmic graph theory; computational learning theory; logic and formal methods; quantum computation; networks and the theory of network computation; computational biology; coding and information.

Work in the theory of computing that is directed towards applications in other areas of Computer Science, or in other areas of science, is welcome. This is the case especially when the application necessitates the development of new theory.

Numerical Computing and Optimization:

The TF cluster encourages the study of advanced algorithmic and computational techniques, as well as the development of basic mathematical tools and methods. The cluster supports the development of advanced methods for design and analysis of numerical algorithms, and for modeling and simulating physical processes. To support computational science in applications throughout various disciplines of Science and Engineering, the cluster encourages work that integrates numerical computing and optimization into problem-solving environments. This includes design and construction of high quality computing software for scientific research and experimentation.

Specific research topics of interest include, but are not limited to, the following: numerical linear algebra; linear and non-linear optimization; modeling and simulation of complex processes; numerical solutions of differential equations and PDE's. Research in numerical computing and optimization has natural interdisciplinary applications. In fact, the cluster seeks applications in Science and Engineering whose basic problems actually require the development of new numerical and optimization methods.

Computational Geometry:

The discipline of Computational Geometry (CG) grew out of the need to solve problems such as motion planning, design of 3D objects and assessment of information in large databases. New research in the area includes foundational work including the design and analysis of new geometrical algorithms, as well as the creation of software and tools for doing geometric computations.

A cluster interest is in the "geometry of data" that is, finding CG techniques that will assist in exploring, segregating, analyzing, assessing and viewing data. This could involve using deep mathematical ideas to develop new ideas and directions in CG. Another interest stems from the practical need for CG techniques to manage large-scale, distributed, networked, spatial-temporal geometric data that is acquired at a high rate. Applications that may motivate advances in computational geometry fundamentals include, for example, graphics, visualization, information systems, robotics, engineering design, molecular biology, astrophysics, and medicine.

Symbolic and Algebraic Computation:

The field's genesis is in the early symbolic manipulation programs (e.g. Project MAC at MIT.) Now the intellectual work necessary to advance the field requires deep exploration at the intersection of Computer Science and Mathematics. Research is aimed at finding powerful methods for symbolically solving algebraic - numeric systems that combine differential, integral and polynomial equations. The cluster interest includes foundational research in algorithms and their efficient execution. Basic research topics include: computational algebra and analysis, computational number theory and algebraic geometry, integration of numeric and symbolic techniques, symbolic scientific applications and software. Fruitful application

areas for symbolic computation include: cryptography, optimization, and the solution of complex equation sets.

Signal Processing Systems:

The cluster supports basic research in signal processing algorithms, and supporting software and hardware systems that will continue to maintain Signal Processing as an enabling technology for information systems and as a catalyst for new technological and theoretical innovations. Specific research topics of interest include, *but are not limited to*, the following: sampling/representation, compression and enhancement of both one dimensional and multidimensional spatio-temporal data; statistical signal and array processing; multimedia and multimodal signal processing precipitated by the needs of surveillance as well as the entertainment industry; signal processing for wireless communications; collaborative/distributed signal processing for sensor networks and other distributed systems; novel biometric signal/image processing methodologies for national security; signal processing for biomedical applications; signal processing methods inspired by fundamental biological processes including sequencing as well as cellular communication. The cluster also supports research in new paradigms that enlarge its scope from the domain of linear to the realm of nonlinear – from linear algebra to algebra, from Euclidean to curved spaces, from uniformly to highly non-uniformly time and space sampled processes, to signal processing on graphs; research that will develop efficient power aware and hardware-friendly algorithms; and, research on signal processing algorithms for the new network science of distributed, decentralized, and cooperative algorithms that avoid global communications.

The cluster is particularly interested in complex systems arising from the rapid deployment of optical fiber and recent advances in biology. Examples include exciting new applications from the “Glass-Wired World”: signal processing at the Interface that allows humans to effectively process information – virtual and enhanced reality, telepresence, a fresh look at speech and vision; to monitoring the Nation’s Critical Infrastructures, which entails signal representation, fusion, anomaly detection, distributed information processing in a networked environment (in the latter domain, emphasis will be on signal processing aspects rather than the network aspects). These scenarios may lead to revisiting many old questions but now in new contexts with new constraints and new challenges to Signal Processing researchers.

Cross-Cluster Activities and Beyond:

The TF cluster strongly encourages proposals that transcend the confines of each of the areas delineated above and of other CISE clusters. For example, Computational Geometry and Theory of Computing proposals that address challenges in managing large-scale, distributed, networked, spatial-temporal geometric data could impact virtually every cluster within CISE and many outside the CISE Directorate. Signal Processing proposals that explore novel clustering and classification algorithms in learning theory may be relevant to various signal/image understanding tasks that are addressed in various clusters within IIS and the BIO Directorate.

The TF cluster continues to invite proposals in the **Scientific Foundations for Internet’s Next Generation (SING).** This topic merges elements of the theoretical foundations of computing, communications, signal processing, and network science into a foundation for a clean-slate redesign of the Internet (http://www.nsf.gov/cise/geni/).

SING is expected to challenge well-established theories and break barriers between research communities: theoretical and experimental, communications and computing, physical and network layers.

With SING broader research is envisioned on:

- *Core theory:* formulating a new framework for computing and communication systems considering the temporal and spatial distribution of information and power. Interplay between information and queuing theory; theory for sensing and control networks. New networking theories inspired by economics, biology and physics.
- *Fundamental algorithms:* Cooperative communications. Scalability, complexity, and interactivity problems. Security. Adaptive compression. Signal processing techniques to support content analysis. Power aware processing. Tradeoffs between communication and computation and storage. Models for mobility enhanced information dissemination. Search and information retrieval, complex queries, full text search. Peer-to-peer communications. Auctions. Manipulating massive data sets. Algorithmic distributed mechanism design and distributed control. Quality of service driven mobility. Traffic engineering.
- *Applications:* enabled by new theoretical foundations; mobile and sensor networks, ad hoc networks. Quality of service models. Control loop applications over the network, Signal processing, computing, and communications techniques enabling pervasive computing and communication environments.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Anticipated Type of Award: Standard or Continuing Grant

Estimated Number of Awards: 60-75

Approximately 15 small awards at $60,000/year or less will be made. For example, projects by new faculty may require NSF support for only one student or for summer salary. Most small awards will go to (or preference will be given to) PI's who have not previously been a PI or coPI on an NSF award.

Up to 55 awards will be made with an average grant size of $125,000/year for durations up to three years.

Up to 5 awards of up to $500,000/year for well-integrated projects of larger scope are anticipated.

Anticipated Funding Amount: $30,000,000 for awards made in this competition, contingent upon the availability of funds

IV. ELIGIBILITY INFORMATION

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

An investigator may participate as PI, co-PI or Senior Personnel in at most one proposal in response to this solicitation.

Additional Eligibility Info:

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from 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.

B. Budgetary Information

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

C. Due Dates

- **Submission Window Date(s):**

  January 19, 2007 - February 19, 2007

Deadline: 5 PM EST, February 19, 2007.

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 and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

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

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

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

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

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Adhoc Review or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

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 *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm.

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:

- John H. Cozzens, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: jcozzens@nsf.gov
- Robert Grafton, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: rgrafton@nsf.gov
- Eun Park, Program Director, 1115 N, telephone: (703) 292-8910, email: epark@nsf.gov
- William Steiger, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: wsteiger@nsf.gov
- Sirin Tekinay, Program Director, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: stekinay@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Tracey M. Wilkinson, Senior Program Assistant, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: twilkins@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.

The primary contacts for the five components are:

- **Communications Research:** Sirin Tekinay;
- **Computational Geometry and Symbolic and Algebraic Computation:** Robert Grafton;
- **Numerical Computing and Optimization:** E.K. Park;
- **Signal Processing Systems:** John Cozzens; and,
- **Theory of Computing:** William Steiger.

For

- **Cross-Cluster Activities and Beyond:** Cognizant PD's; and,

- **SING:** Sirin Tekinay.

For questions related to the use of Grants.gov, please contact:

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

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, 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.

Related Programs:

- Design Automation for Micro and Nano Systems
- Computer Systems Research (NSF 05-629)
- Cyber Trust (NSF 06-517)
- Networking Technology and Systems (NSF 06-516)

Other Related Programs

- Integrative, Hybrid & Complex Systems (PD 05-7564)

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.

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