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Foundations of Data and Visual Analytics (FODAVA)

Program Solicitation
NSF 07-583

National Science Foundation

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

Directorate for Mathematical & Physical Sciences
Division of Mathematical Sciences

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

November 20, 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.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Foundations of Data and Visual Analytics (FODAVA)

Synopsis of Program:

Those involved with science, engineering, commerce, health, and national security all increasingly face the challenge of synthesizing information and deriving insight from massive, dynamic, ambiguous and possibly conflicting digital data. The goal of collecting and examining these data is not to merely acquire information, but to derive increased understanding from it and to facilitate effective decision-making. To capitalize on the opportunities provided by these data sets, a new, interdisciplinary field of science is emerging called Data and Visual Analytics, which is defined as the science of analytical reasoning facilitated by interactive visual

interfaces. Data and Visual Analytics requires interdisciplinary science, going beyond traditional scientific and information visualization to include statistics, mathematics, knowledge representation, management and discovery technologies, cognitive and perceptual sciences, decision sciences, and more. This solicitation is concerned only with a subset of the overall problem, namely the creation of the mathematical and computational sciences foundations required to transform data in ways that permit visual-based understanding.

To facilitate visual-based data exploration, it is necessary to discover new algorithms that will represent and transform all types of digital data into mathematical formulations and computational models that will subsequently enable efficient, effective visualization and analytic reasoning techniques.

With this solicitation, the National Science Foundation (NSF) and the Department of Homeland Security (DHS) invite research proposals that capitalize on knowledge and expertise in the fields of mathematics, computational science, and intelligent systems to produce new data representations and transformations to enable data stakeholders to detect the expected and discover the unexpected in massive data sets. New mathematical and computational algorithms and techniques are sought that will fundamentally improve our ability to transform large, often streaming data sets into representations that better support visualization and analytic reasoning.

In order to provide a cohesive structure for advancing the science of Data and Visual Analytics, two types of proposals are sought:

- FODAVA-Lead proposals will be submitted by research teams where all team members belong to a single academic institution willing to assume a leadership and coordination role. FODAVA-Lead proposals will compete for a single award with the successful institution expected to play a key role in the development of FODAVA. In addition to forming the lead scientific research team, the FODAVA-Lead organization will be responsible for performing a variety of functions as defined in Section II of this solicitation in order to assure that results are disseminated to the FODAVA community, that effective liaison between FODAVA researchers and the DHS National Visualization and Analytics Center (NVAC) takes place, that testbed data sets are developed and disseminated, and that the mathematics and computer science research communities become increasingly aware of the need for FODAVA-related research

- FODAVA-Partner proposals will be submissions for two-to-three year research grants. Recipients will perform fundamental research but will also actively participate with the FODAVA-Lead institute in developing FODAVA as a field.

Awards made are expected to develop the mathematics and computational science required to transform data in ways that will better enable the visual-based analysis of massive data sets. The solicitation's goal is to develop new data reduction and transformation algorithms that will be applicable across broad application areas, laying the scientific base for systems of the future. Proposals should focus on fundamental research advances that will be widely applicable across scientific, engineering, commercial, and governmental domains that utilize visualization and analytics to gain insight and derive knowledge from massive data sets. FODAVA is focused on highly innovative, transformational research that offers the potential to fundamentally change data transformation algorithms. Proposals to extend ongoing research thrusts should be directed elsewhere.

Cognizant Program Officer(s):

- Lawrence Rosenblum (CS Contact), Program Director, Directorate for Computer & Information Science & Engineering, CCF Division, 1115 N, telephone: (703) 292-8910, email: lrosenbl@nsf.gov

- Tie Luo (Math Contact), Program Director, Directorate for Mathematical and Physical Sciences, DMS Division, 1025 N, telephone: (703) 292-8448, email: tluo@nsf.gov

- Sankar Basu, Program Director, Directorate for Computer & Information Science & Engineering, CCF Division, 1115N, telephone: (703) 292-7843, email: sabasu@nsf.gov

- Ephraim Glinert, Program Director, Directorate for Computer & Information Science & Engineering, IIS Division, 1125 N, telephone: (703) 292-8930, email: eglinert@nsf.gov

- Leland Jameson, Program Director, Directorate for Mathematical and Physical Sciences, DMS Division, 1025N,

telephone: (703) 292-4883, email: ljameson@nsf.gov

- Maria Zemankova, Program Director, Directorate for Computer & Information Science & Engineering, IIS Division, 1125 N, telephone: (703) 292-8930, email: mzemanko@nsf.gov

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

- 47.049 --- Mathematical and Physical Sciences
- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 5 to 7 - This will consist of one five-year FODAVA-Lead award totaling $3,000,000; four to six two to three year FODAVA-Partner awards totaling $300,000 to $500,000 each.

Anticipated Funding Amount: $2,250,000 per year for 5 years. NSF will provide $1,500,000 per year for up to five years. DHS will provide $750,000 per year for up to five years. Awards may be standard or continuing grants. The anticipated funding amount is subject to availability of funds.

Eligibility Information

Organization Limit:

None Specified

PI Limit:

FODAVA-Lead proposals must be from a team of computer scientists and mathematicians residing at a single institution, and should be led by a computer scientist.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

An individual may appear as PI, co-PI, Senior Personnel, or Consultant on no more than one FODAVA-Lead proposal and one FODAVA-Partner proposal.

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. 0.00
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

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

  November 20, 2007

Proposal Review Information Criteria

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

Award Administration Information

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

Reporting Requirements: Standard NSF reporting requirements apply

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I. INTRODUCTION

There was a time when lack of data was a problem in many fields. Today, the contrary is true – to make progress in science, engineering, commerce, medicine, and homeland security researchers and other data stakeholders face the difficult task of deriving increased understanding and facilitating effective decision making from extremely large, often dynamic, digital data sets. The interdisciplinary field of Data and Visual Analytics is emerging to address this challenge. Defined as the science of analytical reasoning facilitated by interactive visual interfaces, Data and Visual Analytics is the synthesis of ideas from otherwise disparate fields including scientific and information visualization, statistics, mathematics, knowledge representation, management and discovery technologies, cognitive and perceptual sciences, decision sciences, and more. This solicitation is concerned with developing novel data modeling and reduction techniques that will facilitate subsequent visual-based data analytics.

II. PROGRAM DESCRIPTION

Providing better data and visual analytics systems requires solving numerous underlying scientific issues. The different representations of raw data (e.g., numeric, text, audio, image, and geometric) have many characteristics (e.g., heterogeneous, multimodal, dynamic, uncertain, and high dimensional) that make effective analysis difficult. The focus of this solicitation is the development of the mathematical and computational science foundations required to transform data into representations that are more suitable for visual-based analytics. The techniques that can be applied to the various data types include computational statistics, data mining, geospatial techniques, machine learning, and mathematical modeling. These in turn draw upon many areas of mathematics and computer science.

NSF and DHS will support research exploring novel algorithms and methods that will (1) fundamentally advance the theory and practice of transforming discrete data into new scalable representations suitable for computer manipulation that faithfully represent the content of the underlying data, and (2) synthesize information of different types and from different sources into a unified data representation.

Within the above guidelines, topics of interest include:

- Synergistic combinations of data transformation techniques to create more meaningful representations with semantic richness and validity
- Approaches that will tightly couple novel data transformations with visualization systems, including methods to capture and represent information quality and uncertainty
- Novel transformations to facilitate dynamic identification of new or unanticipated events which may also include measures of usefulness
- Computational and mathematical algorithms that will enable the unified representation of dynamic data of multiple types and sources
- Fundamentally new approaches to identifying changes in massive data sets

This solicitation is concerned with developing data transformation algorithms for Data and Visual Analytics that will be applicable across broad application areas of science, engineering, health, commerce, and homeland security and will lay the scientific base for the systems of the future. While testbed data from specific application areas will likely be needed, proposals should focus on fundamental research advances and not specific application domains. However, background on some research issues, oriented specifically to homeland security, can be found in Chapter 4 of Illuminating the Path – The Research and Development Agenda for Visual Analytics (J. Thomas and K. Cook, editors), DHS National Visualization and Analytics Center (http://nvac.pnl.gov).

The intention of this solicitation is to fund one large, five-year FODAVA-Lead award and several smaller, two-to-three-year FODAVA-Partner awards as described in Section III. The organization receiving the FODAVA-Lead award will serve a central, coordinating role for this effort. In addition to research, the FODAVA-Lead organization will integrate the overall effort

by coordinating activities with the recipients of the smaller grants and with the DHS National Visualization and Analytics Center. The recipients of the smaller FODAVA-Partner grants will be required to interact with the FODAVA-Lead organization and to participate as appropriate in events arranged by this organization and/or by the DHS NVAC. Proposal budgets should include travel funding for this purpose.

This section pertains to proposers for the one FODAVA-Lead award:

The proposal must be from a team of computer scientists and mathematicians residing at a single institution, and should be led by a computer scientist. In addition to describing the technical merit and broader impacts of the proposed activities, the proposers must describe how they plan to accomplish the following required tasks:

1. Serve as a central facility that will involve all FODAVA awardees in a common effort to develop the scientific foundations for data and visual analytics in data representations and transformations.

2. Interface with the DHS NVAC (http://nvac.pnl.gov) in order to provide training opportunities in Data and Visual Analytics including participation in NVAC-sponsored workshops and consortiums, obtain test data for awardees, disseminate results to the user communities with activities such as joint NVAC/FODAVA-Lead workshops, and perform other interactions that will benefit the program.

3. Provide a plan for a series of workshops, including dissemination of the results, which will expose additional research communities to Data and Visual Analytics. These need not be limited only to topics covered by this solicitation.

4. Demonstrate the ability to expand with appropriate in-house expertise if additional funding becomes available to cover such topics as human-computer-interaction.

5. Organize and participate in the program's kick-off meeting, annual reviews, and educational events. Host the kick-off meeting, annual reviews, and educational meetings if so requested.

6. Plan for research results dissemination and sustainability.

This section pertains to proposers for the two-to-three-year FODAVA-Partner awards:

The proposal may come from either single investigator or collaborative teams. In addition to describing the intellectual merit and broader impacts of the proposed activities, proposers must describe how they will accomplish the following tasks:

1. Obtain and utilize testbed data sets such as those provided by the DHS NVAC (http://nvac.pnl.gov), the FODAVA-Lead institution, and/or other sources.

2. Interact with the successful proposer for FODAVA-Lead to advance the solicitation’s goals.

3. Participate in the kick-off meeting, annual program reviews, and educational events.

The solicitation seeks to develop data transformations leading to the development of new tools and techniques for Data and Visual Analytics. Topics that will not be considered under this solicitation include visual interfaces and visualization algorithms (except as needed to demonstrate how the novel transformations can impact visual interfaces), data transformation algorithms that emphasize automated approaches to analytics or otherwise fail to demonstrate their applicability to visual analytics systems, geometric transformations such as mesh simplification, and (because of funding limitations) image and video processing and transformations. These areas are supported by other CISE and Division of Mathematical Sciences (DMS) programs. For computer science, visualization algorithms are supported by the Computing and Communication Foundations (CCF) Division's Foundations of Computing Processes and Artifact Cluster, visual interfaces by the Information and Intelligent Systems (IIS) Division's Human-Centered Computing Cluster, automated approaches to analytics by the Information Integration and Informatics Cluster in the IIS Division, mesh simplification in the Theoretical Foundations Cluster in the CCF Division, and image and video processing in the Robust Intelligence Cluster in the IIS Division. Mathematics proposals on these topics are supported by the DMS Cluster that contains the underlying mathematical topic area of the proposal. This list of topics that will not be supported is non-inclusive and potential proposers are encouraged to discuss ideas with a cognizant program officer prior to submission.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. The estimated number of awards is one five-year FODAVA-Lead award totaling $3,000,000 and four to six two- to three-year FODAVA-Partner awards totaling $300,000 to $500,000 each.

IV. ELIGIBILITY INFORMATION

Organization Limit:

None Specified

PI Limit:

FODAVA-Lead proposals must be from a team of computer scientists and mathematicians residing at a single institution, and should be led by a computer scientist.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

An individual may appear as PI, co-PI, Senior Personnel, or Consultant on no more than one FODAVA-Lead proposal and one FODAVA-Partner proposal.

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

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

  November 20, 2007

  Deadline Date

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.

Additional Review Criteria:

Advancing the FODAVA Research Community

The degree to which proposed activities will help to develop FODAVA as an interdisciplinary research community, both for required tasks (see Section II) and for additional plans presented, will be part of the decision process. FODAVA-Lead proposals will also be evaluated based on proposed activities to integrate FODAVA research with the FODAVA user communities over a five-year period.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions: PIs are required to attend an annual program review at a location and time to be determined by NSF and DHS.

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:

- Lawrence Rosenblum (CS Contact), Program Director, Directorate for Computer & Information Science & Engineering, CCF Division, 1115 N, telephone: (703) 292-8910, email: lrosenbl@nsf.gov
- Tie Luo (Math Contact), Program Director, Directorate for Mathematical and Physical Sciences, DMS Division, 1025 N, telephone: (703) 292-8448, email: tluo@nsf.gov
- Sankar Basu, Program Director, Directorate for Computer & Information Science & Engineering, CCF Division, 1115N, telephone: (703) 292-7843, email: sabasu@nsf.gov
- Ephraim Glinert, Program Director, Directorate for Computer & Information Science & Engineering, IIS Division, 1125 N, telephone: (703) 292-8930, email: eglinert@nsf.gov
- Leland Jameson, Program Director, Directorate for Mathematical and Physical Sciences, DMS Division, 1025N, telephone: (703) 292-4883, email: ljameson@nsf.gov
- Maria Zemankova, Program Director, Directorate for Computer & Information Science & Engineering, IIS Division, 1125 N, telephone: (703) 292-8930, email: mzemanko@nsf.gov

For questions related to the use of FastLane, contact:

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

For questions relating to Grants.gov contact:

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

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, MyNSF (formerly the Custom News Service)is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. MyNSF also is available on NSF's Website at http://www.nsf.gov/mynsf/.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

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