Science of Science and Innovation Policy (SciSIP)

FY 2008

Program Solicitation

NSF 08-520

Replaces Document(s):

NSF 07-547

National Science Foundation

Directorate for Social, Behavioral & Economic Sciences

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

March 18, 2008

Full Research Proposals

REVISION NOTES

This solicitation calls for data-development projects regarding the science and engineering enterprise, in addition to projects that focus on analytical tools and model building. Although datasets could be developed or enhanced as part of the modeling or tool-building processes, the data-development projects are those that focus on creating new datasets for use by the community of researchers. These projects may also focus on merging datasets across countries with the view to creating international science and engineering indicators.

This solicitation also calls for proposals where multiple investigators develop collaborative research projects that are facilitated by collaboratories or virtual organizations. The Program Description below gives examples of such projects.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Science of Science and Innovation Policy (SciSIP)

Synopsis of Program:

The Directorate for Social, Behavioral and Economic Sciences (SBE) at the National Science Foundation (NSF) aims to foster the development of the knowledge, theories, data, tools, and human capital needed to cultivate a new Science of Science and Innovation Policy (SciSIP). The SciSIP program underwrites fundamental research that creates new explanatory models, analytic tools and datasets designed to inform the nation's public and private sectors about the processes through which investments in science and engineering (S&E) research are transformed into social and economic outcomes. SciSIP's goals are to understand the contexts, structures and processes of S&E research, to evaluate reliably the tangible and intangible returns from investments in research and development (R&D), and to predict the likely returns from future R&D investments within tolerable margins of error and with attention to the full spectrum of

potential consequences. Specifically, the research, data collection and community development components of SciSIP's activities will: (1) develop usable knowledge and theories of creative processes and their transformation into social and economic outcomes; (2) develop, improve and expand models and analytical tools that can be applied in the science policy decision making process; (3) improve and expand science metrics, datasets and analytical tools; and (4) develop a community of experts across academic institutions and disciplines focused on SciSIP. For purposes of this solicitation, the term "science metrics" refers to quantitative measures or indicators that provide summary information on the size, scope, quality, and impact of science and engineering activities, with particular focus on inputs and outputs of the science, technology and innovation system. Characterizing the dynamics of discovery and innovation is important for developing valid metrics, for predicting future returns on investments, for constructing fruitful policies, and for developing new forms of workforce education and training.

The FY 2008 competition includes three emphasis areas: Analytical Tools, Model Building, and Data Development and Augmentation. The emergent body of research will develop and utilize techniques for retrospective and prospective analyses. In addition, research will provide insight into factors that propagate new ideas at levels from the molecular functioning of the human brain to the organizational, state, national and international levels. This solicitation also calls for research that improves and expands science metrics and datasets. The utilization of virtual organizations or collaboratories by social and behavioral scientists in the discovery process is included in this call for research proposals.

Cognizant Program Officer(s):

- Julia Lane, 907.7, telephone: (703)292-5145, email: jlane@nsf.gov

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

- 47.075 --- Social Behavioral and Economic Sciences

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 15 to 20

Anticipated Funding Amount: $7,000,000 Award sizes are expected to range from $50,000 to $400,000 in total costs (including indirect costs) for the duration of the grant with durations up to three years. Additional funding may be made available if the project involves major data collection activities with appropriate justification for the funds. These estimates are subject to the availability of funds. Additional funds are anticipated in future years.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and two-and four-year colleges (including community colleges) located and accredited in the US, acting on behalf of their faculty members and non-profit organizations in the US. Proposals from individuals, for-profit organizations or foreign organizations will not be accepted. However, individual researchers (not associated with any institution) and researchers at ineligible organizations (including foreign universities and colleges, private-sector research firms and consultants, and national laboratories) may be included on proposals from eligible institutions through subawards or as consultants.

PI Limit:

An individual may appear as Principal Investigator (PI), co-PI, or other senior personnel on only one SciSIP proposal submitted in FY 2008 in response to this Program Solicitation. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any collaborative proposal. Proposals that do not meet this requirement will be returned without review. These restrictions apply to this SciSIP solicitation only and are not meant to inhibit submissions of proposals by investigators to other NSF activities or programs.

For the purposes of this solicitation, senior personnel include the PI, any co-PIs, and any other researchers actively involved in the scientific or technical management of the project. It does not include students, postdoctoral researchers, or consultants who provide specific expertise on a limited portion of the project.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 1

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: 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 under this solicitation.
- **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):

  March 18, 2008

  Full Research Proposals

Proposal Review Information Criteria

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

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Directorate for Social, Behavioral and Economic Sciences (SBE) at the National Science Foundation (NSF) aims to foster the development of the knowledge, theories, data, tools, and human capital needed to cultivate a new Science of Science and Innovation Policy (SciSIP). SciSIP underwrites fundamental research that creates new explanatory models, analytic tools and datasets designed to inform the nation's public and private sectors about the processes through which investments in science and engineering (S&E) research are transformed into social and economic outcomes. Parallel research and data development will help answer pressing questions, such as: What are the critical elements of creativity and innovation? What are the likely futures of the technical workforce and what is its response to different forces of change? What is the impact of globalization on creativity and productivity in the science and engineering fields? Are there significantly different outcomes from federal and private investments in R&D and innovative activities? How does state support for public universities influence the national innovation system?

SciSIP's goals are to understand the contexts, structures and processes of S&E research, to evaluate reliably the tangible and intangible returns from investments in research and development (R&D), and to predict the likely returns from future R&D investments within tolerable margins of error and with attention to the full spectrum of potential consequences. Specifically, the research, data collection and community development components of SciSIP's activities will: (1) develop usable knowledge and theories of creative processes and their transformation into social and economic outcomes; (2) develop, improve and expand models and analytical tools that can be applied in the science policy decision making process; (3) improve and expand science metrics, datasets and analytical tools; and (4) develop a community of experts across academic institutions and disciplines focused on SciSIP. For purposes of this solicitation, the term "science metrics" refers to quantitative measures or indicators that provide summary information on the size, scope, quality, and impact of science and engineering activities, with particular focus on inputs and outputs of the science, technology and innovation system. Characterizing the dynamics of discovery and innovation is important for developing valid metrics, for predicting future returns on investments, for constructing fruitful policies, and for developing new forms of workforce education and training.

Accomplishing these goals requires disciplinary and interdisciplinary approaches to understanding knowledge generation and innovation processes. Collaborative projects are encouraged, including those that build linkages across disciplinary and national borders and those working through virtual organizations. A multidisciplinary research team might be instrumental in investigating first hand the productivity benefits and costs of interdisciplinary team collaborations. In a different vein, research teams may focus on specific scientific domains or synthesize elements from disparate disciplines to develop new models or tools. To accomplish such research collaborations, investigators may utilize virtual organizations, including collaboratories

(virtual laboratories).

The FY 2008 competition includes three emphasis areas: Analytical Tools, Model Building, and Data Development and Augmentation. The emergent body of research will develop and utilize techniques for retrospective and prospective analyses. In addition, research will provide insight into factors that propagate new ideas at levels from the molecular functioning of the human brain to the organizational, state, national and international levels. This program has strong interests in research that improves and expands science metrics and datasets.

The research objectives go beyond the traditional input-output linkages, to broader outcomes, such as implications for energy, agriculture, national health, environment, security, discovery, education--all important elements of social well-being. New statistical and econometric tools for estimating social and economic returns to science and engineering investments are encouraged, including comparisons of public and private R&D expenditures and returns within a given scientific discipline or field. The research is not limited to quantitative assessments. Qualitative tools, such as case studies, ethnographic studies, historical analyses and cross-national comparisons are welcomed and interdisciplinary collaborations are encouraged. International collaboration among scholars is also encouraged, since much can be learned about country-based methods of scientific exploration and science policies, particularly as the scientific community globalizes. Collaborators from institutions outside the U.S. should seek funding from their respective funding organizations or they could be supported through a subcontract to a U.S. institution.

II. PROGRAM DESCRIPTION

Science of Science and Innovation Policy (SciSIP) is an SBE activity that includes all three SBE divisions--Social and Economic Sciences, Behavioral and Cognitive Sciences, and Science Resources Statistics. Proposals that include collaborators outside the social, behavioral and economic sciences are welcomed. The convergence of biology, engineering, the cognitive and social sciences, mathematical and physical sciences, and computer and information sciences allows the development of conceptualizations, frameworks and models that will build a rigorous evidence-based platform for science policy and build interdisciplinary communities of researchers and educators that are prepared to meet the challenges of SciSIP research. The SciSIP activity, therefore, attempts to establish new vantage points from which to understand and analyze the ecology of innovation. Priority will be given to projects that bring together appropriate researchers from fields and disciplines that do not ordinarily collaborate, bearing in mind that the most competitive projects are those that are broad in scope, with contributions from relevant fields. NSF also encourages SciSIP projects to include junior researchers as team members and, when appropriate, to develop international collaborative partnerships.

A. SciSIP EMPHASIS AREAS

All proposals submitted to the Science of Science and Innovation Policy competition **must** identify one or more of the three emphasis areas described below--Models, Tools or Data. Research projects that involve two of these emphasis areas are encouraged. A primary area of emphasis must be identified. Within and across these categories, the program looks for tools and models enabling path-breaking ideas with relevance to understanding the discovery and innovation processes, as well as prospective analyses of science and technology investments in the face of risk and uncertainty; priority will be given to such projects.

Models (MOD)

Research proposals may develop behavioral and analytical conceptualizations, frameworks or models that have applications across a broad array of SciSIP challenges. The interdisciplinary nature of the projects may link the behavior of individuals and/or organizations and their social, cognitive or biological underpinnings, as they evolve over varying time scales, to influences including natural and built environments, geographical contexts, and social networks. Researchers could explore domain-specific applications, where models are generalizable within a given discipline, field or area of research, such as chemistry, biology, physics, or nanotechnology.

Proposals in this emphasis area may focus on but are not limited to: models of components of the innovation system, particularly knowledge, financial and workforce stocks and flows; models that can be used to assess and inform science and technology investment decisions; computational models of creativity; agent-based behavioral models; network models; risk and uncertainty assessment models; portfolio management models; life-cycle models; models that describe the inherent complexity of social systems and that explore it incorporating the theories of stochastic and dynamical systems; organizational studies of discovery and innovation; and frameworks that systematically relate how intellectual, social and physical organization influence creativity and innovation.

Tools (TLS)

Although guided by theoretical and empirical foundations of science policy, policymakers need enabling tools for assessments and decision-making, as well as data manipulation and extraction. Applicants to this emphasis area must focus on methodologies to analyze science and technology data and related information, and to develop novel means to convey the information to a variety of audiences.

Proposals in this emphasis area may focus on but are not limited to: statistical and econometric tools for estimating returns to science and engineering investments; assessment and evaluation tools, such as systemic research, evolutionary computation, and other tools that can be used to analyze complex systems; algorithmic information theory, including computer simulations; supply-chain management tools; Internet applications; cyber techniques; and data visualization applied to SciSIP.

Data (DAT)

Twenty-first century science and technology policy requires the creation or improvement of S&E metrics and indicators reflecting current discovery, R&D and innovation activities. For example, statistical agencies need a new data taxonomy that captures nanotech, biotech and other areas that are typically subsumed in current classifications of S&E activities. Research that could inform the development of a new taxonomy would be appropriate under this solicitation. There is also a need for improved comparability, scope, scalability, relevance, and availability of data. This requires new or modified surveys, innovative uses of existing survey and administrative data, and improved data sample frames, links and aggregability. Researchers who submit proposals in this emphasis area may focus on one or several aspects of these characteristics for datasets, metrics and indicators.

The substantive focus of datasets, metrics and indicators is equally important. Proposals in this emphasis area may focus on but are not limited to: the science and engineering workforce; knowledge-based accounting mechanisms that link innovation surveys and metrics to accounting structures; measurements of intangible assets that facilitate the capitalization of R&D in the national income accounts; the broader social impacts of specific S&E activities; and the stocks and flows of knowledge, investments and human capital in the innovation system. Although investments at the federal and university levels are typically local, human capital and knowledge flows extend beyond national boundaries. Therefore, researchers that target this emphasis area are encouraged to develop datasets, metrics and indicators at different scales.

The development and utilization of new and augmented datasets can be facilitated by new cyberinfrastructure-based data extraction, matching and manipulation techniques. Cyber-tools can also give data-users real-time accessibility that should improve the capacity to develop more reliably predictive tools. With the emphasis on a new data taxonomy and datasets, a focus on preserving longitudinal data series is also important.

Researchers should take note of the following data-sharing requirements in section B below.

B. GENERAL INFORMATION REGARDING ALL EMPHASIS AREAS

Data Management

To ensure efficient accessibility of new data, metrics and indicators that are developed via this SciSIP competition, all research proposals that develop new datasets must include a data management plan. Proposers must adhere to NSF's general data policy (see Section VII.B. of this solicitation) and should apply the following requirements as appropriate.

Requirements for the data management plan:

- Statement regarding where data will be archived. At a minimum, the proposal should include a letter of support from the specified data center.
- Identification of the data management point of contact and the person who is responsible for submitting the data, metadata and other documentation.
- Clear indication of which data are to be shared in the research community. Such data must be made available through an openly accessible data management system as soon as data are collected and verified.

Within the first three months of the award, investigators will provide a metadata inventory description (a high-level summary of the data to be collected) to the relevant archive. If a community-wide data coordination service is established, the metadata must be shared with this service. Every project must submit complete documentation and quality-controlled data to the appropriate archive in accordance with NSF's data policy.

In some cases the data that are collected will be sensitive in nature. Proposers may request an exemption from the SciSIP NSF program officer for those data. The request for exemption must clearly state why the data cannot be disseminated. In some cases proposers might indicate a reasonable time period within which the data must be privately held.

Virtual Organizations and Other Collaborative Efforts

Virtual organizations allow researchers across geographical and disciplinary spaces to develop research platforms that share data, instrumentation and computational resources, as well as graduate-student talent and experimental subjects. Social and behavioral scientists could utilize the collaboratories to study scientific processes and activities in specific fields such as chemistry, physics, biology, engineering, or nanoscience. For example:

- Collaboratories could be established to map discovery and innovation in an existing nanotechnology research laboratory. Engineers and behavioral scientists could collaborate on projects furthering the understanding of cognitive pathways and interaction strategies that lead to new discoveries, or on optimizing team strategies in the innovative process. Chemists working with social and behavioral scientists might develop theoretical frameworks that explain how chemists achieve new discoveries. Mathematical biologists, behavioral scientists and economists might develop computational models on how social agents make strategic investments in incremental or large-leap innovations.
- Collaboratories could be useful for experimentalists when subjects are in different locations.
- Researchers could use collaboratories to investigate product, process or organizational development activities in private-sector firms.
- Virtual organizations and cybertools could be used for data extraction and augmentation purposes.
- Virtual networks could be utilized as organizational catalysts, whereby researchers form virtual workshops to disseminate their findings and to initiate new collaborations.

It should be noted that these projects must be designed to achieve SciSIP goals and address SciSIP criteria (see section VI.A. below)

NSF has special interest in proposals that develop and employ innovative approaches in the study of Science of Science and Innovation Policy and include research personnel from all ranks, who are representative of the diversity in U.S. society. When appropriate, interdisciplinary and international collaborative partnerships are encouraged. SciSIP encourages research-intensive and extensive universities to partner with other types of colleges and universities, especially ones serving underrepresented minority populations.

International efforts present opportunities for collaboration with foreign scientists in the development of integrated projects, which could lead to important advances in the understanding of the global innovation system. Participation of non-U.S. scientists in proposals supported under this SciSIP solicitation is strongly encouraged. Awards made through this program will support the U.S.-based participants only. Collaborators from institutions outside the U.S. should seek funding from their respective funding organizations or they could be supported through a subcontract to a U.S. institution.

Alignment with SciSIP Goals

Proposals that do not target SciSIP goals will be returned without review. The SciSIP activity overlaps with many other research activities and areas at NSF. Researchers with projects that do not meet the specific SciSIP criteria might consider other NSF programs and activities. Those programs that may be of particular interest to SciSIP researchers are: Economics; Sociology; Innovation and Organizational Sciences; Methodology, Measurement and Statistics; Social Psychology; Science, Technology and Society; and Developmental and Learning Sciences.

III. AWARD INFORMATION

Pending availability of funds, NSF anticipates making approximately 15 to 20 SciSIP awards in FY 2008. These awards will typically be for three years, with total award sizes (including indirect costs) not to exceed $400,000. This maximum is the total for the project; it is not a yearly maximum. Additional funding could be made available if the project involves major data collection and if appropriate justification for the funds is given in the proposal. These estimates are subject to the availability of funds. Additional funds are anticipated in future years. At least $7,000,000 is expected for awards.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and two-and four-year colleges (including community colleges) located and accredited in the US, acting on behalf of their faculty members and non-profit organizations in the US. Proposals from individuals, for-profit organizations or foreign organizations will not be accepted. However, individual researchers (not associated with any institution) and researchers at ineligible organizations (including foreign universities and colleges, private-sector research firms and consultants, and national laboratories) may be included on proposals from eligible institutions through subawards or as consultants.

PI Limit:

An individual may appear as Principal Investigator (PI), co-PI, or other senior personnel on only one SciSIP proposal submitted in FY 2008 in response to this Program Solicitation. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any collaborative proposal. Proposals that do not meet this requirement will be returned without review. These restrictions apply to this SciSIP solicitation only and are not meant to inhibit submissions of proposals by investigators to other NSF activities or programs.

For the purposes of this solicitation, senior personnel include the PI, any co-PIs, and any other researchers actively involved in the scientific or technical management of the project. It does not include students, postdoctoral researchers, or consultants who provide specific expertise on a limited portion of the project.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 1

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.

The information below supplements the standard proposal preparation guidelines in the Grant Proposal Guide (GPG) and the NSF Grants.gov Application Guide. It pertains to all SciSIP submissions.

Proposal Cover Sheet. Begin your title with the one acronym corresponding to the primary area of emphasis/ focus (MOD, TLS and/or DAT) chosen for your proposal. Failure to submit this information may delay or prevent processing. If your project includes **international activities,** you must check the box for International Cooperative Activities Country Name that appears under Other Information when the "remainder of cover sheet" is clicked, then select the countries involved. Grants.gov users enter information about international activities in Field 5 of the R&R Other Project Information Form.

Project Summary. Provide a summary description of the SciSIP project, including its research or development theme and key innovative features, in a manner that will be informative to a general technical audience. If the project includes international activities, they should be included in the project summary also. Project Summaries must be written carefully to explicitly point to and detail the two NSF evaluation criteria -- intellectual merit and broader impacts -- in separate paragraphs. **If the project summary does not explicitly address both the intellectual merit and the broader impacts of the proposed activity, the proposal will be returned without review.** At the top of this page include the title of the SciSIP project, the name of the principal investigator, and the lead organization. Also list any other participating institutions/ organizations, including international collaborators.

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Project Description. In addition to the topics described in the GPG or NSF Grants.gov Application Guide, SciSIP project descriptions should discuss the following, as appropriate:

- **Fit to Science of Science and Innovation Policy.** SciSIP projects will enable novel and innovative activities not usually supported through other existing NSF programs. The project description should address the expected project significance: how its intellectual merits and broader impacts will add to the fundamental knowledge base across relevant fields related to Science of Science and Innovation Policy and how it will enhance the capabilities of people who engage in research and/or education in these areas.

- **Multidisciplinarity and Interdisciplinarity.** This SciSIP competition does not require that interdisciplinary methodologies be used in research projects, although such collaborations are welcomed. When a project uses or develops methodologies that bring together seldom-linked fields in new partnerships, it should be identified and explained in the project description

Biographical Sketches. Each proposal must include biographical sketches for all senior investigators, and also include biographical sketches for principal foreign collaborators. All biographical sketches must adhere to the format given in the GPG (Chapter II .C.2.f) at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg

Project Budget. The budget justification (up to 3 pages) should explain and justify major cost items. For undergraduate and graduate student participants and postdoctoral associates, include a breakdown of costs by types of participants. The total maximum (including indirect costs) budget for research proposals is $400,000. Additional funding could be made available if the project involves major data collection and if appropriate justification for the funds is given in the proposal

Supplementary Documentation. Collaborative research proposals must include a Supplementary Documentation section with the following information:

1. A document that lists the names, organizational affiliations, and primary academic fields of all senior personnel and paid consultants associated with the project. This information helps to insure that prospective reviewers do not have conflicts-of-interest. NSF defines senior personnel as the principal and co-principal investigators responsible for the scientific or technical direction of the project and other faculty members involved in the project. (A complete definition can be found in NSF s Grant Proposal Guide, Exhibit II-7). This list should also include all individuals on subawards who fall into the category of senior personnel. This document needs only be included with the lead proposal of collaborative proposals.
2. A signed written statement from all senior personnel confirming participation in the project. Any one individual may participate on just one SciSIP proposal submitted in FY 2008 as a PI, co-PI, or other senior personnel and violation

of this PI Eligibility Limit will result in the proposal(s) being returned without review. This statement is also required of all individuals on subawards who fall into the category of senior personnel. The following text may be used as a template: I am a member of the research team that is submitting a proposal to the FY 2008 SciSIP competition. The lead PI is [name of PI], at [name of institution]. I am not a PI, co-PI, senior personnel or investigator on any other proposal for this competition. This should be uploaded as a Supplemental Document in FastLane or Grants.gov.

3. A document from all senior personnel listing: (a) primary thesis and post-doctorate advisors and advisees and (b) collaborators within the last 48 months. This information helps to insure that prospective reviewers do not have conflicts-of-interest. Although this information is available in the Biographical Sketches, we require it to also be included here.
4. To ensure efficient accessibility of new data, metrics and indicators that are developed via this SciSIP competition, all research proposals that develop new datasets must include a data management plan. Proposers must also adhere to NSF s general data policy and should apply the following requirements as appropriate.

Requirements for the data management plan:

- Statement regarding where data will be archived. At a minimum, the proposal should include a letter of support from the specified data center.
- Identification of the data management point of contact and the person who is responsible for submitting the data, metadata and other documentation.
- Clear indication of which data are to be shared in the research community. Such data must be made available through an openly accessible data management system as soon as data are collected and verified.

Within the first three months of the award, investigators will provide a metadata inventory description (a high-level summary of the data to be collected) to the relevant archive. If a community-wide data coordination service is established, the metadata must be shared with this service. Every project must submit complete documentation and quality-controlled data to the appropriate archive in accordance with NSF s data policy.

In some cases the data that are collected will be sensitive in nature. Proposers may request an exemption from the SciSIP NSF program officer for those data. The request for exemption must clearly state why the data cannot be disseminated. In some cases proposers might indicate a reasonable time period within which the data must be privately held.

Items 1-3 and 4 (if new data will be generated in the project) should be uploaded as "Supplemental Documents" in FastLane. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

This section may also include: letters of collaboration from foreign researchers and/or institutions; letters indicating access to sites or equipment for research or other associated project activities, as needed; and certifications associated with the use of human or animal subjects.

Unless authorized here or in the NSF Grant Proposal Guide, no other materials should be included in this section. Investigators sometimes put survey protocols into this section; this is specifically not allowed.

Proposals Involving Multiple Organizations

Proposals involving multiple organizations may be submitted in one of two ways: (1) as a single proposal with one organization serving as the lead organization and with support to other organizations provided through subawards, or (2) as a collaborative proposal, where each submitting organization must meet the eligibility criteria outlined in section IV. Organizations eligible to submit proposals include universities and two- and four-year colleges (including community colleges) located and accredited in the US, acting on behalf of their faculty members. In addition, non-profit organizations in the US may submit proposals. Please note that all collaborative proposals submitted as separate submissions from multiple organizations must be submitted via FastLane. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

Proposals Involving Collaborators at Foreign Organizations

Proposers are reminded that they must provide biographical sketches of all senior project personnel, including those at foreign organizations. In addition, as supplementary documentation, proposals involving foreign collaborators should provide documentation of a willingness to collaborate through letters of commitment from the international counterpart organizations. Please note that although eligibility for this competition is restricted to U.S. organizations, as described in section IV of this solicitation, collaborations with foreign organizations are also encouraged.

Human Subjects

If the project involves human subjects, the Institutional Review Board (IRB) of the submitting organization must certify that the proposed project is in compliance with the Federal Government's "Common Rule" for the protection of human subjects. If IRB

approval has been obtained and the date of approval is listed on the cover sheet, no other certification is required. If IRB approval is still pending, submit certification of IRB approval in electronic form as soon as approval is obtained to the cognizant program officer. (The name of this program officer will be listed in the Proposal Status module of FastLane.) Delays in obtaining IRB certification may result in NSF being unable to make an award. For more information regarding the protection of human subjects, consult: http://www.nsf.gov/bfa/dias/policy/human.jsp.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

C. Due Dates

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

  March 18, 2008

  Full Research Proposals

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 where they will be reviewed if they meet NSF proposal preparation requirements. 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 of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

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

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

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.

NSF staff also 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:

As outlined in section V, all SciSIP project descriptions should address the following special criteria. Reviewers will be asked to use these criteria to evaluate the proposals:

- **What is the fit to Science of Science and Innovation Policy?** SciSIP projects will enable novel and innovative activities not usually supported through other existing NSF programs. Does the proposal address the expected project significance, i.e. how its intellectual merits and broader impacts will add to the fundamental knowledge base across relevant fields related to Science of Science and Innovation Policy and how it will enhance the capabilities of people who engage in research and/or education in these areas?
- **Multidisciplinarity and Interdisciplinarity (when applicable).** This SciSIP competition does not require that interdisciplinary methodologies be used in research projects, although such collaborations are welcomed. If a project uses or develops methodologies that bring together seldom-linked fields in new partnerships, then how well are the plans for these elements identified and explained in the proposal?

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 deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/general_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

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

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Julia Lane, 907.7, telephone: (703)292-5145, email: jlane@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.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: pubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records, " 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this

collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230