

# Science of Science and Innovation Policy (SciSIP)

FY 2007

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## Program Solicitation

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):

May 22, 2007

Full Research Proposals

## REVISION NOTES

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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](http://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

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### General Information

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**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). SciSIP will underwrite fundamental research that creates new explanatory models and analytic tools 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 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; and (3) develop a community of experts across academic institutions focused on SciSIP. 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. Research teams may also focus on specific scientific domains or synthesize elements from disparate disciplines to develop new models or tools. For example, 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 might make strategic investments in incremental or large-leap innovations. In a different vein, a multidisciplinary research team might be instrumental in investigating first hand the productivity benefits and costs of interdisciplinary team collaborations.

The FY 2007 competition includes two emphasis areas: Analytical Tools and Model Building. 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, and at the state, national and international levels. Future solicitations will also target research that would improve and expand science metrics and datasets.

**Cognizant Program Officer(s):**

- Kaye Husbands Fealing, Science Advisor, Science of Science and Innovation Policy, Directorate for Social, Behavioral, and Economic Sciences, 907 N, telephone: (703) 292-7267, email: [khusband@nsf.gov](mailto:khusband@nsf.gov)

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

- 47.075 --- Social, Behavioral and Economic Sciences

**Award Information**

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**Anticipated Type of Award:** Standard Grant

**Estimated Number of Awards:** 20 to 30

**Anticipated Funding Amount:** \$50,000 to \$400,000 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. These estimates are subject to the availability of funds. Additional funds are anticipated in future years.

**Eligibility Information**

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**Organization Limit:**

Proposals may only be submitted by the following:

- U.S. universities and colleges (including two-and four-year colleges and community colleges) and non-profit organizations in the U.S. Proposals from individuals, for-profit organizations or foreign organizations will not be accepted. However, individual researchers 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. NSF will not pay indirect costs on subawards to foreign

organizations.

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.

#### **PI Limit:**

An individual may appear as Principal Investigator (PI), co-PI, other senior personnel or investigator on only one SciSIP proposal submitted in FY 2007 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**

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#### **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](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>)

#### **B. Budgetary Information**

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

#### **C. Due Dates**

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

Full Research Proposals

**Proposal Review Information Criteria**

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**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**

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**Award Conditions:** Standard NSF award conditions apply

**Reporting Requirements:** Standard NSF reporting requirements apply

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**I. INTRODUCTION**

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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 will underwrite fundamental research that creates new explanatory models and analytic tools 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 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; and (3) develop a community of experts at academic institutions focused on SciSIP. 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. Research teams may also focus on specific scientific domains or synthesize elements from disparate disciplines to develop new models or tools. For example, 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 might make strategic investments in incremental or large-leap innovations. In a different vein, a multidisciplinary research team might be instrumental in investigating first hand the productivity benefits and costs of interdisciplinary team collaborations.

The FY 2007 competition includes two emphasis areas: Analytical Tools and Model Building. 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, and at the state, national and international levels. Future solicitations will also target research that would improve and expand science metrics and datasets.

The research objectives go beyond the traditional input-output linkages, to broader outcomes, such as implications for national health, security, education, and 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

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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 lampposts or 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 appropriate fields. NSF also encourages SciSIP projects to include junior researchers as team members and, when appropriate, to develop international collaborative partnerships.

The SciSIP activity overlaps with many other research activities and areas at NSF. 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 Change, Methodology, Measurement and Statistics, Social Psychology, and Development and Learning Sciences.

### A. SciSIP EMPHASIS AREAS

All proposals submitted to the Science of Science and Innovation Policy competition **must** identify one of the two emphasis areas described below Models and Tools. Research projects that involve both of these emphasis areas are encouraged, but a primary area of emphasis must be identified. There is particular interest in path-breaking ideas with relevance to understanding the discovery and innovation processes, as well as prospective analyses on science and technology investments in the face of risk and uncertainty. Priority will be given to those 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 flows and stocks; models that can be used to assess and inform science and technology investment decisions; computational models of creativity; agent-based and network models; risk and uncertainty assessment models; portfolio management models; complexity theory; stochastic and dynamical systems theory; organizational studies of discovery and innovation; and frameworks that systematically relate how intellectual, social and physical organization influence creativity and innovation.

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 community data. Community 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.

### **Tools (TLS)**

Although guided by theoretical and empirical foundations of science policy, policymakers need enabling tools for assessments, 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-computing power; and data visualization.

## **B. GENERAL INFORMATION REGARDING ALL EMPHASIS AREAS**

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.

All SciSIP proposals will be evaluated with respect to their intellectual merit, their broader impacts, and their responsiveness to the goals of the SciSIP competition. Multidisciplinary advisory panels will evaluate all proposals. Proposals that do not target SciSIP goals will be returned without review. Proposals that fit existing programs may be considered by these programs.

### III. AWARD INFORMATION

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Pending availability of funds, NSF anticipates making approximately 20 to 30 SciSIP awards in FY2007. 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. 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, with maximum award sizes of \$400,000. These estimates are subject to the availability of funds.

### IV. ELIGIBILITY INFORMATION

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#### Organization Limit:

Proposals may only be submitted by the following:

- U.S. universities and colleges (including two-and four-year colleges and community colleges) and non-profit organizations in the U.S. Proposals from individuals, for-profit organizations or foreign organizations will not be accepted. However, individual researchers 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. NSF will not pay indirect costs on subawards to foreign organizations.

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.

#### PI Limit:

An individual may appear as Principal Investigator (PI), co-PI, other senior personnel or investigator on only one SciSIP proposal submitted in FY 2007 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

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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**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](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](mailto: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](mailto: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 Grant Proposal Guide (GPG) or NSF Grants.gov Application Guide proposal preparation guidelines. 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 or TLS) 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.

**Table of Contents.** The Table of Contents is system-generated and cannot be edited.

**Project Description.** All SciSIP project descriptions should address the following special criteria. Reviewers will be asked to use these criteria to evaluate the proposals:

- **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 encouraged. 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 Grant Proposal Guide (Chapter II.C.2.f, <http://www.nsf.gov/pubsys/ods/getpub.cfm?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.

**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, Appendix F). This list should also include all individuals on subawards who fall into the category of senior personnel. This document needs only to be included with the lead proposal.
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 2007 as a PI, co-PI, other senior personnel or investigator 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 2007 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.
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 community data. Community 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.

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 U.S. universities and colleges, including two- and four-year colleges and community colleges, acting on behalf of their faculty members. In addition, non-profit organizations in the U.S. 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 GPG 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 III 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/hsfaqs.jsp>.

## **B. Budgetary Information**

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

## **C. Due Dates**

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

May 22, 2007

Full Research Proposals

## **D. FastLane/Grants.gov Requirements**

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- **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](mailto: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/CustomSupport>. 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](mailto: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

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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

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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:**

**All SciSIP project descriptions should address the following special criteria. Reviewers will be asked to use these criteria to evaluate the proposals:**

- **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 encouraged. 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.

## **B. Review and Selection Process**

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Proposals submitted in response to this program solicitation will be reviewed by 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**

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## A. Notification of the Award

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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

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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](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](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpm](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm).

## C. Reporting Requirements

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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

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General inquiries regarding this program should be made to:

- Kaye Husbands Fealing, Science Advisor, Science of Science and Innovation Policy, Directorate for Social, Behavioral, and Economic Sciences, 907 N, telephone: (703) 292-7267, email: [khusband@nsf.gov](mailto:khusband@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto: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](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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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

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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](mailto: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

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