

Science and Technology Centers: Integrative Partnerships

PROGRAM SOLICITATION

NSF 08-580

REPLACES DOCUMENT(S):

NSF 03-550



National Science Foundation

Directorate for Biological Sciences

Directorate for Computer & Information Science & Engineering

Directorate for Education & Human Resources

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical & Physical Sciences

Office of Cyberinfrastructure

Office of Integrative Activities

Office of International Science and Engineering

Office of Polar Programs

Directorate for Social, Behavioral & Economic Sciences

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. proposer's local time):

October 14, 2008

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

April 30, 2009

Full proposals are by invitation only.

IMPORTANT INFORMATION AND REVISION NOTES

August 29, 2008

The organizational restriction which specified:

"A single organization may also request funding via a subaward as a funded partner organization. In no case, may an organization request funds as a lead or funded partner organization on more than five preliminary proposals."

has been eliminated. The restriction on the number of preliminary proposals that an organization may submit as the lead organization remains unchanged at three.

In consideration of this change, the deadline for submission of preliminary proposals has been extended to 5 p.m., proposer's local time, on October 14, 2008.

July 1, 2008

The following items have been revised and updated for this solicitation: cost sharing; eligibility information related to the number of preliminary proposals; current and pending support statement requirements; and allowance of collaborative proposals.

Cost sharing is no longer required for preliminary or full proposals submitted in response to this solicitation.

An organization may submit no more than three proposals as lead institution; however, an organization may participate in up to five proposals as lead or funded partner organization (see Eligibility Information for more details).

Centers requesting financial support for the lead and partner institutions must submit a single proposal with sub-awards; collaborative proposals will not be accepted.

Current and pending support statements are required in the full proposal for the principal investigator (PI) and co-PIs only.

Font and margin requirements will be strictly enforced (See section II.B.2 of the [NSF Grant Proposal Guide](#)).

In response to this program solicitation, proposers invited to submit full proposals may opt to do so via Grants.gov or via the NSF FastLane system.

Due to the complexity of the proposals being submitted, however, use of FastLane to prepare and submit invited full proposals is strongly encouraged.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Science and Technology Centers: Integrative Partnerships

Synopsis of Program:

The Science and Technology Centers (STC): Integrative Partnerships program supports innovative, potentially transformative, complex research and education projects that require large-scale, long-term awards. STCs conduct world-class research through partnerships among academic institutions, national laboratories, industrial organizations, and/or other public/private entities, and via international collaborations, as appropriate. They provide a means to undertake important investigations at the interfaces of disciplines and/or fresh approaches within disciplines. STC investments support the NSF vision of advancing discovery, innovation and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.

Centers provide a rich environment for encouraging future scientists, engineers, and educators to take risks in pursuing discoveries and new knowledge. STCs foster excellence in education by integrating education and research, and by creating bonds between learning and inquiry so that discovery and creativity fully support the learning process.

NSF expects STCs to demonstrate leadership in the involvement of groups traditionally underrepresented in science and engineering at all levels within the Center. To achieve their diversity objectives, STCs are expected to involve individuals from underrepresented groups as members of the Center faculty, and as students actively engaged in Center activities. STCs are strongly encouraged to form meaningful, substantive and long-term partnerships with minority-serving institutions, women's colleges and institutions that primarily serve students with disabilities, thereby providing formal connections with institutions that serve large populations of underrepresented students interested in STEM.

Centers undertake activities that will facilitate knowledge transfer, i.e., the mutual exchange of scientific and technical information among the Center partners and others with the objective of disseminating and utilizing knowledge broadly in multiple sectors.

To date, five competitions have been held to establish NSF Science and Technology Centers. The first two competitions, one in the late 1980's and one in the early 1990's, led to the establishment of 25 Science and Technology Centers, which are no longer funded as NSF centers. A third competition for Science and Technology Centers: Integrative Partnerships was held in 1999 and resulted in five new Centers. A fourth competition resulted in six new Centers in 2002. The fifth and most recent competition, in FY 2005, added six centers.

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.078 --- Office of Polar Programs
- 47.079 --- Office of International Science and Engineering
- 47.080 --- Office of Cyberinfrastructure
- 47.081 --- Office of Experimental Program to Stimulate Competitive Research

Award Information

Anticipated Type of Award: Cooperative Agreement - initial commitment of five years; the possibility of five-year renewal.

Estimated Number of Awards: 5 to 7

Anticipated Funding Amount: \$25,000,000 for first year support of newly funded centers. Funds are approximate and subject to availability in FY 2010.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Preliminary proposals and invited full proposals may be submitted by U.S. academic institutions that have research and degree-granting education programs in any area of research supported by NSF. The lead institution is expected to develop multi-institutional partnerships or arrangements with other universities/colleges, national laboratories, research museums, private sector research laboratories, state

and local government laboratories, and international collaborations that enable the Center to attain its strategic goals. Partner institutions invest intellectual resources in Center activities and work collaboratively with the lead institution and NSF to ensure integration of the research, education, broadening participation, and knowledge transfer activities of the Center and to attain the performance goals of the Center. The lead institution has ultimate responsibility for planning, operating, and managing all Center activities, including institutional resources provided by the partners. NSF will not provide funds to non-U.S. partner institutions.

PI Limit:

None Specified

Limit on Number of Proposals per Organization: 3

A single organization may submit a maximum of three preliminary proposals as the lead institution. Full proposals are to be submitted only when invited by NSF. **The STC program will not provide support for more than one proposed Center from any one lead institution in this competition.**

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information

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

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):
October 14, 2008
- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):
April 30, 2009
Full proposals are by invitation only.

Proposal Review Information Criteria

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

Award Administration Information

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

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The Science and Technology Centers: Integrative Partnerships — Concept

The Science and Technology Centers (STC): Integrative Partnerships program supports innovative research and education projects that require large-scale, long-term investments. STCs conduct world-class research through partnerships among academic institutions, national laboratories, industrial organizations, and/or other public/private entities, and via international collaborations, as appropriate. Their partnerships build intellectual and physical infrastructure within or between disciplines and facilitate the creation, integration, and transfer of new knowledge.

The STC program supports important investigations at the interfaces of disciplines or fresh approaches within disciplines. STCs exploit opportunities in science, engineering and technology where the complexity of the research agenda requires the duration, scope, scale, flexibility, and facilities that Center support can provide. They help enable U.S. leadership in research areas in a world in which discovery, learning and innovation enterprises are increasingly interconnected, and increasingly global. Centers offer the science and engineering community a venue for interaction and an effective mechanism to undertake long-term, integrated scientific and technological research and education activities; to explore better and more effective ways to educate students; to broaden participation of underrepresented groups; and to develop approaches to ensure the timely transfer of research and education advances made in service to society. STC partner institutions work together with the lead institution as an integrated whole to achieve the shared research, education, diversity, and knowledge-transfer goals of the Center.

II. PROGRAM DESCRIPTION

A. Objectives of the STC Program are to:

- Support research and education of the highest quality in a Center-based environment in which the whole is greater than the sum of its parts;
- Exploit opportunities in science, engineering and technology where the complexity of the research agenda requires the advantages of scope, scale, flexibility, duration, equipment, and facilities that a Center can provide;
- Support innovative frontier investigations at the interfaces of disciplines and/or investigations that will lead to fresh approaches within disciplines;
- Engage and develop the Nation's intellectual talent, including groups underrepresented in the sciences, mathematics and engineering disciplines, in the conduct of research and education activities;
- Promote organizational connections and linkages within and between campuses, schools or the world beyond (state, local, federal agencies, national labs, industry, international collaborations), capitalizing upon cyberinfrastructure to facilitate these linkages;
- Focus on integrative learning and discovery and the preparation of U.S. students for a broad set of career paths; and
- Foster science and engineering in service to society especially with respect to new research areas, promising new instrumentation and potential new technologies.

B. Characteristics of Science and Technology Centers

The partners comprising an STC share an ambitious research vision or theme of national importance that integrates research and education and is of sufficient scale and complexity to require the Center mode of support. The Center's theme may involve any area of research supported by NSF (Consult the NSF Guide to Programs for further details: http://www.nsf.gov/funding/browse_all_funding.jsp). STCs vary in size and exhibit diverse forms of organization, collaboration, and operation suited to their individual needs. The size, structure, and operation of an STC are determined by the proposed research, education, and knowledge transfer activities. Not every partner must support every aspect of the Center's activity, but all of the expected features of a Center must be accomplished via the integrated portfolio of partners activities. PIs are encouraged to exploit aspects of cyberinfrastructure such as high performance computing, data analysis and visualization, and virtual organizations for distributed communities, in order to support the science and engineering goals of the Center, and to enable and enhance collaborations and resource sharing among the partner institutions. (Further information is available in the NSF document, *Cyberinfrastructure Vision for 21st Century Discovery*: <http://www.nsf.gov/pubs/2007/nsf0728/index.jsp>.)

Activities that define Center partnerships must be integrated at all levels, and all partners must share a common commitment to achieving the research, education, diversity and knowledge transfer goals espoused by the Center. Partnerships may include multi-institutional collaborations or arrangements with other universities/colleges, national laboratories, research museums, private sector research laboratories, state and local government laboratories, and international collaborations. A partner is an organization or institution that invests intellectual resources in Center activities and works collaboratively to ensure achievement of Center goals.

The STC program seeks to support education activities directed toward development of a diverse, internationally competitive and globally engaged workforce of scientists, engineers, and citizens well-prepared for a broad set of career paths. The education goals of an STC may address the needs of students participating in Center research activities, of students in broader fields of research represented by the STC activities, and of other college and pre-college students, faculty and teachers as appropriate for the Center, its partners, and the various disciplines. Within Centers, education and human resource development may be advanced through formal and informal education, research, and varied activities such as summer programs, workshops, and recruitment and retention programs. STC Student Councils may be established to encourage student interaction and collaboration across research groups and campuses. These activities should be based on current research, form a cohesive effort with the

appropriate expertise involved, and be monitored by a formal evaluation effort led by competent evaluators. STCs foster excellence in education by integrating education and research, by creating bonds between learning and inquiry so that discovery and creativity fully support the learning process, and by engaging in systematic evaluation of the effectiveness of these efforts. Centers provide a rich environment for encouraging future scientists, engineers, and educators to take risks in pursuing discoveries and new knowledge. For STCs, developing effective educational programs that integrate research and education will broaden the career paths of students and attract more U.S. citizens, nationals and permanent residents (http://travel.state.gov/law/citizenship/citizenship_781.html) into graduate STEM fields.

NSF expects STCs to demonstrate leadership in the involvement of groups traditionally underrepresented in science and engineering, at all levels within the Center. NSF is committed to the principle of diversity and deems it central to the activities it supports. To achieve their diversity objectives, STCs may involve individuals from underrepresented groups as members of the Center faculty and as students and postdoctoral researchers actively engaged in the Center activities. STCs are also encouraged to form substantive and long-term partnerships and collaborations with minority-serving institutions. Increasing the participation of a diverse U.S. citizenry, including women, persons with disabilities, and underrepresented minorities, by creating opportunities and enabling them to contribute is essential to the health and vitality of science and engineering. The Higher Education Act defines the term "underrepresented minority" as an American Indian, Alaskan Native, Black (not of Hispanic origin), Hispanic (including persons of Mexican, Puerto Rican, Cuban, and Central or South American origin) and Pacific Islanders (<http://www.ed.gov/about/offices/list/ocr/edlite-minorityinst-list.html>).

STCs foster a climate of interaction and effective knowledge transfer among departments within the lead institution and between the lead institution and its partners, which may include other universities and colleges, industry, government, local communities and the public. Knowledge transfer activities involve the mutual exchange of scientific and technical information among the Center partners and others with the objective of applying the knowledge. Knowledge transfer focuses on disseminating and utilizing knowledge broadly through multiple economic sectors and sharing of resources to further the creation and utilization of new knowledge. In a Center environment, knowledge transfer is multidirectional and may be facilitated in a variety of ways, including: involvement of industrial or other non-academic experts on the STC external advisory committee or on graduate student advisory committees, formal partnerships established through membership agreements, faculty consulting relationships with industry, visiting instructorships by industrial scientists at the STC, use of industrial or university facilities, student internships in industry, student mentoring by industrial or other partners, innovative use of cyberinfrastructure, and/or other mechanisms.

C. Leadership, Management, and Oversight of STCs

One of the partner institutions must accept overall management and budgetary responsibility for the proposed Center and is thus designated as the lead institution. The lead institution has ultimate responsibility for planning, operating, and managing the Center. Proposals must describe the essential role of the lead and each partner institution and explain the contribution of each to the integrated research, education and knowledge transfer goals of the Center. Proposals must contain a management plan as described in the proposal preparation instructions below.

Each Center has dedicated full-time leaders in key positions who are responsible for Center direction, management, research, education and knowledge transfer. The Center Director must have the leadership capacity to develop and lead a diverse team to fulfill the vision of the Center. He/she may choose to direct the research or may delegate responsibilities to selected Center leaders. The Center Director is responsible for the management, staffing, and resource allocation of the Center, for administering the award in accordance with NSF policies and the terms of the Cooperative Agreement, and for serving as the liaison between the Center and the National Network of STC Directors. The Center Director must assure that the STC develops the ability to communicate with NSF and the other STCs electronically, including web-based distribution of information and videoconferencing capability. Key members of the Center management team must demonstrate adequate management experience and qualities to administer their component of the Center. The Center team must develop a management plan to share responsibilities as appropriate. The Center-financed team must support the Director in his/her role and take responsibility for management, research, education, and knowledge transfer.

STC Directors will serve collectively as members of a national liaison team for the STC Program. This National Network of STC Directors is charged with addressing common goals, problems and opportunities, and facilitating personnel and resource exchanges as well as ensuring linkages and cooperation among Centers. Each STC Director is responsible for developing, implementing, and maintaining an active liaison with the network. The chair of this liaison team will be elected annually by participating members and will serve a one-year term.

Typical functions of the National Network of STC Directors include: fostering complementarity and balance among research, education and knowledge transfer activities, and avoidance of duplication of effort; facilitating interactions to address research, education, and management issues and opportunities that transcend individual Center capabilities; acting as a liaison with private sector, state, local and national laboratories to identify needs/opportunities and to plan joint implementation strategies, workshops, and other forums; cooperating and serving as a liaison with NSF staff in the development and maintenance of databases and other metrics in response to the requirements of the Government Performance and Results Act and other assessment activities; and preparing documents or web sites to enhance public understanding concerning the importance of science, engineering, technology and education advances in service to society.

Each Center will establish, maintain, and convene annually an External Advisory Committee (EAC). The function of the EAC is to provide guidance, advice, and oversight for all the Center's activities, consistent with its vision, goals, and objectives. EAC membership is subject to NSF approval and must include representation from those sectors served by the Center (e.g., academic institutions, industry, state and local agencies, national laboratories), and must include members of underrepresented groups (for example, women, persons with disabilities and minorities). The EAC must also include members having the capability to assess all aspects of the project including management, research, education, and knowledge transfer. Individuals with a financial, institutional, or collaborative connection to the Center may not serve as members of the external advisory committee. The EAC will develop a charter and submit it with the Center's first annual progress report.

D. Summary of STC Features

Each STC must

- Be focused on research and education at the research frontier, and of scope and scale to demand funding through the center mechanism.
- Be based in an academic institution;
- Be directed by a science or engineering faculty member and be integrated into academic programs;
- Have an annual budget ranging from \$1.5M to \$5.0M of NSF support;
- Demonstrate a tangible commitment to achieving strategic goals shared by the lead and partnering institutions as demonstrated by institutional commitments;
- Establish multi-institutional collaborations or linkages with other universities/colleges, national laboratories, research museums, private sector research laboratories, state and local government organizations, and international collaborations, as appropriate;
- Develop a management plan that integrates the research, education, diversity, and knowledge transfer

- activities across all partners and affiliates;
- Include diverse teams at all organizational levels of the Center, inclusive of women and men, underrepresented minorities, and persons with disabilities;
- Provide research and education opportunities for U.S. students, postdoctoral researchers and faculty that will result in outcomes consonant with the Center's goals. A recruitment plan for U.S. students (citizens, permanent residents, nationals) must be proposed and maintained during the life of the center.
- Include industrial, national or international internships or other career broadening experiences for faculty, postdoctoral researchers and students, appropriate to the research area;
- Facilitate knowledge transfer through significant intellectual exchange and resource linkages among various types of institutions and organizations (e.g., schools; colleges and universities such as minority-serving institutions, community colleges, EPSCoR institutions, and others; nonprofit organizations; national laboratories; industry; federal, state, and local governments), and via international collaborations, as appropriate;
- Demonstrate appropriate leadership for the Center program—each Center must have a Director with the capacity to develop and lead a diverse team to fulfill the vision of the Center. The management team must comprise dedicated full-time leaders in key positions who are responsible for Center direction, management, research, education, broadening participation, and knowledge transfer;
- Develop, implement and formally evaluate research-based activities to meet education, diversity, and knowledge-transfer goals;
- Establish and convene annually an External Advisory Committee to provide guidance, advice, and oversight; and
- Participate in the National Network of STC Directors.

E. Milestones for this FY-2008 to FY-2010 STC competition:

- Preliminary proposals due October 14, 2008
- Panel review of preliminary proposals, January, 2009
- Invited list announced and declines informed, January 30, 2009
- Invited full proposals due April 30, 2009
- Full proposal review (mail and panel), May-July 2009
- Notification of invitation for site visit, and declined PIs informed, August 2009
- Site visits (management and budget focus), September-October 2009
- NSF external ad hoc STC Review Committee (Blue Ribbon Panel), early December 2009
- NSF-STC management team recommendations, early January 2010
- Recommendations to NSF senior management, January 2010
- NSB consideration of awards, February 2010
- Declines informed and recommended awards announced, March 2010
- Development and approval of Center strategic plan and cooperative agreement, March – June 2010
- Anticipated start date of awards, June 2010

III. AWARD INFORMATION

Approximately \$25 million is expected to be available for first year support of newly funded centers in FY 2010, and NSF expects to make 5-7 awards, contingent on availability of funds. Each award will be made as a Cooperative Agreement to the lead institution, with an initial commitment for five years of support and a possibility of renewal for five additional years. The amount of NSF's investment in each Center will depend upon the needs, plans, and opportunities offered by the Center, as well as the availability of NSF funds. Awards from this competition are expected to commence in June 2010. Oversight of each individual STC is the responsibility of the appropriate NSF research directorate in coordination with the Office of Integrative Activities (OIA). Support for each year of the Cooperative Agreement of a funded STC will be contingent upon a satisfactory annual review and site visit by NSF of the Center's progress and future plans, with an emphasis on the quality of the research, education, diversity and knowledge transfer activities. In the fourth year of operation, the STC may submit a renewal proposal for five additional years of NSF support. During the subsequent annual review, the STC's achievements and future plans will be evaluated comprehensively to determine if the STC is meeting its goals and objectives as well as the goals and objectives of the STC Program. This in-depth review will consist of an ad hoc review of the renewal proposal and a formal on-site review, involving external reviewers who will produce a written report to NSF. Centers successful in passing the fourth-year review will be renewed for another five years, commencing at the beginning of the sixth year. The Cooperative Agreement will include a two-year phase-out period for years nine and ten. Centers that pass the fourth-year review will continue to be reviewed by NSF every 12 months. Centers that do not pass the fourth year review will be phased-out over a one-year period at a reduced level of support. The NSF may support an STC for a maximum of ten years.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Preliminary proposals and invited full proposals may be submitted by U.S. academic institutions that have research and degree-granting education programs in any area of research supported by NSF. The lead institution is expected to develop multi-institutional partnerships or arrangements with other universities/colleges, national laboratories, research museums, private sector research laboratories, state and local government laboratories, and international collaborations that enable the Center to attain its strategic goals. Partner institutions invest intellectual resources in Center activities and work collaboratively with the lead institution and NSF to ensure integration of the research, education, broadening participation, and knowledge transfer activities of the Center and to attain the performance goals of the Center. The lead institution has ultimate responsibility for planning, operating, and managing all Center activities, including institutional resources provided by the partners. NSF will not provide funds to non-U.S. partner institutions.

PI Limit:

None Specified

Limit on Number of Proposals per Organization: 3

A single organization may submit a maximum of three preliminary proposals as the lead institution. Full proposals are to be submitted only when invited by NSF. **The STC program will not provide support for more than one**

proposed Center from any one lead institution in this competition.

Limit on Number of Proposals per PI:

None Specified

Additional Eligibility Info:

Proposed STC annual budgets may range from \$1.5M to \$5.0M per year of NSF support. Preliminary proposals and full proposals outside this range will be returned without review. Each preliminary and invited full proposal must demonstrate institutional commitment in the area proposed. Cost sharing is not required; therefore, voluntary cost sharing, if provided, will not influence the review process.

Past STCs or group members from Centers may participate in this open competition, but must propose to focus on radically different research and education topics or themes from those they were pursuing with prior NSF Center support. The proposers must focus on a different research topic and different education issues, not simply extend the methods and intent of the past STC to a slightly larger purview or a new geographic area.

The STC Program complements the Engineering Research Centers, the Materials Research Science and Engineering Centers, the Nanoscale Science and Engineering Centers, Science of Learning Centers, Centers of Research Excellence in Science and Technology, and other NSF programs that support group research and education activities; proposals that might typically be eligible for such programs are welcome in the STC program. Simultaneous submission of duplicate or substantially similar proposals to other NSF programs is not permitted, and such proposals will not be considered. However, participation in a Center does not preclude individuals from receiving NSF support for their individual research in complementary areas.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

When preparing a preliminary proposal for this competition, proposers are advised to consult the Program Description and the Proposal Review Information found in this solicitation for general information pertinent to the STC program. Required components of the preliminary proposal are given below. Strict adherence to page limitations given in this document is required. Descriptions should be clear and concise. Proposers should review the most current [NSF Grant Proposal Guide \(GPG\)](#) for specific information on signatures and format for the required sections. Proposers are also encouraged to access the STC web site for updated information and answers to frequently asked questions (FAQ's) relevant to this competition: <http://www.nsf.gov/od/oa/programs/stc/index.jsp>.

Preliminary Proposal Contents

Required Sections of the Preliminary Proposal

The preliminary proposal items allowed will consist only of the main documents and supplementary documents described in Sections (1)-(10) below.

1. Cover Sheet. For planning purposes, **June 1, 2010** should be shown as the start date. The proposed Center Director must be shown as the Principal Investigator.
2. Project Summary (up to 2 pages). The summary should be written in the third person and should provide a rationale for the Center, describe the unique opportunities to be provided by the Center, and indicate the potential national impact of the Center. The summary should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader. The summary should provide a clear description of the proposed Center, its vision, mission, and goals, its distinguishing features and focus; and the value added of funding the activity as a Center. State the long-range plans for the proposed research and education themes, indicate how the research and education are to be integrated, provide the knowledge transfer strategies of the Center, and state the diversity goals of the Center. The names of the partner institutions involved with the proposed Center and the major contribution of each to the Center components must be included in the description. Both NSF merit review criteria (intellectual merits and broader impacts) must be addressed in separate statements (see [GPG](#) for additional instructions).
3. Table of Contents. A Table of Contents is automatically generated for the proposal by the FastLane system. The proposer cannot edit this form.
4. Project Description. The Project Description must contain Sections (4.a) through (4.d), and is limited to 10 pages including tables and illustrations regardless of the number of research groups or themes. Links to URL's may not be used (see [GPG](#) for additional information). The broader impacts resulting from the proposed project must be addressed and described as an integral part of the narrative. Results from Prior NSF Support should **not** be included in the Project Description.

(4.a) Narrative description of the Center's Research Plans and Objectives (by themes or research areas): State and briefly describe the long-range research goals and the research components of the integrated center. Provide a tentative timeline for major milestones to be achieved over the first five-year period. The proposed research should be sufficiently complex, large-scale and long-term to justify a Center and flexible enough to permit change as the research proceeds. Name the partner organizations and key individuals affiliated with each. Explain what unique opportunities will be provided by the Center and also the potential contributions and roles of the STC partner organizations and key individuals. Address the impact or potential of the Center to produce scientific and technological breakthroughs of national and global importance. Provide sufficient detail to allow assessment of the scientific merit and the necessity for the Center mode of operation.

(4.b) Narrative description of the Center's Education and Human Resource Plans and Objectives: State and briefly describe the long-term education and human resource goals of the integrated center. Provide a tentative timeline for major milestones to be achieved over the first five-year period. STC education goals may address the educational needs of students participating in the Center research activities and students in the broader fields of research represented by the STC, and may involve other college and pre-college students, faculty, and teachers, as appropriate to the Center goals. Briefly outline plans for attracting and retaining high quality students, including U.S. citizens, nationals and permanent residents, and those from underrepresented groups, in the Center research and education activities, and for formally evaluating the

effectiveness of these approaches. Name the partner organizations and key individuals affiliated with special activities, and explain the potential contributions and roles of each. Describe the planned approaches for establishing the impact of education activities on research and knowledge transfer and vice-versa. Provide sufficient detail to allow assessment of the potential merit and impact of the strategic integration of education activities with the research and other partnership opportunities of the Center.

State and briefly outline the Center's diversity goals, plans for increasing the participation of women, underrepresented minorities, and people with disabilities in all levels of Center activities, and mechanisms for monitoring the effectiveness of these approaches. Describe the contribution and role of each partner institution to the diversity plan and its implementation. Describe the diversity plans in sufficient detail to allow assessment of their merit and impact.

(4.c) Narrative description of the Center's Knowledge Transfer Plans and Objectives: Briefly outline plans and expected impact of knowledge transfer activities among Center partners and between Center partners and others with the objective of applying the knowledge. Knowledge transfer should focus on disseminating and utilizing knowledge broadly, and sharing of resources to further the creation and utilization of new knowledge. Knowledge transfer may involve public and community groups, schools, colleges and universities such as minority-serving institutions, community colleges, EPSCoR institutions, and others; nonprofit organizations; national laboratories; industry; federal, state, and local governments. Outline plans for mutual sharing of knowledge linking such organizations and the STC partners. Linkages should be based upon mutual exchange of scientific and technical information, significant intellectual exchange and resource commitments, and may involve internships and the use of cyberinfrastructure. Indicate the purpose and benefit of international collaborations, as appropriate.

(4.d) Narrative Description of the Center's Leadership and Management Plan: State and briefly describe the Center management team and provide an outline and a simplified chart of the management structure of the integrated Center. Describe the integrated organizational structure, including plans for integrating and managing all partners and project personnel involved in the research, education, and knowledge transfer components. Name the key individuals. There must be a Center Director, with the leadership capacity to develop and lead a diverse team to fulfill the vision of the Center. He/She may choose to direct the research or may delegate responsibilities to selected research leaders. The center management team should include individuals responsible for management, research, education, broadening participation and knowledge transfer activities. They must have adequate management experience and qualities to administer their component of the Center.

Describe the management plan and center structure in sufficient detail to demonstrate that the research, educational, and knowledge transfer activities are strategically integrated with one another such that the whole is greater than the sum of the parts. The Center management structure should also promote organizational connections and linkages among the partners and with the world beyond the Center.

5. Budget (see [GPG](#)). Provide a one-page budget for the full 5-year period (this should be entered in Budget Year 1 in FastLane). The proposed budget should be consistent with the needs and complexity of the proposed activity. Details of the budget justification should provide some information for each year of the full five-year period, showing how funds will be allocated to the research, education, broadening participation, and knowledge transfer areas during the start-up phase, and major equipment that will be required.
6. References Cited (two-page limit). See NSF [GPG](#) instructions.
7. Biographical Sketches (two-page limit per person). Biographical sketches are required for all key participants (Center Director, Managing Director, Education Coordinator, Knowledge Transfer Coordinator, Diversity Coordinator, Research Coordinator, Research Group Leaders, or equivalent). Use instructions from NSF [GPG](#) section II.C.2.f. Copies of publications should not be included or sent to NSF.

Special Information and Required Supplementary Documents (Sections 8-10): (Required information to be entered in the Supplementary Documents section of FastLane)

8. Lists of Partner Institutions and Project Personnel. Provide current, accurate information for the two required lists described below. This information provides NSF and reviewers with a comprehensive list of personnel and institutions involved in the STC; it is used in determining conflicts of interest in the review process.
 - (8.a) Partner Institutions. List all institutions and organizations for which there are corresponding project personnel listed in Section (8.b.). List all partner organizations (those that plan to make a commitment to the Center, e.g., industries providing student fellowships, etc.) at the time of submission of the preliminary proposal. Organize the list of institutions involved in the proposed Center into the following categories, as applicable: Academic Institutions (colleges, universities), National Laboratories, Federal Government, Industry, Non-Governmental Organizations, State and Local Government, International, and Other. For each category, list the partner institutions for that category in alphabetical order.
 - (8.b) Project Personnel. List all personnel who would have a role in the management, research, education, and knowledge transfer components of the Center. For each person, provide the first name, last name, and institution/organization. Subdivide the list of project personnel into the following categories, as applicable: Academic Institutions (colleges, universities), National Laboratories, Federal Government, Industry, Non-Governmental Organizations, State and Local Government, International, and Other. If appropriate, indicate facilities or major instrumentation to be shared.
9. Institutional Commitment (one-page limit). Provide a synopsis of institutional and other support of the proposed Center. Outline the lead institution's commitment: space (new space and/or renovations to existing facilities), faculty and staff positions, capital equipment, and access to facilities and instrumentation. Major commitments of partner institutions should also be described. Describe how the commitment contributes to realizing the strategic goals of the integrated Center. Describe support from all other sources that has been committed, including space, facilities, and personnel for the Center. Note that cost sharing is not required; voluntary cost sharing, if provided, will not influence the review process.
10. Results of Prior Support for PI and Co-PIs (2 pages). Provide information only for the PI and each co-PI, for contributions to the development of human resources in science and engineering, including broadening participation, over the past five years (from any funding source). Include a brief statement of results of funded projects.

Optional Information to be submitted to NSF via the FastLane Single Copy Documents Section.

- List of suggested reviewers or reviewers not to include;
- Proprietary or privileged information (if applicable).

Required Information to be submitted to NSF via email.

In addition to the FastLane instructions, the proposer must send the following document via email. After receipt of the proposal number from FastLane, send an email to stc@nsf.gov. The subject heading of the email should note the proposal number and the lead institution. Attach the following document to it:

The table of participants and partners inserted into an Excel spreadsheet available on the STC Program website (<http://www.nsf.gov/od/oa/programs/stc/index.jsp>). This table will be used by NSF to check for conflicts of interest in assembling the review community. Remember to email this table to stc@nsf.gov; do not submit it through FastLane.

No other items or appendices are to be included. Information pertaining to "Current and Pending Support", and "Facilities, Equipment and Other Resources" is not required for preliminary proposals and should not be included. Preliminary proposals containing items other than those required above will be returned without review.

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 nsfpubs@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 nsfpubs@nsf.gov.

Full proposals will be accepted only if invited by NSF. **Due to the complexity of the proposals being submitted, use of FastLane to prepare and submit invited full proposals is strongly encouraged.** When preparing a full proposal for this competition, proposers are advised to review the Program Description and the Proposal Review Information found in this solicitation for general information pertinent to this program. Proposers are encouraged to review the most current NSF Grant Proposal Guide (GPG) for specific information on signatures and format for the required sections. Proposers are encouraged to review the STC web site for updated information and answers to frequently asked questions: <http://www.nsf.gov/od/oa/programs/stc/index.jsp>.

The full proposal should provide much more detail than the preliminary proposal and include information on implementation plans and assessment. Descriptions should be clear and concise. Every effort should be made to update information that was provided in the preliminary proposal and to fully address issues raised in the preliminary proposal review. Full proposals should be comparable in scope and budget to that which was presented in the preliminary proposal. Required proposal components and additions to or differences from the NSF GPG are given below.

Full Proposal Contents

Required Sections of the Full Proposal

The full proposal must include only the main documents and supplementary documents described in Sections 1-13, below.

1. Cover Sheet. For planning purposes, **June 1, 2010** should be shown as the start date. The full proposal must show the proposed Center Director as the Principal Investigator. Include the pre-proposal number and follow instructions provided in FastLane and GPG.
2. Project Summary (two-page limit). The summary should be written in the third person and should make a compelling case for a Center. The summary should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader. Include the names of the Center, Director, and lead institution at top of the first page. Write a clear description of the Center, provide a rationale for the Center; and state the mission and vision of the Center. Provide highlights of its distinguishing features, multidisciplinary or disciplinary focus; the proposed research goals and goals for education of U.S. students in the Center; the integrative nature of the Center; the diversity plan of the Center; and the knowledge transfer strategy of the Center. Briefly indicate the unique opportunities that the Center will provide within a global context. Articulate the potential legacy and national and global impact of the Center if funded. Identify all partner institutions and describe the major contribution of each to the integrated Center activities. Both NSF merit review criteria (intellectual merit and broader impacts) must be addressed in separate statements (see NSF Grant Proposal Guide for additional instructions).
3. Table of Contents. A Table of Contents is automatically generated for the proposal by the system. The proposer cannot edit this form.
4. Project Description. (exclude Results from Prior NSF Support) -- The Project Description must contain Sections (4.a) through (4.f) and is limited to 25 pages including tables and illustrations. The broader impacts resulting from the proposed project must be addressed and described as an integral part of the narrative.

(4.a) Rationale for Center Concept (one-page limit): Justify the Center approach. Explain the unique opportunities that an integrated Center will provide and describe what will be achieved in the Center mode that could not be achieved with group or individual support. State and briefly discuss the long-term strategic goals of an integrated Center. Describe the potential legacy and national and global impact of the proposed Center.

(4.b) Narrative Description of the Management Plan for the Research, Education, Broadening Participation, and Knowledge Transfer Activities of the Center (three-page limit): Develop and present a management plan for the integrated Center. A diagram to explain the organizational relationships and reporting structure among the key areas of responsibility, such as Center Direction, Management, Research, Education, Broadening Participation, and Knowledge Transfer, may be useful. Identify responsibilities of the lead and partner organizations. Explain the role of each key participant/component and explain the approach for integrating and managing all partners involved in the research, education, broadening participation, and knowledge transfer activities. Describe the process to be used to focus Center activities; to select and integrate research projects with one another and with other Center activities; to allocate funds and equipment across Center activities and among partners; and to select a replacement for the Center Director.

Identify key members of the Center Management Team and explain their specific roles and areas of responsibility. The Center Director must have the leadership capacity to develop and lead a diverse team to fulfill the vision of the Center. He/She may choose to direct the research or may delegate responsibilities to selected research leaders. Key members of the Center Management Team must have adequate management experience and qualities to administer their component of the Center.

Briefly describe the external advisory committee (EAC) that will provide guidance and advice to the Center on all activities. This committee is required — it should be diverse and its members should have science, technical and management expertise appropriate to the Center. If a proposal is selected for a site visit, NSF will require additional information on the overall management plan for the Center.

(4.c) Narrative Description of the Research Objectives of the Center (nine-page limit): State the overall vision and long-range research goals of the integrated Center. Describe the proposed research areas/themes, how they integrate with each other to realize the Center's research vision, and provide timelines for the activities. Organize the description according to research topics or goals. Name the lead partner organizations responsible and lead/key individuals. Indicate the role of each partner/participant in the research topic/goal area. The research focus should be sufficiently long-term to justify a Center form of organization and flexible enough to permit change as the research proceeds. Provide a research plan with sufficient detail to allow assessment of the scientific merit and to justify the necessity for the Center mode of operation.

Indicate the potential impact or expected significance the Center's research will have on the Nation's scientific and/or technological base. Include a description of current activities in research and, if the proposed Center research is closely related to ongoing research at an existing Center (e.g., an STC, ERC, MRSEC, SLC or national laboratory), explain how the research activities of the proposed Center complement as well as differ from those of the existing Center(s). Explain how the proposed research relates to other state and national research capabilities as well as international programs in the proposed fields of research.

(4.d) Narrative Description of the Education and Human Resource Development Objectives of the Center (five-page limit): State the long-term education and human resource goals of the integrated Center and explain how they link with the research and organizational partnering opportunities presented by the Center. The STC goals must address the educational needs of students participating in the Center research activities and must address the educational needs of students in the broader fields of research represented by the STC. The education activities, which should be based on current knowledge about teaching and learning, may involve other college and pre-college students, faculty, and teachers, as appropriate to the Center's goals. Describe plans for the mentoring and professional development of students involved in Center activities. Name the lead organizations and key individuals involved with individual projects, and explain the potential contributions and role of each in the education activity. Describe the process by which the education and human resource development goals will be established, used to guide the formal evaluation approaches, and modified during the award period, if needed. Provide timelines for all activities and explain how and when progress toward these goals will be measured.

Describe plans for attracting and retaining high quality students, including U.S. citizens, nationals and permanent residents, and those from underrepresented groups, in the Center research and education activities. Describe the proposed activities in sufficient detail to allow assessment of their intrinsic merit, potential effectiveness, and their anticipated contribution toward a highly competent and globally engaged technical and instructional workforce and educated citizenry. Provide a summary chart of M.S. and Ph.D. degrees completed during the past three years under the directorship of the proposed Center senior personnel. Indicate average time to complete degree requirements, and provide information on the gender, ethnicity, disability status, and nationality of the degree recipients in the aggregate, i.e., do not identify individual degree recipients by name.

(4.e) Narrative Description of the Diversity Objectives of the Center (four-page limit): State and describe the diversity objectives to be achieved, outline strategies for achieving them, and explain how progress will be measured and how strategies will be adapted, if necessary. Describe the diversity of the current students of the participating faculty, and the diversity of the participating faculty and partners. Describe plans for increasing diversity through the participation of women, underrepresented minorities, and persons with disabilities who are U.S. citizens, nationals and permanent residents in all organizational levels of Center activities, and cite relevant recent research on effective practices. Describe the contribution/role of each partner institution in the diversity plans. Describe plans (if any) for partnerships with minority-serving institutions, women's colleges and institutions that primarily serve persons with disabilities, and indicate the role of students and faculty from such institutions and how they will be fully integrated into Center activities. Describe the proposed activities in sufficient detail to allow assessment of their intrinsic merit, potential effectiveness, and anticipated contribution toward a diverse, highly competent, and globally engaged technical and instructional workforce and educated populace.

(4.f) Narrative Description of the Knowledge Transfer Objectives of the Center (three-page limit): State the knowledge transfer goals and the expected impact of knowledge transfer activities of the integrated Center. Linkages should involve significant intellectual exchange and resource commitments such as facilities, and/or people, in both directions between the sponsoring institution and partners, and may involve internships and novel use of cyberinfrastructure to enhance such linkages. Describe plans for linkages among Center partners and between Center partners and others with the objective of applying newly created knowledge. Partnerships and linkages beyond the boundaries of the academic institution should be emphasized.

Describe strategies to facilitate knowledge transfer activities that involve significant intellectual exchange and resource linkages among various types of institutions and organizations (e.g., public and community groups; schools; colleges and universities such as minority-serving institutions; community colleges, EPSCoR institutions, and others; nonprofit organizations; national laboratories; industry; and federal, state, and local governments.) Describe plans for linking with appropriate research and education communities and institutions beyond the sponsoring institution (e.g., other colleges, schools, universities, disciplinary subfields, other disciplines, nonprofit research organizations, and/or international entities) to further enhance involvement and knowledge transfer. Explain the role of each partner/participant in the Center's knowledge transfer activities. Discuss how students and/or faculty will be involved in this activity. Explain the role of international collaborations and shared experimental facilities, as appropriate. Describe the knowledge transfer activities in sufficient detail to allow assessment of their merit and impact. Describe plans for the use of cyberinfrastructure to facilitate the above activities, if proposed. For those projects that will result in large data sets, describe plans for data management and dissemination.

5. Facilities and Equipment. This section must support the description of the infrastructure of the Center in the body of the proposal, Section (12), by describing the equipment and facilities available to the proposed Center.
6. Budget and Budget Justification. Provide a budget for each of the five years. FastLane or Grants.gov will automatically provide a cumulative budget. The proposed budget should be consistent with the needs and complexity of the proposed activity. The budget and budget justification should reflect start-up activities at the commencement of the Center activities. The Center management and education positions will require full-time lead personnel paid through the Center budget. Funds allocated for research, education, broadening participation, and knowledge transfer areas must be discernible.

Submit a separate budget and budget justification (two-page limit) for each participating institution in cases where a subaward exceeds \$100,000 per year. Identify items of equipment costing more than \$10,000. Full justification for the latter is required. Individual graduate students may not be supported for a period in excess of five years.

NSF will not provide salary support for scientists, engineers, or educators employed by Federal agencies or Federally Funded Research and Development Centers. For participants at foreign organizations, NSF will consider support only for the U.S. portion of the collaborative projects involving U.S. and foreign institutions.

7. References Cited. Section not to exceed five pages.
8. Biographical Sketches (two page limit per person). Biographical sketches are required for all key participants (Center Director, Managing Director, Education Coordinator, Diversity Coordinator, Knowledge Transfer Coordinator, Research Coordinator, Research Group Leaders, or their equivalent). Use GPG instructions for sections II.C.2.f. Collaborators should be included in Section (14.b) below. Copies of publications should not be included or sent to NSF.
9. Current and Pending Support. Provide current and pending support information for the PI and co-PIs only, i.e., only those persons listed on the cover page of the proposal.

Special Information and Required Supplementary Documents (Sections 10-13):

10. (Required information to be entered in the Supplementary Documents section in FastLane. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.)
 - (10 a.) Partner Institutions and (10 b.) Project Personnel. The Partner Institutions and Project Personnel that were required in preliminary proposal Sections (8.a) and (8.b) as part of the preliminary proposal (see Preliminary proposal Preparation Instructions) must be updated to reflect any changes occurring since the time of preliminary proposal submission. In addition, provide the names of External Advisory Committee Members appointed (if any) and their affiliations.
11. Responsible Conduct of Research and Intellectual Property Rights (one-page limit). Provide a clear statement of the proposed Center's policies on responsible conduct of research and intellectual property rights. If a proposal is selected for a site-visit, a more detailed description of the lead institution's official policy will be required covering cross-disciplinary and multi-institutional activities of the Center, Center and subawardee staff, including faculty, visiting faculty, industrial fellows, postdoctoral researchers, and graduate and undergraduate students. Discussion should address the nature of the research, methodologies used, ownership of research and ideas, and roles and responsibilities regarding intellectual property. A program of training in responsible conduct of research within the cross-disciplinary and multi-institutional context of the Center, for all Center and subawardee staff, including faculty, as visiting faculty, industrial fellows, postdoctoral researchers, graduate and undergraduate students, is required. Training topics should include the nature of the research, methodologies used, ownership of research and ideas, and roles and responsibilities regarding intellectual property.
12. Shared Experimental Facilities (four-page limit). Where appropriate, describe the shared facilities to be established, including specific major research instrumentation, and plans for the development of new instrumentation. Distinguish between existing facilities/instrumentation (and their location) and any that will be developed by the Center.

Develop and describe a plan that addresses:

 - maintenance and operation of STC-related facilities, including assurance of organizational commitments/support;
 - mechanisms to deal with potential risk;
 - availability of sufficient infrastructure and technical expertise to ensure effective usage of the instrument;
 - availability of appropriate technical expertise to design and construct new instruments; and provisions for user fees and plans for ensuring shared access by all partners and outside users.
13. Institutional and other Sector Support (one-page limit). Clear evidence of institutional commitment must be included with the proposal. At a minimum, a letter of support from a senior official (e.g., institutional Chief Financial Officer or institutional Vice President for Research) should outline the commitment of resources and facilities to sustain and support the project throughout the period of funding, and to maintain these resources beyond the period of support.

Outline the lead institution's commitment: space (new space and/or renovations to existing facilities), faculty and staff positions, capital equipment, and access to facilities and instrumentation. Major commitments of partner institutions should also be described. Describe how the commitment contributes to realizing the strategic goals of the integrated Center. Describe support from other sources that has been committed, including space, facilities, and personnel for the Center. Cost sharing is not required; voluntary cost sharing, if provided, will not influence the review process.

Optional Information to be submitted to NSF via the FastLane Single Copy Documents Section. If submitting via Grants.gov, complete the information and attach as a PDF file (see Field 6, Additional Single Copy Documents, on the NSF Grant Application Cover Page).

- List of suggested reviewers or reviewers not to include;
- Proprietary or privileged information (if applicable).

Full proposals containing items other than those described above will not be reviewed.

Required Information to be submitted to NSF via email.

In addition to the FastLane instructions, the proposer must send the following document via email. After receipt of the proposal number from FastLane, send an email to stc@nsf.gov. The subject heading of the email should note the proposal number and the lead institution. Attach the following document to it:

The table of participants and partners inserted into an Excel spreadsheet available on the STC Program website (<http://www.nsf.gov/od/oia/programs/stc/index.jsp>). This table will be used by NSF to check for conflicts of interest in assembling the review community. Remember to email this table to stc@nsf.gov; do not submit it through FastLane.

Proposers are reminded to identify the program solicitation number (NSF 08-580) 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.

B. Budgetary Information

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

Indirect Cost (F&A) Limitations: Not applicable.

Budget Preparation Instructions: Proposed STC annual budgets may range from \$1.5M to \$5.0M per year of NSF support. Preliminary proposals and full proposals outside this range will be ineligible and will not be reviewed or considered for support. The core budget for the Center is expected to include support for all research, education, broadening participation, and knowledge transfer activities including, if proposed, those for undergraduate students and for teachers. Cost sharing is not required; voluntary cost sharing, if provided, will not influence the review process.

The following information applies only for those STC proposals that will be reviewed in the Office of Polar Programs:

The Office of Polar Programs (OPP) strongly encourages STC proposals related to all aspects of polar research supported by the Foundation. For any proposals requiring access to the polar regions or polar logistical support, investigators must contact appropriate OPP program managers for guidance about submitting information needed to assess logistical support requirements. This should be done during proposal development. For proposals requiring access to the arctic, contact Renee Crain (rcrain@nsf.gov) or Pat Haggerty (phaggert@nsf.gov). For proposals requiring access to the Antarctic, contact Alexandra Isern (aisern@nsf.gov). Additional information on field work requirements may be found in the OPP Arctic Research Opportunities (<http://www.nsf.gov/pubs/2006/nsf06603/nsf06603.htm>) and Antarctic Research (<http://www.nsf.gov/pubs/2008/nsf08535/nsf08535.htm>) solicitations.

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):

October 14, 2008

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

April 30, 2009

Full proposals are by invitation only.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://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>.

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 judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of 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>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

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:

For preliminary proposals and full proposals, excellence must be demonstrated in all aspects of each of the above criteria, as well as the following criteria specific to the STC Program:

1. Value-added of funding the activity as a Center:

- In what ways are the identified science and technology challenges of sufficient import, scale, and complexity to justify a center-mode type of investment? How will the proposed Center provide an environment to enable discovery, learning and innovation? How will the Center's research and educational programs make a special contribution to the achievement of a diverse, highly competent, and globally-engaged technical and instructional workforce, and of an educated citizenry? How will the Center's partnerships achieve significant intellectual exchange and resource linkage with the school, public, industry, federal, and/or international sectors and thereby foster science and technology in service to society?

2. Proposed Leadership and Management Plan:

- Do the Center Director and the Center management team convincingly demonstrate the vision, experience, and capacity to manage a complex, multifaceted, and innovative research, education, broadening participation, and knowledge transfer enterprise? What is the likely effectiveness of the proposed management plan, including mechanisms to modify resource allocation and research areas or themes, and mechanisms to address evaluation and termination of mature (or initiation of promising) research areas or themes? Is there documentation of institutional and other commitments to the proposed Center? Is the requested budget appropriate for the scope and complexity of the research, education, broadening participation, and knowledge transfer projects proposed?
- What is the succession plan for leadership of the Center?
- Is access to human resources, financial resources, and physical resources sufficient?
- Are intellectual property rights properly and adequately discussed?

3. Integrative Nature of the Proposed Center:

- Are the research, educational, knowledge transfer and diversity-related activities strategically integrated such that the whole is greater than the sum of the parts? Do the partner organizations and participants have an essential and meaningful role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond? Is it clear how each of the various educational activities contributes to the larger, unifying mission of the Center and plays a role in realizing the education-related goals of the Center?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Site Visit Review.

STC Proposal Review Process for Preliminary and Full Proposals

The STC Program will evaluate proposals in a multi-phase merit review process. In order to reduce the cost of proposal preparation and the workload on the scientific community, NSF will utilize a preliminary proposal phase. Preliminary proposals will be evaluated by panels of individuals intellectually distinguished in their fields and experienced in integrative science, mathematics, engineering and technology research, and education partnerships. The panelists will be asked to base their comments on the review criteria described above and to give special attention to vision and potential impact of the research proposed. NSF will notify applicants of the results of the preliminary proposal competition on or before **January 30, 2009**.

Proposing institutions whose preliminary proposals are judged most promising by the panel and program director will be invited to submit full proposals that will be evaluated by both *ad hoc* and panel review using the selection criteria listed above with special attention given to the integrative nature of the proposed Center. Only those full proposals that were invited will be accepted. The full proposal review panel will use the above criteria to identify a small number of full proposals deemed worthy of site-visit reviews; the other proposals will be declined. NSF will notify all invited proposers as to whether they will be declined or site-visited in **August 2009**.

Site Visit Review Criteria and Award Selection Process

For proposals that are selected for a site visit, the site visit review will consider the above criteria and the vision and potential legacy of the proposed center. It will focus on unresolved issues identified earlier in the review process, and will give special attention to the proposed plans for management and leadership of the Center. Foundation staff will provide additional information regarding the site visit review in advance of the meeting. The site visit team will prepare a written report to advise NSF and PIs will have an opportunity to respond.

A comprehensive review of all proposals that are site-visited will be conducted by an external ad hoc STC Review Committee ("Blue Ribbon" Panel). The Blue Ribbon Panel will provide a brief statement and will develop a list recommending proposals to be funded by NSF. In developing its recommendations for awards, this committee will consider: the relative merit of the STC proposals using the criteria listed above, the potential national impact and legacy of the proposed activity, the balance of awards among scientific fields, geographical distribution, and the combined ability of the proposed Centers to meet the objectives of the STC Program. In developing funding recommendations to the Director and the Director's Review Board, NSF management will consider the Blue Ribbon Panel's recommendations. NSF expects to announce the final results of this STC competition on or about March 1, 2010.

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 Research 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/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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

Special Award Conditions: STC awards are made in the form of Cooperative Agreements. The STC Cooperative Agreements will have an extensive section of Special Conditions relating to the period of performance, statement of work, awardee responsibilities, NSF responsibilities, joint NSF-awardee responsibilities, funding and funding schedule, reporting requirements, key personnel, and other conditions. NSF has responsibility for providing general oversight and monitoring of STCs to help assure effective performance and administration, as well as facilitating any coordination among the STCs as necessary to further the objectives of the STC program. Prior to finalizing the Cooperative Agreement, a retreat of the Center's key personnel to address strategic planning of the STC will be required.

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, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report 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. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

Centers awarded a Cooperative Agreement will be required to submit annual reports on progress and plans, which will be used as a basis for performance review and determining the level of continued funding. To support this review and the management of a Center, STCs will also be required to develop a set of management and performance indicators for submission annually to NSF via an NSF evaluation technical assistance contractor. Part of this reporting will take the form of a database that will be owned by the institution and eventually made available to an evaluation contractor. This database will capture specific information to demonstrate progress towards achieving the goals of the program. Such reporting requirements will be included in the Cooperative Agreement which is binding between the academic institution and the NSF.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Dragana Brzakovic, Senior Staff Associate, telephone: (703) 292-8040, email: dbrzakov@nsf.gov
- Joan M. Frye, Senior Staff Associate, telephone: (703) 292-8040, email: jfrye@nsf.gov
- Pamela O'Neil, telephone: (703) 292-8040, email: poneil@nsf.gov
- Randy L. Phelps, Staff Associate, telephone: (703) 292-8040, email: rphelps@nsf.gov
- Margaret E. Tolbert, telephone: (703) 292-8040, email: mtolbert@nsf.gov
- STC Information, telephone: (703) 292-8040, email: stc@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.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, National Science Foundation Update is a free e-mail subscription service 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 when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

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: nsfpubs@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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