

CISE Pathways to Revitalized Undergraduate Computing Education (CPATH)

Program Solicitation

NSF 06-608



National Science Foundation

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

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

January 23, 2007

REVISION NOTES

In furtherance of the President's Management Agenda, NSF has identified programs that will offer proposers the option to utilize Grants.gov to prepare and submit proposals, or will require that proposers utilize Grants.gov to prepare and submit proposals. Grants.gov provides a single Government-wide portal for finding and applying for Federal grants online.

In response to this program solicitation, proposers may opt to submit proposals via [Grants.gov](#) or via the [NSF FastLane](#) system. In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the [NSF FastLane](#) system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

CISE Pathways to Revitalized Undergraduate Computing Education (CPATH)

Synopsis of Program:

Computing has permeated and in many cases transformed almost all aspects of our everyday lives. As computing becomes more important in all sectors of society, so does the preparation of a globally competitive U.S. workforce with knowledge and understanding of critical computing concepts, methodologies, and techniques. Unfortunately, despite the deep and pervasive impact of computing and the

creative efforts of individuals in a small number of institutions, undergraduate computing education today often looks much as it did several decades ago.

Through the CISE Pathways to Revitalized Undergraduate Computing Education (CPATH) program, NSF's Directorate for Computer and Information Science and Engineering (CISE) is challenging its partners – colleges, universities and other stakeholders committed to advancing the field of computing and its impact - to **transform undergraduate computing education on a national scale**, to meet the challenges and opportunities of a world where computing is essential to U.S. leadership and economic competitiveness across all sectors of society.

The CPATH vision is of a U.S. workforce with the computing competencies and skills imperative to the Nation's health, security and prosperity in the 21st century. This workforce includes a cadre of computing professionals prepared to contribute to sustained U.S. leadership in computing in a wide range of application domains and career fields, and a broader professional workforce with knowledge and understanding of critical computing concepts, methodologies and techniques.

To achieve this vision, CISE is calling for colleges and universities to work together, and with other stakeholders in undergraduate computing education including industry, professional societies and other types of organizations, to formulate and implement plans to revitalize undergraduate computing education in the United States. The full engagement of faculty and other individuals in CISE disciplines will be critical to success. Common challenges - such as fluctuating enrollments in traditional computer science programs, changes and trends in workforce demographics, the imperative to integrate fast-paced computing innovations into the curriculum, and the need to integrate computing concepts and methodologies into the undergraduate curriculum at large – must be identified, and goals and strategies developed to address them. Successful CPATH projects will be systemic in nature, address a broad range of issues, and have significant potential to contribute to the transformation and revitalization of undergraduate computing education on a national scale.

CPATH will support four *types* of projects:

- Community Building (CB) Grants;
- Evaluation, Adoption, and Extension (EAE) Grants;
- Transformation (T) Grants; and
- CISE Distinguished Education Fellow (CDEF) Grants.

Cognizant Program Officer(s):

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 18 to 30 total. 15 to 25 Community Building (CB) awards several of which may be focused at the national level, 1 or 2 Evaluation, Adoption and Extension (EAE) awards, 1 or 2 Transformation (T) awards, and 1 to 3 CISE Distinguished Education Fellow (CDEF) awards.

Anticipated Funding Amount: \$6,000,000 in FY 2007 pending the availability of funds and the quality of the proposals submitted. CB projects are likely to be funded from levels of \$50,000 to a maximum of \$500,000 total for durations up to three years. EAE projects will be funded at levels up to \$900,000 total for durations of up to three years. T projects will be funded at levels up to \$1,500,000 total for a maximum duration of five years. CDEF projects will be supported at levels up to \$250,000 total for a maximum duration of two years, with potential for renewal for a third year.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Organizational limits differ by CPATH project type as defined below:

For CB and CDEF projects. GPG eligibility guidelines apply.

For EAE and T projects. Academic institutions of higher learning in the United States, its territories or possessions, or the Commonwealth of Puerto Rico, that award degrees in a field supported by NSF are eligible to apply for EAE and T awards.

CPATH proposals that describe partnerships with other organizations with a stake in undergraduate computing education are strongly encouraged, where partner organizations may include industry, professional societies, or other not-for-profit organizations, amongst others.

PI Limit:

At least one individual on the project leadership team (PI or co-PI) must be a member of the community served by CISE.

Limit on Number of Proposals per Organization:

For EAE and T proposals: an academic institution may submit or participate in no more than one EAE proposal; and, an academic institution may submit or participate in no more than one T proposal. There is no organizational limit for CB and CDEF proposals.

Limit on Number of Proposals per PI: 2

An individual may participate as PI, Co-PI, or Senior Personnel on at most one EAE proposal or one T proposal. An individual may also participate as PI, Co-PI or Senior Personnel on at most one CB proposal or one CDEF proposal.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Full Proposals:**
 - Full Proposals submitted via FastLane: Grant Proposal Guide (GPG) Guidelines apply. The complete text of

the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.

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

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

January 23, 2007

Proposal Review Information Criteria

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

Award Administration Information

Award Conditions: Standard NSF award conditions apply

Reporting Requirements: Standard NSF reporting requirements apply

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I. INTRODUCTION

Computing has permeated and in many cases transformed almost all aspects of our everyday lives. As computing becomes more important in all sectors of society, so does the preparation of a globally-competitive U.S. workforce with knowledge and understanding of critical computing concepts, methodologies, and techniques. Unfortunately, despite the deep and pervasive impact of computing and creative efforts in a small number of institutions, undergraduate computing education today often looks much as it did several decades ago. To date, undergraduate computing education has been highly heterogeneous, and has suffered from a lack of recognized leaders or mechanisms for identifying leaders. Often, the small grassroots communities that have emerged flounder due to lack of leadership, administrative support or other resources needed to help them flourish. To enable systemic changes within institutions, among groups of institutions, and at the national level, leaders must be nurtured, communities supported, and educational and organizational change catalyzed and sustained.

II. PROGRAM DESCRIPTION

The CISE Pathways to Revitalized Undergraduate Computing Education (CPATH) vision is a U.S. workforce with the computing competencies and skills imperative to the Nation's health, security and prosperity in the 21st century. This workforce includes a cadre of computing professionals prepared to contribute to sustained U.S. leadership in computing in a wide range of application domains and career fields, and a broader professional workforce with knowledge and understanding of critical computing concepts, methodologies and techniques.

To achieve this vision, NSF's Directorate for Computer and Information Science and Engineering (CISE) is challenging colleges and universities to work together and with others with a stake in undergraduate computing education, including industry, professional societies and other types of organizations, to formulate and implement plans to transform undergraduate computing education to meet the challenges and opportunities of our 21st century world. Critical to this work is the full engagement of faculty and other individuals representing CISE disciplines. Common challenges - such as fluctuating enrollments in traditional computer science programs, changes and trends in workforce demographics, the imperative to integrate fast-paced computing innovations into the curriculum, and the need to integrate computing concepts and methodologies into the undergraduate curriculum at large – must be identified, and plans developed to address them.

In the aggregate, CPATH projects will:

- Contribute to the development of a diverse, agile workforce with the computing knowledge essential to U.S. leadership in the global innovation enterprise;
- Increase awareness of the strategic importance of undergraduate computing education in a wide range of career fields and disciplinary and interdisciplinary areas;
- Identify and implement integrative new models for undergraduate computing education that are replicable across a variety of programs and institutions, and have a high probability of adoption on a national scale;
- Be sensitive to and capitalize upon changing demographics in the U.S. workforce;
- Engage national leaders in computing in defining the future of undergraduate computing education;
- Nurture future leaders to ensure a continuing and sustainable focus on innovation in computing education;
- Promote the formation of partnerships within and among academic institutions, and among academic, industry and other organizations with a stake in the transformation of undergraduate computing education;
- Empower a broad range of administrators and faculty across multiple disciplines and from all types of institutions to participate in the transformation of undergraduate computing education; and
- Promote organizational change within academic institutions to ensure the sustainability of integrative models for undergraduate computing education.

In the FY 2007 competition, CISE will support four types of CPATH projects as defined below.

Community Building (CB) Projects.

CB awards will support community-building efforts that bring stakeholders together to discuss the challenges and opportunities inherent in transforming undergraduate computing education, and to identify creative strategies to do so. Examples of the types of activities supported by CB grants include, but are not limited to: development of forums and opportunities for community stakeholders to come together to explore common interests, share lessons learned and identify promising practices; engagement of stakeholders in undergraduate computing education including administrators and faculty from computer science and other disciplines in which computing is playing an increasingly important role, within one institution or more broadly; and efforts focused on developing strong partnerships among academic, industrial and not-for-profit organizations with a stake in undergraduate computing education. The scope of CB activities is deliberately broad; CISE encourages the community to develop creative strategies likely to effect transformation in undergraduate computing education at the institutional, local, regional and/or national levels and across all institution types.

Some CB projects may support the planning activities essential to institutions wishing to submit a Transformation (T) proposal in future CPATH competitions.

Evaluation, Adoption, and Extension (EAE) Projects.

EAE awards will support the ongoing work of institutions who have already implemented innovative undergraduate computing education models and approaches to realize the CPATH vision, as well as those organizations wishing to emulate and/or evolve the models. Specifically, EAE awards will support efforts to evaluate the success and impact of new models currently being implemented; to engage additional institutions in their implementation; and/or, to expand the scope of ongoing efforts. EAE grants will support either or both the originating institutions and the institutions committed to replicating or evolving the promising model. EAE grantees will be expected to disseminate lessons learned and promising practices such that other institutions and organizations may benefit from the project outcomes.

CPATH Transformation (T) Projects.

T grants will support the implementation of innovative, integrative models for undergraduate computing education that have potential to serve as national models. T projects are expected to:

- develop and implement innovative, integrative organizational models for undergraduate computing education at one or more institutions;
- create sustainable changes in culture and practice within the participating organizations; and
- serve as models and resources for the national computing community.

Single institution T grants must engage multiple academic units or disciplines. T awards will also support the work of multiple institutions committed to the implementation of common or related models of undergraduate computing education.

CISE Distinguished Education Fellow (CDEF) Projects.

CDEF grants will recognize accomplished, creative, and talented computing professionals who have the potential to serve as national leaders or spokespersons for change in undergraduate computing education. CDEF awards will be made to individuals who have achieved distinction in the computing profession, who are committed to transforming undergraduate computing education, and who have innovative ideas on how to do so. CDEF recipients may spend significant time and effort on projects focused on innovative, original, and possibly untested ideas that will benefit undergraduate computing education on a national scale.

In FY 2007, the majority of CPATH funding will be directed to CDEF and CB projects, to nurture emerging leaders and most importantly to encourage the broad community to: engage in an inclusive conversation about the imperative to transform undergraduate computing education; identify promising strategies to do so; and support the planning essential to the development of promising T and EAE proposals for future CPATH competitions. Future CPATH competitions will increasingly emphasize the support of T and EAE projects.

Note: CPATH will not fund projects whose focus is primarily curriculum development. PI's or institutions seeking to undertake narrower curricular-focused activities are encouraged to consider submitting to CISE core programs. Most CISE programs support worthy educational activities. A list of current CISE programs can be found on the CISE website (<http://www.nsf.gov/dir/index.jsp?org=CISE>). Proposals submitted to CPATH whose primary focus is curriculum development will be returned without review.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. NSF anticipates having \$6M in FY2007 for new awards under this solicitation, pending the availability of funds. Four project types will be supported as follows: Community Building awards will range from \$50,000 total to \$500,000 total for durations ranging from one to three years. It is anticipated that between 15 and 25 CB projects will be funded in FY 2007. Evaluation, Adoption, and Extension awards will be funded at levels up to \$900,000 total for durations of up to three years. It is anticipated that no more than 1 or 2 EAE projects will be funded in FY 2007. Transformation awards will be funded at levels up to \$1,500,000 total for a maximum duration of five years. It is anticipated that no more than 1 or 2 T projects will be funded in FY 2007. CISE Distinguished Education Fellow awards will be supported at levels up to \$250,000 total for a maximum duration of two years, with potential for renewal for a third year. It is anticipated that 1 to 3 CDEF projects will be funded in FY 2007.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Organizational limits differ by CPATH project type as defined below:

For CB and CDEF projects. GPG eligibility guidelines apply.

For EAE and T projects. Academic institutions of higher learning in the United States, its territories or possessions, or the Commonwealth of Puerto Rico, that award degrees in a field supported by NSF are eligible to apply for EAE and T awards.

CPATH proposals that describe partnerships with other organizations with a stake in undergraduate computing education are strongly encouraged, where partner organizations may include industry, professional societies, or other not-for-profit organizations, amongst others.

PI Limit:

At least one individual on the project leadership team (PI or co-PI) must be a member of the community served by CISE.

Limit on Number of Proposals per Organization:

For EAE and T proposals: an academic institution may submit or participate in no more than one EAE proposal; and, an academic institution may submit or participate in no more than one T proposal. There is no organizational limit for CB and CDEF proposals.

Limit on Number of Proposals per PI: 2

An individual may participate as PI, Co-PI, or Senior Personnel on at most one EAE proposal or one T proposal. An individual may also participate as PI, Co-PI or Senior Personnel on at most one CB proposal or one CDEF proposal.

Additional Eligibility Info:

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (<http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

Proposers are reminded that all projects involving human subjects must either (1) have approval from the organization's Institutional Review Board (IRB) before issuance of an NSF award or, (2) must affirm that the IRB or an appropriate knowledgeable authority previously designated by the organization (not the Principal Investigator) has declared the research exempt from IRB review, in accordance with the applicable subsection, as established in section 101(b) of the Common Rule. NSF's Common Rule on Protection of Human Subjects is available on the NSF website at:

<http://www.nsf.gov/bfa/dias/policy/docs/45cfr690.pdf>.

Guidance about the regulation is available at:

<http://www.nsf.gov/bfa/dias/policy/guidance.htm#human>.

Additional Instructions for Proposal Preparation.

Proposal Title: To assist NSF staff in sorting proposals for review, proposal titles should begin with the acronym that identifies the type of project proposed. For example: "CPATH EAE: Adopting the Distributed Computing Practice Model at Liberal Arts Institutions"; or, "CPATH CDEF: Developing a Professional Community for Integrated Computing Education".

Project Summary: The project summary should also clearly identify the CPATH project type – CB, EAE, T, or CDEF. The project summary must specifically discuss in separate sections the Intellectual Merit and Broader Impacts of the proposed activities, in accordance with the guidelines described in the GPG or the NSF Grants.gov Application Guide. Proposals that fail to do so will be returned without review.

Project Description: The project description instructions for CPATH proposals vary by project type as described below.

- The Project Description for **EAE** and **T** proposals should include the following sections:

Project Vision, Goals, Objectives and Outcomes (~1 – 2 pages). Motivated by the CPATH vision articulated in this solicitation, describe the vision, goals, objectives, and anticipated outcomes of the proposed project. The activities described should be clearly informed by relevant research and current knowledge of factors impacting undergraduate computing education.

Current State (~1 page). Provide a current assessment of undergraduate computing education in the relevant participating organizations. Describe any prior pilot programs or planning activities conducted to date, if any, and their outcomes. Describe how the project vision, goals, objectives, and anticipated outcomes are innovative and improvements over existing practices. Where possible, provide institutional data to document the current environment by uploading data into the Supplementary Docs section of the proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

Implementation Plan (~ 8 - 10 pages). Describe in detail the activities to be undertaken to realize the project vision, goals, objectives and anticipated outcomes. Identify the targeted undergraduate cohort that will benefit from the project. Describe the potential for the project to contribute to the revitalization of undergraduate computing education on a national scale. Where appropriate, describe current or emerging models and their connection to the project. Describe how organizational change will be effected and sustained. Describe the roles that each partner organization will play in the project. Describe the role of individuals from CISE disciplines in the project, and discuss the expertise and capacity of the team to carry out the proposed work. Using a table, a spreadsheet, or one of the many project management tools that are available, summarize the activities that will take place during the lifetime of the project; the table should describe project milestones in the context of a project timeline, it should identify responsible parties and expected outcomes for each milestone, and it should be included either as a figure within this section in the proposal or uploaded into the Supplementary Docs section of the proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

Collaboration Plan (~1 -2 pages). Describe the participating groups or organizations that will work together to realize the project vision, goals, objectives, and outcomes, and the key stakeholders (faculty, students, administrators, industry, professional societies) participating in project planning and implementation. Describe how the proposing team will form, orient, manage, and reinforce team relationships on the project. Provide evidence of the commitment of the participating organizations to the project vision and goals. Letters of support should be uploaded into the Supplementary Docs section of the proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form. Provide evidence of the commitment of the participating institutions to sustain the educational and organizational change effected.

Evaluation and Dissemination Plan (~ 1-2 pages). Describe the plan that will inform the project progress and measure its impact. Include a description of the instruments/metrics used to measure, document, and report on the project's progress. Identify individuals who will be responsible for the evaluation component and discuss their expertise related to the evaluation as well as any other linkages to the project or organizations involved.

Describe how project results will be disseminated to the community and other relevant groups. List relevant publications, conferences, and workshops. Describe how organizational or community building models will be disseminated to broad community groups and how project resources will be made available to others to adopt or adapt. Identify proactive measures that will be put in place to find and support adopters of promising models and practices.

- The Project Descriptions for **CB** proposals should include the following sections:

Vision, Goals, Objectives, and Outcomes (~1-3 pages). Motivated by the CPATH vision articulated in this solicitation, describe the vision, goals, objectives, and anticipated outcomes of the proposed project.

Implementation Plan (~10-13 pages). Describe in detail the activities to be undertaken to realize the project vision, goals, objectives and anticipated outcomes. Identify the types of participants likely to engage in the activity (e.g. if a workshop is being proposed, the names of workshop participants need not be identified, but the target audience should be, for example, faculty from local community colleges and undergraduate institutions or local industry leaders). Describe the potential for the project to contribute to the revitalization of undergraduate computing education. Describe the roles that each of the proposing partner organizations will play in the project. Describe approaches to engage individuals from CISE disciplines in the activities, both as leaders and as participants. Describe the expertise and capacity of the proposing team to carry out the proposed work. Using a table, a spreadsheet, or one of the many project management tools that are available, summarize the activities that will take place during the lifetime of the project; the table should describe project milestones in the context of a project timeline, it should identify responsible parties and expected outcomes for each milestone, and it may be included as a figure in this section of the proposal or uploaded into the Supplementary Docs section of the proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

- The Project Descriptions for **CDEF** proposals should include the following sections:

Professional Qualifications (~1-3 pages). Describe the PI's educational background, quality of professional experience (industrial, academic, or other accomplishments), domain of reputation (as evidenced by publications, grants, conference participation or other), teaching experience (including awards, unique pedagogical approaches, involvement in curricular or other student projects, other) and any other information that provides evidence of accomplishment in the field and recognition as a national leader. In addition, upload the PI's full resume into the Supplementary Docs section in the proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

Implementation Plan (~ 10-13 pages). Describe the potential for the project to contribute to the revitalization of undergraduate computing education on a national scale. Describe the project vision, goals, objectives and anticipated outcomes, and strategies to achieve them. Identify participating groups or partners involved and the nature of their involvement. Demonstrate knowledge of current or emerging models and their connection to the project. Describe activities designed to disseminate project outcomes to the broader community, plans to serve as an ambassador for undergraduate computing education transformation, and specific activities planned for outreach.

Recommendations. Provide letters of support appropriate to the proposed project. These letters may come from organization administrators, collaborators, or others having insight into the feasibility of the project proposed, those who will provide resources needed to pursue the project, and those who pledge to collaborate in the proposed project. Letters of support should be uploaded into the Supplementary Docs section of the proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

B. Budgetary Information

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

Other Budgetary Limitations:

The CPATH program provides funding for activities that include:

- Faculty summer salary and/or release salary
- Program coordination and clerical support
- Faculty travel for project coordination and dissemination
- Travel to attend annual PI meetings
- Workshop costs
- Evaluation and assessment costs

In addition, as CPATH projects develop and ideas emerge, supplemental funding may be requested for community building, outreach, and other activities.

CPATH will not provide funding for large equipment purchases and facilities.

C. Due Dates

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

January 23, 2007

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program

solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: <http://www.grants.gov/CustomerSupport>. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program and, if they meet NSF proposal preparation requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts with the proposer.

A. NSF Merit Review Criteria

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

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

What is the intellectual merit of the proposed activity?

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

What are the broader impacts of the proposed activity?

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

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

Integration of Research and Education

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

Integrating Diversity into NSF Programs, Projects, and Activities

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

Additional Review Criteria:

Additional review criteria differ by CPATH project type as described below.

EAE and T proposals.

In the context of the Intellectual Merit and Broader Impacts review criteria, reviewers will be asked to comment specifically on the following aspects of EAE and T proposals.

Project Vision, Goals, Objectives, and Anticipated Outcomes. Comment on the potential of the proposed project and the likelihood that it will contribute in significant ways to realization of the CPATH vision, and to systemic change in undergraduate computing education.

Current State. Comment on the readiness of the participating organizations to undertake the proposed work. Do the proposers demonstrate a clear understanding of the current state of undergraduate computing education within the nation, within participating organizations, and within the domain of focus for the proposed project. If data are provided, do they support the proposing team's assessment.

Implementation Plan. Comment on the likelihood that the proposed implementation plan will result in realization of the proposed vision, goals, objectives and milestones for the project. Assess and comment on the degree to which individuals from CISE disciplines are engaged in the project, both in the leadership team and in the project as a whole.

Collaboration Plan. Comment upon the proposed collaboration plan and the commitment of the participating organizations to the project vision, goals, objectives and outcomes. Does the collaboration plan give confidence that organizational change necessary to project success will be effected.

Evaluation and Dissemination Plan. Comment upon the quality of the proposed evaluation and dissemination activities.

CB proposals.

In the context of the Intellectual Merit and Broader Impacts review criteria, reviewers will be asked to comment specifically on the following aspects of CDEF proposals:

Project Vision, Goals, Objectives, and Anticipated Outcomes. Comment on the potential of the proposed project and the likelihood that it will contribute in significant ways to realization of the CPATH vision.

Implementation Plan. Comment on the likelihood that the proposed implementation plan will result in realization of the proposed vision, goals, objectives and outcomes. Assess and comment upon the degree to which individuals from CISE disciplines will be engaged in the proposed activities.

CDEF proposals.

In the context of the Intellectual Merit and Broader Impacts review criteria, reviewers will be asked to comment specifically on the following aspects of CDEF proposals:

Professional Qualifications. Comment upon the professional qualifications of the PI and the contributions the PI has made and has potential to make as a visionary leader in undergraduate computing education.

Implementation Plan. Comment upon the innovative nature of the proposed project and the likelihood that the implementation activities described will impact undergraduate computing education on a national scale.

Recommendations. Comment upon the support and recommendations made by community members for this project.

B. Review and Selection Process

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

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

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

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has

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

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

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

C. Reporting Requirements

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

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

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

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Harriet Taylor, NSF CISE/CNS Room 1175.13, telephone: (703) 292-7973, email: htaylor@nsf.gov
- Anita La Salle, NSF CISE/CNS Room 1175.19, telephone: (703) 292-5006, email: alasalle@nsf.gov
- Janice Cuny, NSF CISE/CNS Room 1175.07, telephone: (703) 292-8489, email: jcuny@nsf.gov
- Le Gruenwald, NSF CISE/IIS, 1125 S, telephone: (703) 292-8930, email: lgruenwa@nsf.gov
- C.S. George Lee, NSF CISE/IIS Room 1125 S, telephone: (703) 292-7838, email: csglee@nsf.gov
- Sylvia Spengler, NSF CISE/IIS Room 1125 S, telephone: (703) 292-8930, email: sspengle@nsf.gov
- Joseph Urban, NSF CISE/CCF Room, 1115, telephone: (703) 292-8910, email: jurban@nsf.gov
- Sonya Lucas, telephone: (703) 292-7063, email: slucas@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Sharon Glivens, telephone: (703) 292-8950, email: sglivens@nsf.gov
- Mary Mellette, telephone: (703) 292-8950, email: mmellett@nsf.gov

For questions relating to Grants.gov contact:

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

IX. OTHER INFORMATION

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

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

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

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

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230

- **For General Information** (NSF Information Center): (703) 292-5111

- **TDD (for the hearing-impaired):** (703) 292-5090

- **To Order Publications or Forms:**

Send an e-mail to: pubs@nsf.gov
or telephone: (703) 292-7827

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


PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

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

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

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