CISE Pathways to Revitalized Undergraduate Computing Education (CPATH)

PROGRAM SOLICITATION
09-528

REPLACES DOCUMENT(S):
NSF 08-516

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):

April 28, 2009

April 22, 2010

REVISION NOTES

This solicitation is the successor solicitation to NSF 08-516. It is different in the following major ways:

1. This new solicitation emphasizes the development of student competencies in computing concepts, methods, technologies and tools - referred to as computational thinking - in approaches that promise to revitalize undergraduate education.

2. The former CPATH tracks of Community Building and Institutional Transformation have been replaced by Class I and Class II tracks; Class I and II tracks are defined by project budget size. The types of project activities previously proposed in the Community Building and Institutional Transformation tracks may be proposed to the new Class I and II tracks.

3. This solicitation is a multi-year solicitation.

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this new requirement).

As announced on May 21, 2009, proposers must prepare and submit proposals to the National Science Foundation (NSF) using the NSF FastLane system at http://www.fastlane.nsf.gov/. This approach is being taken to support efficient Grants.gov operations during this busy workload period and in response to OMB direction guidance issued March 9, 2009. NSF will continue to post information about available funding opportunities to Grants.gov FIND and will continue to collaborate with institutions who have invested in system-to-system submission functionality as their preferred proposal submission method. NSF remains committed to the long-standing goal of streamlined grants processing and plans to provide a web services interface for those institutions that want to use their existing grants management systems to directly submit proposals to NSF.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

CISE Pathways to Revitalized Undergraduate Computing Education (CPATH)

Synopsis of Program:

Computing has permeated and transformed almost all aspects of modern life. As computing becomes more important in all sectors of society, so does the preparation of a globally competitive U.S. workforce able to ***apply core computing concepts, methods, technologies, and tools*** - referred to here as Computational Thinking (CT) - to a broad range of societal challenges and opportunities.

CT capitalizes on concepts, methods, technologies, and tools fundamental to the fields of computing, i.e. computer and information science and engineering. For example, computing concepts and methods equip us to reason at multiple levels of abstraction simultaneously, to think algorithmically and apply foundational mathematical concepts

to solve complex problems, and to understand the dimensions and consequences of scale. However, it is only when computing concepts and methods are combined with the power of automation afforded by contemporary computing technologies and tools that the full potential of CT is unleashed. Drawing deeply on computational concepts, methods, technologies and tools, CT serves as a powerful strategy to more effectively design, understand and solve problems associated with complex systems in many aspects of modern life.

The CISE Pathways to Revitalized Undergraduate Education in Computing (CPATH) program recognizes the growing importance of CT in society. The goals of the program are to:

- contribute to the development of a globally competitive U.S. workforce with CT competencies essential to U.S. leadership in the global innovation enterprise;
- increase the number of students developing CT competencies by infusing CT learning opportunities into undergraduate education in the core computing fields - computer and information science and engineering, and in other fields of study; and,
- demonstrate transformative CT-focused undergraduate education models that are replicable across a variety of institutions.

Through the CPATH program, CISE challenges the academic community to identify and define the core computing concepts, methods, technologies and tools to be integrated into promising new undergraduate education models, and to demonstrate effective strategies to develop and assess CT competencies in the relevant learning communities. While aimed primarily at revitalizing undergraduate education, CISE encourages the exploration of new models that extend from institutions of higher education into the K-12 environment; activities that engage K-12 teachers and students to facilitate the seamless transition of secondary students into CT-focused undergraduate programs are particularly encouraged.

Successful CPATH proposals will include administrators, researchers, educators and students in institutions of higher education. Further, the engagement of stakeholders in other types of organizations including, but not limited to, K-12 schools and school districts, industry, and professional societies is also encouraged. Every CPATH proposal ***must*** demonstrate the engagement of faculty with expertise in the core computer and information science and engineering (CISE) disciplines.

The CPATH program seeks proposals in two size classes: Class I projects with project budgets totaling no more than $300,000 for 1-, 2- or 3-year durations; and, Class II projects with project budgets totaling no more than $800,000 each for 2- or 3-year durations.

Cognizant Program Officer(s):

- Harriet Taylor, Program Director, Division of Computer and Network Systems, telephone: (703) 292-8950, email: htaylor@nsf.gov
- Sylvia Spengler, Program Director, Division of Information and Intelligent Systems, telephone: (703) 292-8930, email: sspengle@nsf.gov
- Joan Peckham, Program Director, Division of Computer and Network Systems, telephone: (703) 292-8950, email: jpeckham@nsf.gov
- Dmitry Maslov, Program Director, Division of Computing and Communication Foundations, telephone: (703) 292-8910, email: dmaslov@nsf.gov

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: 12 to 30 new awards in each annual competition.

Anticipated Funding Amount: $10,000,000 for each annual competition, pending the availability of funds. Each Class I project will be funded at a level not to exceed $300,000 total for 1, 2 or 3 years. Each Class II project will be funded at a level not to exceed $800,000 total for 2 or 3 years.

Eligibility Information

Organization Limit:

None Specified

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:

None Specified

Limit on Number of Proposals per PI: 1

An individual may participate as PI, Co-PI, or Senior Personnel in at most one proposal in each annual CPATH competition.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **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:** 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):

  April 28, 2009

  April 22, 2010

Proposal Review Information Criteria

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

Award Administration Information

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

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

Computing has permeated and transformed almost all aspects of modern life. As computing becomes more important in all sectors of society, so does the preparation of a globally competitive U.S. workforce able to apply core computing concepts, methods, technologies, and tools - referred to as ***Computational Thinking (CT)*** in this document - to a broad range of societal challenges and opportunities.

CT capitalizes on concepts, methods, technologies, and tools fundamental to the fields of computing, i.e. computer and information science and engineering.For example, computing concepts and methods equip us to reason at multiple levels of abstraction simultaneously, to think algorithmically and apply foundational mathematical concepts to solve complex problems, and to understand the dimensions and consequences of scale. However, it is only when computing concepts and methods are combined with the power of automation afforded by contemporary computing technologies and tools that the full potential of CT is unleashed. Drawing deeply on computing concepts, methods, technologies and tools, CT serves as a powerful strategy to more effectively design, understand and solve problems associated with complex systems in all aspects of modern life.

II. PROGRAM DESCRIPTION

The CISE Pathways to Revitalized Undergraduate Education in Computing (CPATH) program recognizes the growing importance of CT in society. The goals of the program are to:

- contribute to the development of a globally competitive U.S. workforce with CT competencies essential to U.S. leadership in the global innovation enterprise;
- increase the number of students developing CT competencies by infusing CT learning opportunities into undergraduate education in the core computing - computer and information science and engineering - disciplines, and in other fields of study; and,
- demonstrate transformative CT-focused undergraduate education models that are replicable across a variety of institutions.

Through the CPATH program, CISE challenges the academic community to identify and define the core computing concepts, methods, technologies and tools to be integrated into promising new undergraduate education models, and to demonstrate effective strategies to develop and assess CT competencies in the relevant learning communities. While aimed primarily at revitalizing undergraduate education, the CPATH program encourages the exploration of education models that extend from institutions of higher education into the K-12 environment; activities that include the engagement of K-12 teachers and students to facilitate the seamless transition of secondary students into CT-focused undergraduate programs are particularly encouraged.

Successful CPATH proposals will include administrators, researchers, educators and students in institutions of higher education. Further, the engagement of stakeholders in other types of organizations including, but not limited to, K-12 schools and school districts, industry, and professional societies is also encouraged. Every CPATH proposal ***must*** demonstrate the engagement of faculty with expertise in the core computer and information science and engineering (CISE) disciplines.

CPATH invites proposals from academic institutions and their partners to plan, develop, adopt, implement and/or extend promising approaches to infuse CT into undergraduate education. Proposals may focus on undergraduate education in (1) computing fields alone, or (2) computing and other fields in which the development of CT competencies is likely to have significant impact. All proposals must include plans to disseminate project outcomes to a national audience. Proposals that engage K-20 administrators, faculty, teachers and students are encouraged.

By identifying specific learning objectives, CPATH projects will empower students to develop deep CT competencies that can be applied to a broad range of societal challenges and opportunities. Further, through rigorous evaluation, CPATH projects will provide detailed performance feedback to administrators, faculty, teachers, students and other stakeholders.

The CPATH program will support the following types of activities:

- Projects focused on common CT interests and affinities that encourage community collaboration, interaction and resource sharing. Such efforts might include a topical, pedagogical, geographical, or other unifying focus that defines the CT objectives of the participating parties.
- Activities designed to develop and support communities of practice experimenting with the introduction or replication of promising CT-centric education models.
- Activities focused on the preparation that institutions may need to do to plan for and embark upon comprehensive, CT-focused curriculum reform and implementation.
- Implementation and institutionalization of innovative CT-centric education models designed to revitalize undergraduate education at one or more participating institutions. Proposers may seek to implement promising new models in one or more participating institutions or may seek to adopt, adapt, extend or expand existing successful models.

However, please note that the examples provided above do not represent an exhaustive list of the types of CPATH activities of interest to CISE. Proposers are strongly encouraged to think creatively about the ways in which they might contribute to the realization of CPATH goals.

CPATH will make awards in two project size classes, Class I and Class II. Class I projects have budgets of no more than $300,000 total for 1, 2 or 3 year durations. Class II projects have budgets of no more than $800,000 total for 2 or 3 year durations. Investigators should select the class based on the proposed project scope and intended outcomes.

All CPATH projects must include evaluation and assessment components that can effectively document both successes and failures. Awardees must set and meet measurable goals and collect evidence to determine progress towards these goals. Awardees must also participate in a CPATH program-level evaluation and provide common data to the CPATH program-level evaluator. All Class II projects must include comprehensive evaluation plans that involve external evaluators with the expertise necessary to conduct project evaluation and to design and conduct quasi-experimental evaluation components as part of the NSF CPATH programmatic evaluation. Class II projects must budget for an external evaluator normally at the level of 10-15% of the overall project budget.

Additional Information Relevant to all CPATH Proposals

In 2009, the Computer Science and Telecommunications Board of the National Academy of Sciences will host two workshops to explore the nature of CT and its cognitive and educational dimensions. A report for each workshop will be developed to summarize and synthesize discussions, compare and contrast the views of the invited expert participants, and identify common ground and areas for moving forward. The reports will be disseminated widely in both computing and educational communities. PIs are encouraged to monitor the CSTB web site (http://sites.nationalacademies.org/cstb/CurrentProjects/CSTB_043590) for more information on these studies.

The NSF CPATH web site (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=500025&org=CNS&from=home) includes a link to a CPATH Frequently Asked Questions (FAQ) document. Check the CPATH FAQ site for updates additional information about preparing CPATH proposals and for recent updates to the growing set of CT resources emerging across the country.

Competitive CPATH proposals will extend beyond the preparation of a new curriculum and its passive dissemination through a web site. The incremental revision of existing courses, such as the introductory computing course sequence, will not satisfy the goals of CPATH. CT curricular efforts should be broad and inclusive, and should include active engagement of a community of stakeholders. Typically, the focus of a CPATH proposal will be broader than a single course, single workshop, or single faculty member.

Many CPATH projects and activities will result in new pathways and opportunities that might attract a broader audience of students and faculty to undergraduate programs in which CT is playing an important and growing role. CPATH projects must focus on goals related to fundamentally changing the nature of undergraduate education through a focus on CT, rather than on strategies primarily aimed at broadening participating. While broadening participation goals may well be a component of CPATH projects, a focus on achieving the three goals of the CPATH program must dominate. Individuals primarily interested in broadening participation might consider the CISE Broadening Participation in Computing (BPC) program.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. NSF anticipates having $10 M for 12-30 new awards in each annual compeitition, pending the availability of funds. Class I projects will be funded at levels not to exceed $300,000 total for 1, 2 or 3 years. Class II projects will be funded at levels not to exceed $800,000 total for 2 or 3 years.

IV. ELIGIBILITY INFORMATION

Organization Limit:

None Specified

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:

None Specified

Limit on Number of Proposals per PI: 1

An individual may participate as PI, Co-PI, or Senior Personnel in at most one proposal in each annual CPATH competition.

Additional Eligibility Info:

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified 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-PUBS (7827) or by e-mail from nsfpubs@nsf.gov.

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/human.jsp

Additional Instructions for Proposal Preparation.

Proposal Title: To assist NSF staff in sorting proposals for review, proposal titles should identify the size class of project proposed. For example: "I: Adopting the Distributed Computing Practice Model at Liberal Arts Institutions"; or, "II: Developing a Professional Community for Integrating Computational Thinking into Undergraduate Education".

Project Summary: The project summary must specifically discuss in separate labeled sections the Intellectual Merit and Broader Impacts of the proposed activities, in accordance with the guidelines described in the GPG. Proposals that fail to do so will be returned without review.

Project Description: The Project Description is limited to 15 pages, and should include the following sections:

Project Vision, Goals, Objectives and Outcomes. Describe the CT-centric vision, goals, objectives, and anticipated outcomes of the proposed project. Clearly indicate how they will contribute to realization of the three CPATH program goals.

Intellectual Basis / Related Work. Describe the intellectual basis for the project and discuss related prior work. Include a review of the research literature relevant to the project and provide corresponding references.

Current State. Provide a current assessment of undergraduate education in the relevant participating organizations. Describe prior pilot programs or planning activities conducted to date, if any, and their outcomes. Where appropriate, provide institutional data to document the current environment by uploading data into the Supplementary Docs section in FastLane.

Implementation Plan. Describe in detail the CT-centric activities to be undertaken to realize the project vision, goals, objectives and anticipated outcomes.

Define, or describe how the proposing team will attempt to define, the core computing concepts, methods, technologies and tools to be integrated into promising new undergraduate education models. Describe your plans to identify and implement effective strategies to develop and assess CT competencies in the relevant learning communities. Identify the stakeholder cohort, e.g. K-20 administrators, faculty, teachers, students, etc., that will participate in and/or benefit from the activities. If relevant, describe how change will be effected and sustained in the participating organizations.

Describe project milestones in the context of a project timeline and identify responsible parties and expected outcomes for each milestone. Summarize this information in a figure that you upload into the Supplementary Docs section in FastLane.

Describe how project outputs and outcomes will be disseminated to the relevant stakeholder groups and to the national community and if relevant, how project resources will be made available to others to adopt or adapt. Identify proactive measures to find and support adopters of promising models and/or practices. Describe plans for outreach to other groups or interested institutions that will take place during the project.

Collaboration and Management Plan. Provide a collaboration and management plan that will guide project implementation. Describe how the project leadership team will form, orient, manage, and reinforce relationships in the project. Provide evidence of the commitment of the participating organizations to effect and sustain the anticipated project outcomes; letters of collaborative support should be uploaded into the Supplementary Docs section in FastLane.

Evaluation Plan. Provide an evaluation 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 the evaluator 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. *Note that each Class II proposal must identify an external evaluator with the expertise necessary to design and conduct quasi-experimental evaluation.*

Proposers are reminded to identify the program solicitation number (Populated with NSF Number at Clearance) 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.

Other Budgetary Limitations:

For Class II proposals, funds must be requested to allow the project evaluators to attend an annual evaluator meeting organized by NSF; evaluation should comprise approximately 10-15% of the cost of Class II projects.

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

All CPATH project budgets must include funds for at least one PI to attend the annual CPATH PI meeting.

Significant faculty involvement and commitment is essential for all CPATH proposals. This should be reflected in the Project

Description and in the budget requested.

C. Due Dates

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

  April 28, 2009

  April 22, 2010

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 judgements.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?
What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

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

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:

In the context of the Intellectual Merit and Broader Impacts review criteria, reviewers will be asked to consider specifically the following aspects of CPATH proposals.

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

Intellectual Basis/Related Work. Assess the proposed intellectual contribution, and the potential for dissemination and adaptation in the national community.

Current State. Evaluate 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 the 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. Evaluate the soundness of the proposed implementation plan. Determine 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. Assess the quality of the proposed dissemination activities.

Collaboration and Management Plan. Evaluate the proposed collaboration and management plan and the commitment of the participating organizations to the project vision, goals, objectives and outcomes. Assess the expertise of the project team to carry out the project.

Evaluation Plan. Assess the quality of the proposed evaluation activities. Are Class II proposing teams using external evaluators with the expertise to design comprehensive project evaluations that include components with quasi-experimental designs? Do Class II budgets for the evaluation constitute approximately 10 - 15 % of the total project cost?

B. Review and Selection Process

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

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

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

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or 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:

All CPATH awardees must participate in a CPATH program-level evaluation, and will be required to provide common data to the CPATH program-level evaluator under contract with NSF.

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, Program Director, Division of Computer and Network Systems, telephone: (703) 292-8950, email: htaylor@nsf.gov
- Sylvia Spengler, Program Director, Division of Information and Intelligent Systems, telephone: (703) 292-8930, email: sspengle@nsf.gov
- Joan Peckham, Program Director, Division of Computer and Network Systems, telephone: (703) 292-8950, email: jpeckham@nsf.gov
- Dmitry Maslov, Program Director, Division of Computing and Communication Foundations, telephone: (703) 292-8910, email: dmaslov@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:

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