

Information Technology Research (ITR)

Fiscal Year 2003 Announcement

Program Solicitation

NSF-02-168

DIRECTORATE FOR BIOLOGICAL SCIENCES
DIRECTORATE FOR COMPUTER AND INFORMATION SCIENCE AND
ENGINEERING
DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
DIRECTORATE FOR ENGINEERING
DIRECTORATE FOR GEOSCIENCES
DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES
DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES
OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING
OFFICE OF POLAR PROGRAMS

PRE-PROPOSAL DUE DATES(S) (*required* for Large projects only): November 18, 2002

PROPOSAL DEADLINE(S) :

March 24, 2003 **Large projects: Pre-proposals are mandatory and are due by November 18, 2002. After NSF review of pre-proposals, only PIs who are invited may submit full proposals. NSF will return feedback to pre-proposal PIs by the week of January 27, 2003.**

February 12, 2003 **Medium projects: Proposals are due by February 12, 2003.**

December 12, 2002 **Small projects: Proposals are due by December 12, 2002.**



NATIONAL SCIENCE FOUNDATION



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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: (301) 947-2722
- **To Locate NSF Employees:** (703) 292-5111

SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Information Technology Research (ITR)

Synopsis of Program:

Information Technology (IT) today is an essential ingredient in research, technology, education, and other societal endeavors. IT includes the automated capturing of data and processing of information; large-scale networking; high-end computing; high-end computation and infrastructure; high-confidence software and systems; human-computer interaction and information management; as well as theoretical studies of the nature of information and the limits of computation. In addition, there are important social, economic, and workforce implications of IT. This Announcement broadly invites innovative fundamental research proposals that address the challenges that face IT or seek advances at the frontiers of science and engineering through the creative and innovative use and further development of IT. The ITR Program is interested in fostering visionary work that could lead in the future to major advances, new and unanticipated technologies, revolutionary applications, or new ways to perform important activities. The program is especially interested in multi-disciplinary research. In general, research that fits well in existing NSF disciplinary programs and that pursues an already established research agenda should be directed to those programs and will be less competitive in the ITR Program.

In FY 2000, the NSF Information Technology Research (ITR) program stressed fundamental research on information technology itself, and in the second year, research on applications of information technology to the various sciences was added. In FY 2002, the program expanded research in multidisciplinary areas, focusing on fundamental research at the interfaces between information technology and other disciplines; proposals were solicited in three topical categories: software and hardware systems, augmenting individuals and transforming society, and advancement of the frontiers of science and engineering through information technology. While explicit categories will not be used in FY 2003, ITR will continue to support new awards in these previously targeted areas and will additionally emphasize the fundamental relationship between the acquisition and utilization of knowledge and the information tools needed to acquire, organize, and interpret that knowledge. The intent in FY 2003 is to stimulate research on the fundamental challenges facing the continued expansion and utilization of IT across the sciences and engineering, creation of novel use and development of IT, the interaction of IT with society at large, and the use of IT to enhance security and reduce the vulnerabilities of our society to catastrophic events, whether natural or man-made.

Cognizant Program Officer(s):

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

- 47.074 --- Biological Sciences
- 47.070 --- Computer and Information Science and Engineering
- 47.076 --- Education and Human Resources
- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.049 --- Mathematical and Physical Sciences
- 47.078 --- Office of Polar Programs
- 47.075 --- Social, Behavioral and Economic Sciences

ELIGIBILITY INFORMATION

- **Organization Limit:**

Only U. S. academic institutions and non-profit research institutions may submit pre-proposals and full proposals.

NSF encourages proposers to collaborate with international researchers, for-profit corporations, and national laboratories. However, in keeping with the Foundation's desire to stress educational benefits of this funding, proposals will only be accepted from U.S. institutions of higher education and from U.S. non-profit research institutions which either have a strong educational component or team up with such an institution as part of the project submitted. For-profit organizations, government laboratories operated by other agencies and foreign

institutions may not apply directly; they may receive subawards, but such subawards must be justified by explaining what unique capability is being made accessible. In no case will NSF support salaries of regular Federal employees of other agencies.

- **PI Eligibility Limit:** An individual may appear as PI, co-PI, or Senior Personnel on no more than two ITR full proposals.
- **Limit on Number of Proposals:** None

AWARD INFORMATION

- **Anticipated Type of Award:** Standard and Continuing grants for Small and Medium projects; Cooperative Agreements for Large projects. Please see Section IV. in the full solicitation for more details.
- **Estimated Number of Awards:** The number and type of awards are dependent upon available funding. Please see the full solicitation (Section IV.) for more information.
- **Anticipated Funding Amount:** NSF intends to spend approximately \$145 million in Fiscal Year 2003 on proposals received in response to this solicitation. The actual funding level depends on Congressional action.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Pre-proposals:** Submission of Pre-proposals is required for Large projects only. Please see the full program announcement/solicitation for further information.
- **Full Proposals:** Supplemental Preparation Guidelines
 - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

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

C. Deadline/Target Dates

Letters of Intent (optional): None

Pre-proposals (required for Large projects only): November 18, 2002

Proposal Deadline Date(s):

- March 24, 2003** **Large projects:** Pre-proposals are mandatory and are due by November 18, 2002. After NSF review of pre-proposals, only PIs who are invited may submit full proposals. NSF will return feedback to pre-proposal PIs by the week of January 27, 2003.
- February 12, 2003** **Medium projects:** Proposals are due by February 12, 2003.
- December 12, 2002** **Small projects:** Proposals are due by December 12, 2002.

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
 - FastLane User Support, telephone: (800) 673-6188, e-mail: fastlane@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full program announcement/solicitation for further information.

I. INTRODUCTION

Information Technology (IT) today pervades science, engineering, education, and society in ways that are in constant flux and need further understanding. Much of recent U.S. economic growth is attributed to IT developments, and we now rely heavily on IT for research, education, government, business and communications, health care, and many other aspects of life. NSF supports research that extends and applies IT, improves our understanding of IT and its effects, and helps prepare our society for the Information Age.

The ITR Program is a primary source of fundamental technological breakthroughs in the advanced computing, networking, software, and information management technologies, and their applications to scientific, engineering, and other topics important to our society. The Program began in FY00, each year expanding its mission and funding. Each year the program has selected a number of focus areas to emphasize within the IT landscape while encouraging groundbreaking and high-risk with potential for high payoff research spanning a broad panorama. The program for Fiscal Year 2003 continues in the same spirit as the preceding three years, emphasizing inter-disciplinary, fundamental research that seeks to increase the trustworthiness, effectiveness, penetration, and interaction of IT with all sectors of our society. In keeping with the core mandate of NSF, one focus of the competition is the innovative use of IT as a tool in science and engineering research and education. Proposals to the ITR Program should demonstrate how they contribute to expanding the frontiers of IT or its applications through research and education, proposing new tools and applications, new theories and techniques, or new bridges between existing disciplines or communities.

This announcement requests proposals that address fundamental research and education in IT; IT implications for individuals, society, and scholarship; or application areas at the intersection of IT and other science or engineering disciplines. Proposed projects should address forward-looking, far-reaching issues and ideas that have the potential to change the IT landscape or open new areas in which IT will play important and defining technical, social, or educational roles. The objective of the Program is to push the IT frontiers beyond those efforts that fall within the scope and short-term goals of industry and mission-oriented investments. The Program Description for ITR suggests a number of areas of potential interest but construes IT in its broadest sense, encouraging research on computers and computation; networking and communication; information and data storage, manipulation, and presentation; new applications of IT in all science and engineering disciplines; new science and engineering research that is facilitated by IT and by collaboration with computer scientists; and uses of this knowledge and technology to advance social, educational, scientific, and engineering goals. Fundamental research that contributes to national security, including new models for information and network security, new IT for emergency response and new IT for prevention, detection, remediation, and attribution of terrorist attacks, is especially encouraged.

ITR funding is available for up to five years to support long-term, multidisciplinary research and education projects. The ITR Program as a whole is divided into three separate competitions according to the size of the projects, each with its own deadlines, but all ITR topics may be addressed in any of the three competitions.

II. PROGRAM DESCRIPTION

Information Technology (IT) now covers a vast array of ideas, techniques, tools, and technologies. The core science underlying the IT universe is broad, covering theory of computability and complexity; exploration of physical, chemical, and biological phenomena that support computing devices; storage, curation, and analysis of massive data sets; networking and communications capabilities to overcome the barriers of time and space and open new frontiers of human interaction and ingenuity; modeling and simulating processes in science and engineering at all length and time scales; modeling human behavior, interactions and cognitive process; verification and validation theories for hardware and software; and much more. IT today, however, has also become a social and economic force due to the penetration of the technologies based on this science into every aspect of daily life. Microprocessors are embedded everywhere, and many things that we think of as serving a passive function, such as homes and bridges, may be equipped with a variety of sensors and controllers to inform or take action in response to the environment. Information lies at the heart of the expanding range of technologies.

The current advances in IT have already transformed the ways in which we view ourselves and the natural world from the sub-microscopic to the extra-galactic, our relationships with each other and with other communities, the ways in which we obtain services, ranging from entertainment and commerce to education and health care, and the ways we pursue the discovery and communication of new knowledge and concepts.

With this Announcement, NSF invites innovative, fundamental research proposals that address the challenges that face IT or seek advances at the frontiers of science and engineering through the creative and innovative use of IT. The ITR Program encourages proposals in all areas of computer science, the physical and biological sciences, engineering, and social sciences where IT has or will have significant impact. That impact could be in the laboratory, in the classroom, in our homes, in the way in which we process and manipulate information, or in securing a safe environment. Visionary work that produces major advances, new and unanticipated technologies, revolutionary applications, or new ways to perform important activities, are especially encouraged. Research that pursues an already established research agenda will be less competitive in the ITR Program and should be directed to the appropriate existing NSF disciplinary program.

Research challenges include, but are not restricted to:

- Advancing fundamental research and the technical state of the art of IT and assessing its impacts on other fields of science and engineering, including:
 - Extending the capability to process, manage, and communicate information on a global scale beyond what we imagine today. This includes new paradigms for communication, networking and data processing in large-scale, complex systems.
 - Understanding how to extend, or scale up, the network infrastructure to include an extremely large number of computing and monitoring systems, embedded devices and appliances.
 - Exploring new research directions and technical developments to enable wide deployment of pervasive IT through new classes of ubiquitous applications and creation of new ways for knowledge acquisition and management.
 - Exploiting the power of IT and networking infrastructures to enable robust, secure and reliable delivery of critical information and services anytime, anywhere, on any device.
- Expanding our capacity to respond through IT to new opportunities and to lower the lag time between concept and implementation. This includes work directly focused on education, workforce, and productivity issues as well as scientific and engineering research.
- Providing new computational, simulation, and data-analysis methods and tools to model physical, biological, social, behavioral, and mathematical phenomena. This can include the creation of novel hardware, the development of computational theory and paradigms coupled with research on a target application, or the enabling of distributed, dynamic data-driven applications and data-intensive computing.
- Improving our ability to understand, model and control the behavior of complex systems as well as their effects on society and the economy. This includes new theories and techniques to understand emergent behaviors in large systems, with a high degree of structural complexity, including technological, social and natural systems.
- Increasing our understanding by acquiring new knowledge about the manner in which social, behavioral, economic, and political processes shape the use of IT by people, organizations, and cultural groups, as well as the ways IT can affect economic growth, democracy and political processes, health care, and other aspects of contemporary life.
- Creating a new generation of scientists and engineers who are capable of fully integrating IT into the whole educational, professional, and creative process of the scientific and engineering disciplines. This includes improved use of existing and emerging information technologies to transform the way we learn, and development and promulgation of new learning methods and interactive learning environments for an effective integration of IT with education and training.

- Using IT to enhance national security, reduce the impact of security breaches on the nation's critical infrastructure, and improve our ability to prevent, detect, respond to, and recover from singular events, whether man-made or natural.
- Exploring how the unfolding possibilities of information technology pose challenges and create opportunities in the areas of ethics, privacy, civil rights and individual liberty, value sensitive design and transparency.
- Integrating advances in IT into research in science and engineering in ways that will enable novel, profound insights about the physical, biological, and social worlds that we inhabit.
- Development of technologies that enhance human abilities and efficiencies, including machines, devices and materials to optimize human interaction and enhance work efficiency, learning, and sensory and cognitive capabilities.
- Incorporating the latest advances in IT into the generation of new scientific and engineering knowledge for the manufacturing and the design of processes, structures and systems.

All proposals submitted to the ITR Program must include explicit descriptions that detail the connection of the proposed research to the challenges and goals of the ITR Program. Reviewers will be instructed to assess the relevance of proposals to IT advancement or to scientific and/or engineering research in which IT plays a fundamental role. Reviewers will also be instructed to address the broader impact these advances will have on the scientific community and on society as a whole.

NSF requires that all proposals address the integration of research and education. In addition to its emphasis on innovative and exciting scientific and engineering research, the Foundation expects that investigators will address one or more of a number of broader issues in proposals submitted to the ITR Program. Examples could include (but are not limited to):

- Diversity of the research team and the impact of the project on diversity of the workforce.
- Collaboration across disciplinary, community, and national boundaries.
- Expansion of a research or educational community or fusion of different communities.
- Impact on the IT workforce or on the IT capability of the broader science and engineering workforce.
- Long-term impact of the proposed research on the larger community.

For reviewing purposes, proposals are divided into three classes by size of budget. The Proposal Submission and Size Classes sections below describe the procedure that must be followed in submitting a proposal in any of the three classes, and the criteria by which each class will be evaluated. PIs should carefully follow the proposal submission rules and familiarize themselves with these classes to ensure that they submit to the correct deadline.

SIZE CLASSES

Proposers should consult the appropriate Directorate contact to determine whether the subject matter of the proposal is suitable and encouraged for the ITR competition in that directorate. The title of each proposal should begin with “ITR:” to identify it, and should include the program solicitation number when submitting in FastLane.

1. Small Projects (up to \$500,000 total budget)

Small proposals should be individual or small-team projects. The scope and budget of these projects are limited to a total budget of \$500,000, usually not exceeding \$180,000 in each year. The proposed research project should be original, innovative, and must have a focus consistent with the ITR goals. Innovative research, at the intersection of fundamental IT research and other science and engineering fields, is highly encouraged.

Selection of a specific NSF division and, if possible, a Program is suggested when submitting in FastLane. Proposers are strongly urged to consult the appropriate Directorate ITR contacts and other disciplinary program directors to assure that the best choice is made in selecting an organizational unit.

2. Medium Projects (Total Budgets not to exceed \$4 million for up to 5 years)

In this size class, the team project is expected to be carried out over 4 or 5 years; however, a 3-year project is acceptable. The annual budget should not exceed \$1 million. Proposals should describe substantial and ambitious research and education projects (e.g., multi-disciplinary activities with multiple PIs and/or institutions). Similar to the expectations for Small projects, a high premium is placed on innovation in fundamental IT research, IT applications in science and engineering, and IT education.

The project description should explain why a budget of this size is required to carry out the proposed activities. Generally, the larger the budget, the more carefully its size must be justified. While high-risk and high-payoff proposals are encouraged, it is also expected that the Medium project description will provide preliminary results to justify their proposed approach.

Proposals for Medium projects should describe plans for distributing the results of their research and should strive to assist scientists and engineers to use their results in ways that go beyond traditional academic publications. Midterm external reviews and/or site visits may be expected in the Medium Proposal category; the decision is left to the discretion of the managing Directorate.

3. Large Projects (Total Budgets over \$4 million, not to exceed \$3 million per year for up to 5 years)

Pre-proposals are required for Large projects. Pre-proposals will be peer reviewed in accordance with NSF Proposal Processing and Review guidance (refer to http://www.nsf.gov/pubs/2002/nsf022/nsf0202_3.html); results of the pre-proposal evaluation process will be binding: only those pre-proposal investigators invited by NSF are eligible to submit full proposals. Furthermore, only one full proposal (or set of collaborative proposals) may be submitted for each invited pre-proposal. In this size class, NSF seeks proposals that address very large, long-term, coordinated research and education efforts; a high premium is placed on innovation at the intersection of fundamental IT research and other science and engineering fields. Proposals for Large projects should address research that is innovative in terms of its ideas, scale, or integration of its parts. Proposals in this size class should carefully justify the need for an effort of such magnitude. It is very important that the project be an integrated whole rather than a collection of independent pieces. Proposals in this class must contain an explicit management plan that is appropriate to the coordination of the proposed activities and demonstrates the advantages of the large project structure. NSF has a strong interest in educational and community-extending activities. We expect that Large projects will include one or more community-extending concepts such as creative undergraduate education activities; programs to address the under-representation of women and minorities in IT; links to institutions with strong traditions of teaching, mentoring and workforce development; or participation by institutions in EPSCoR states.

Large projects, because of the significant public investment, have a special responsibility to address the NSF broader impacts criteria. It is expected that large proposals will specify how artifacts and knowledge generated by the projects will be shared with and used by the wider engineering and scientific communities. It is also expected that large proposals will have significant education and outreach activities - especially activities that will increase the diversity of the science, technical, engineering and mathematics work force. The types of activities that would fulfill these requirements include, but are not limited to: plans for distributing software, data, or other products developed in the course of the research; maintaining software repositories with documented, portable implementations of algorithms and other software tools; hosting tutorials and workshops to promote community interest, understanding, and use of new methods; increasing the level of education in IT-related disciplines at either the undergraduate or graduate level, including development of novel educational curricula inspired by proposed ITR research project; publishing technical specifications and schematics of hardware designs; and making databases and project related information accessible on the Web. PIs must consult the NSF Grant Proposal Guide section VII.K on Legal Rights To Intellectual Property. Midterm external reviews of, and/or site visits to awardees in the Large Proposal category can be expected.

The availability of funds for large projects is not uniform across research topics and theme areas. People considering the submission of a large proposal are, therefore, strongly urged to first discuss their ideas with one of the cognizant program officers.

For additional information related to the ITR program, Awards Listings for ITR 2000, 2001 and 2002, responses to Frequently Asked Questions (FAQ), and other notices, see the ITR Home Page at <http://www.itr.nsf.gov/>.

III. ELIGIBILITY INFORMATION

- Organization Limit: Only U. S. academic institutions and non-profit research institutions may submit pre-proposals and full proposals.
- PI Eligibility Limit: An individual may appear as PI, co-PI, or Senior Personnel on no more than two ITR full proposals.

NSF encourages proposers to collaborate with international researchers, for-profit corporations, and national laboratories. However, in keeping with the Foundation's desire to stress educational benefits of this funding, proposals will only be accepted from U.S. institutions of higher education and from U.S. non-profit research institutions which either have a strong educational component or team up with such an institution as part of the project submitted. For-profit organizations, government laboratories operated by other agencies and foreign institutions may not apply directly; they may receive subawards, but such subawards must be justified by explaining what unique capability is being made accessible. In no case will NSF support salaries of regular Federal employees of other agencies.

IV. AWARD INFORMATION

Under this solicitation, proposals may be submitted in either of three size classes:

- Small projects up to \$500K total award, but not more than \$180,000 in each year;
- Medium projects, \$500K to \$4 million in total, but no more than \$1 million/year; and
- Large projects, \$4-15 million in total budget, but no more than \$3 million/year.

A proposal may request funding for up to five years. NSF expects to make awards in each of these size classes and in a variety of durations. The distribution of awards between the size classes will depend on the number and quality of proposals received in the competition in each class. If proposals follow past patterns, NSF expects to spend 30% of the funding on Small projects, 40-60% on Medium projects, and 10-20% on Large projects. It is difficult to estimate the number of awards; a possible scenario is 60-90 small awards, 40-50 medium awards, and 3-4 large awards. NSF expects to spend approximately \$145M in FY03 on proposals received in response to this solicitation. The

actual funding level depends on Congressional action. The anticipated date of funding decisions for Small projects is June 30, 2003; for Medium projects is June 15, 2003; and for Large projects is June 15, 2003. The anticipated start date for all awards is September 2003.

The anticipated type of awards are Standard and Continuing grants comprising (1) Small projects (cumulative budgets up to \$500,000); and (2) Medium projects (cumulative budgets ranging from \$500,000 to \$4 million); Cooperative Agreements for (3) Large projects (cumulative budgets \$4 million - \$15 million). These budgets are total amounts including subaward and indirect costs. In the case of collaborative proposals, the thresholds apply to the sum of the proposal budgets. No project may have a duration exceeding five years.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Pre-proposals:

Pre-proposals are required for Large projects only. No letters of intent are required. Proposers are reminded to identify the program solicitation number (NSF 02-168) in the program solicitation block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may result in exclusion of the proposal from the ITR competition. "INFORMATION TECHNOLOGY RESEARCH" will automatically be entered as the first "NSF Organizational Unit." On the screen that follows, select the ITR Program (ITR: Small, ITR: Medium, ITR: Large).

Please follow the steps below for the following size classes:

- For the Medium and Large class, proposers must select one of the NSF CISE Directorate Divisions for primary consideration of the pre-proposal or proposal. After the primary CISE division has been selected, a secondary organizational unit from all of NSF may be selected. (Scroll down the screen to the "Show All NSF Units" button, and select the most appropriate area). The secondary organizational NSF unit will assist in selection of reviewers.
- For the Small class (under \$500K), proposers may select any NSF Unit appropriate to their proposal for primary consideration. A secondary organizational unit may also be selected. (Scroll down the screen to the "Show All NSF Units" button, and select the most appropriate area).

GPG guidelines should be augmented with the following additions:

1. Pre-proposal Titles: to assist NSF staff in sorting pre-proposals for review, pre-proposal titles should begin with "ITR:".

2. Multi-institutional Projects: only one pre-proposal should be submitted. If a full proposal is invited, it may be submitted as a single proposal (with subawards), or as a set of collaborative ("linked") proposals.

3. Project Summary: A one-page project summary should be provided to assist in sorting and processing all pre-proposals.

4. Project Description: a pre-proposal project description is limited to 5 pages.

- **Management Plan:** Up to one additional page is allowed in pre-proposals to discuss the management plan for the proposed activities. This page should be included in the project description section, which would bring the project description page count to six.
- **Prior Results:** Not required for pre-proposals.

5. References Cited: up to one page of references may be included.

6. Biographical Information: limited to two pages per PI and co-PI in pre-proposals.

7. Budget: Prepare a one-page cumulative budget for the full duration of the project. The budget need not be detailed but should be sufficient for reviewers to grasp the intended scale of the proposed project. (In FastLane, enter your cumulative budget in Budget Year 1. FastLane will then automatically generate a cumulative budget for your proposal.) The lead institution should include the budget information for the other institutions as subawards. The budget justification should describe the subawardee budgets in enough detail to judge the scope of the project at each institution; typically this would include total personnel, equipment, travel, and other direct and indirect costs.

8. Supporting Letters: Do not include letters of support with pre-proposals. If the PI(s) anticipates providing such letters with the full proposal, and believes that it is important for the referees to know about these letters, a brief description of the supporting information may be included in the 5-page project description of the pre-proposal.

9. Current or Pending Support: is required for pre-proposals for all PIs and co-PIs.

10. Cover Page (Form 1207)

11. List of all Personnel Associated with the Pre-Proposal: All pre-proposals must include one page in the Supplementary Documents section listing the names and institutional affiliations of all persons associated with the project, together with their

primary thesis and post-doctorate advisors and their collaborators during the last 48 months. This information is necessary to identify conflicts with reviewers.

12. International Collaborations: Pre-proposals involving international collaborations must address the international aspects of the work in the management plan.

Full Proposal:

Proposals submitted in response to this program announcement/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 Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

No letters of intent are required. Proposers are reminded to identify the program solicitation number (NSF 02-168) in the program solicitation block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may result in exclusion of the proposal from the ITR competition. "INFORMATION TECHNOLOGY RESEARCH" will automatically be entered as the first "NSF Organizational Unit" for consideration. On the screen that follows, select the ITR Program (ITR Small, ITR Medium, or ITR Large). Please follow the steps below for the following size classes:

- Medium and Large proposers must select one of the NSF CISE Directorate Divisions for primary consideration of your pre-proposal or proposal. After the primary CISE division has been selected, you may choose to select a secondary organizational unit from all of NSF. (Scroll down the screen to the "Show All NSF Units" button, and select the most appropriate area).
- Small proposals (under \$500K) may select any NSF Unit appropriate to your proposal for primary consideration. A secondary organizational unit may also be selected. (Scroll down the screen to the "Show All NSF Units" button, and select the most appropriate area).

NSF expects to use the secondary organizational unit in assigning the proposal for review. However, NSF reserves the right to reassign proposals as needed to obtain the best technical review.

Only pre-proposal PIs that are invited by NSF are eligible to submit Large project proposals. Only one full proposal (or set of collaborative proposals) may be submitted for each invited pre-proposal.

GPG guidelines should be augmented with the following additions:

1. Proposal Titles: To assist NSF staff in sorting proposals for review, proposal titles should begin with “ITR:”.

2. Project Summary: Project summaries should be carefully written to describe the project for a general science audience since this section has wide distribution within the Foundation as it plans review of the project and, in the case of an award, is often used to generate the public abstract of the resulting award.

3. Project Description: Project descriptions are limited to 15 pages total length, except for management plan descriptions for Medium and Large projects. Up to two additional pages are allowed to describe the management plan for Medium projects. Up to three additional pages are allowed for Large projects to discuss the management plan. Large projects should provide at least one person to deal with administration, evaluation and outreach functions in the management plan description.

- **International Collaborations:** proposals must address the international aspects of the work, if any. This may be done in the management plan and should identify the names and institutions of the international collaborators, the nature and goals of their activities, and the international synergies and benefits to be gained from the collaboration.
- **Prior Results:** should be included in the project description section, describing results from prior NSF support. This information must be covered within the 15 page limit, and only those results relevant to the proposed project should be described.

4. List of all Personnel Associated with the Proposal: All proposals must include one page in the Supplementary Documents section listing the names and institutional affiliations of all persons associated with a proposal, together with their primary thesis and post-doctorate advisors and their collaborators during the last 48 months. This information is necessary to identify conflicts with referees.

5. Cost Sharing Requirements

No cost sharing is required for this program. If cost sharing is offered and the project is funded, cost sharing will be monitored carefully.

Proposers are reminded of NSF's requirement that broad impacts must be specifically and separately addressed in both the Project Summary and the Project Description.

See the Grant Proposal Guide (GPG) for further details.

Proposers are reminded to identify the program solicitation number (NSF-02-168) in the program announcement/solicitation block on the proposal Cover Sheet. 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 is not required in proposals submitted under this Program Solicitation.

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Pre-proposals (required for Large projects only): November 18, 2002

Proposals by 5:00 PM local time:

March 24, 2003 **Large projects:** Pre-proposals are mandatory and are due by November 18, 2002. After NSF review of pre-proposals, only PIs who are invited may submit full proposals. NSF will return feedback to pre-proposal PIs by the week of January 27, 2003.

February 12, 2003 **Medium projects:** Proposals are due by February 12, 2003.

December 12, 2002 **Small projects:** Proposals are due by December 12, 2002.

All deadlines are 5:00 p.m. PI's local time (for example, the deadline for a university in Oregon will be 8 p.m. in Washington, DC). For multi-institutional collaborative proposals, the deadline applies to each submitting institution separately.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for 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 announcement/solicitation.

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The two National Science Board approved merit review criteria are listed below (see the Grant Proposal Guide Chapter III.A for further information). 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 he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

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

Innovation in Information Technology and its Application to Science or Engineering

As a part of the intellectual merit of a pre-proposal or full proposal, ITR emphasizes the importance of novel, high-risk, and high-impact research. Is the proposal highly innovative, rather than an incremental improvement on standard ideas? Does it promise exciting advances, even if there is some chance of failure?

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail 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.

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 identities of reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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 closing date of an announcement/solicitation or the date of proposal receipt (whichever is later). The interval ends when the Division Director accepts the Program Officer's recommendation.

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 one's 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 Division 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.A. 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 (NSF-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 agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF Grant Policy Manual (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov/>.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Large and Medium projects may be site visited one or more times. For Large projects, NSF anticipates that a successful review of progress after approximately two years of work will be essential for the authorization of later funding.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, 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.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Copy of Information Technology Research should be made to:

- James Granato, Dr., SBE, telephone: (703) 292-8762, e-mail: jgranato@nsf.gov.
- John Cherniavsky, Dr., EHR, telephone: (703) 292-5136, e-mail: jchernia@nsf.gov.
- Stephen Meacham, Dr., GEO, telephone: (703) 292-8527, e-mail: smeacham@nsf.gov.
- Taieb (Ty) Znati, Dr., CISE, telephone: (703) 292-8949, e-mail: tznati@nsf.gov.
- Vladimir Papitashvili, Dr., OPP, telephone: (703) 292-8033, e-mail: vpapita@nsf.gov.
- Barry Schneider, Dr., MPS, telephone: (703) 292-7383, e-mail: bschneid@nsf.gov.
- Eugene Bruce, Dr., BIO, telephone: (703) 292-8413, e-mail: ebruce@nsf.gov.
- Maria Burka, Dr., ENG, telephone: (703) 292-7030, e-mail: mburka@nsf.gov.
- Mark Suskin, Dr., INT, telephone: (703) 292-8702, e-mail: msuskin@nsf.gov.

For questions related to the use of FastLane, contact:

FastLane User Support, telephone: (800) 673-6188, e-mail: fastlane@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

The NSF Guide to Programs is a compilation of funding for research and education in science, mathematics, and engineering. The NSF Guide to Programs is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF E-Bulletin, which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's Custom News Service (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

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, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

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