Information Technology Research for National Priorities (ITR)

Fiscal Year 2004 Announcement

Program Solicitation
NSF 04-012
Replaces Document 02-168

National Science Foundation
Directorate for Computer and Information Science and Engineering
Office of International Science and Engineering
Office of Polar Programs
Directorate for Biological Sciences
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

Letter of Intent Due Date(s) ***(required):***

January 14, 2004

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

February 24, 2004

REVISIONS AND UPDATES

1. An individual may appear as Principal Investigator (PI), co-PI, other senior personnel, investigator, or paid consultant on only one ITR proposal submitted in Fiscal Year 2004 in response to this Program Solicitation NSF 04-012. This limitation includes proposals submitted by a lead institution, any subaward submitted as part of a proposal, or any collaborative proposal. This limitation does not include ITR awards made in previous years. This limitation is a change from last year when an individual could participate in two proposals in the ITR competition and possibly play two roles (e.g., as PI on one proposal and co-Investigator on another.)

   In order to treat everyone fairly and consistently, we will strictly enforce this rule. In the event that a PI, co-PI, other senior personnel or paid consultant does appear in any of these roles on more than one proposal (whether it is a lead or collaborative proposal or a subaward), all proposals that include that person will be returned without review. No exceptions will be made.

   Proposers can avoid having proposal(s) returned without review by a) ascertaining prior to proposal submission exactly who is on their project team, b) making certain that everyone is in compliance with this rule, and c) making certain that no one is included in a proposal without his or her permission. Workarounds after the ITR submission

deadline to circumvent this rule will not be allowed. For example, no proposal can be substantively modified after the ITR deadline to delete any project personnel from the proposal; nor will withdrawing one proposal (after the ITR deadline) have the effect of allowing another proposal to enter the competition.

2. This year, Letters of Intent (LOI) are mandatory and must be submitted via a web-form available at http://www.nsf.gov/home/crssprgm/itr/ by January 14, 2004. NSF will acknowledge the receipt of the LOI via an email, which will include a copy of the information that was submitted. An acknowledged LOI will provide proposers with NSF approval to submit a Full Proposal.

   Prior to to the submission of the LOI, the PI is responsible for providing the LOI information to his or her Sponsored Research Office (SRO) so that they can monitor compliance. The information required for the LOI can be found in Section V.A. of this solicitation.

3. In recent years, the ITR competition has featured multiple size categories for proposals. This year, NSF is soliciting ITR proposals in a single size category. Under this solicitation, individual projects, including all subawards and/or collaborative proposals, may request funding for up to $4,000,000 total, with a duration of up to 5 years. Proposals for projects with durations of four or five years are encouraged. There is no minimum budget size. It is anticipated that the average total award size will be significantly less than $4,000,000 and that most awards will be in the range of $200,000 - $2,000,000.

4. In previous years, NSF's ITR solicitation has generated a large number of high quality proposals. Last year, approximately 10% of the proposals submitted were funded due to budget limitations. A similar success rate is anticipated this year.

5. For those who intend to submit their ITR proposals to divisions in the Directorate for Computer and Information Science and Engineering (CISE), please be aware that CISE has recently reorganized. Please go to http://www.cise.nsf.gov for information on the new CISE divisions.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Information Technology Research for National Priorities (ITR)
Fiscal Year 2004 Announcement

Synopsis of Program:

In FY 2004, the Information Technology Research (ITR) Program is focusing on Information Technology

Research in support of ***National Priorities,*** where National Priorities are defined as:

- **Advances in Science and Engineering (ASE);**
- **Economic Prosperity and Vibrant Civil Society (ECS); and**
- **National and Homeland Security (NHS).**

NSF encourages the submission of proposals targeting one or more of these National Priorities.

Today, networks link people, software, hardware, computational resources and data archives, and they enable unprecedented communications, coordination and collaboration among them. Powerful distributed applications enable new forms of scientific research by collecting, disseminating, and analyzing observational or experimental data, or data from models or simulations. Other powerful applications include the networked services essential to our daily lives, such as cell phones, email, banking systems, transportation systems, critical infrastructures, distributed inventory control systems, and modern environmental observing systems. New knowledge is needed to improve the design, use, behavior, and stability of these widely distributed systems. A better understanding of this historical shift towards increasing connections and interdependencies among heterogeneous systems and how to harness their potential in service to society is necessary.

The three National Priority Areas encompass a broad range of science and engineering research and education topics in which Information Technology (IT) plays a critical role. A number of Technical Focus Areas cut across these National Priorities, including:

- **Int**egration of computing, networking, human-computer interfaces, and information management to support reliable, complex, distributed systems (**int**);
- Innovative approaches to the integration of **d**ata, **m**odels, **c**ommunications, analysis and/or control systems, including dynamic, data-driven applications for use in prediction, risk-assessment and decision-making (**dmc**);
- Interactions and complex interdependencies of information systems and **soc**ial systems (**soc**); and
- Innovation in computational modeling or **sim**ulation in research or education (**sim**).

In this competition, proposers must identify at least one of the Technical Focus Areas described above, although proposers are encouraged to work over more than one area where applicable.

ITR is an activity that includes all NSF Directorates and programmatic Offices. The ITR Program places particular emphasis on interdisciplinary research and education projects.

Proposers should read this solicitation carefully as there are a number of important changes from last year's announcement.

Cognizant Program Officer(s):

- Manfred D. Zorn, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: mzorn@nsf.gov

- C. Suzanne Iacono, ITR Program Director, Directorate for Computer & Information Science & Engineering, Division of Information and Intelligent Systems, 1115 N, telephone: (703) 292-8930, fax: (703) 292-9073, email: siacono@nsf.gov

- John C. Cherniavsky, Senior EHR Advisor for Research, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5136, fax: (703) 292-9046, email: jchernia@nsf.gov

- Suvrajeet Sen, Program Director, Directorate for Engineering, Division of Design, Manufacture, & Industrial Innovation, 550 S, telephone: (703) 292-7081, fax: (703) 292-9056, email: ssen@nsf.gov

- Stephen Meacham, ITR Progam Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8527, fax: (703) 292-9022, email: smeacham@nsf.gov

- Mark Suskin, Program Manager, Directorate for Social, Behavioral & Economic Sciences, Office of International Science and Engineering, 935 N, telephone: (703) 292-8702, fax: (703) 292-9067, email: msuskin@nsf.gov

- Hans G. Kaper, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4879, fax: (703) 292-9032, email: hkaper@nsf.gov

- Vladimir Papitashvili, Program Manager, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8033, email: vpapita@nsf.gov

- Daniel H. Newlon, Program Director/Cluster Coordinator, Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 995 N, telephone: (703) 292-7276, fax: (703) 292-9068, email: dnewlon@nsf.gov

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:**

  Universities and colleges, including two-and four-year colleges and community colleges, acting on behalf of their faculty members may submit proposals. In addition, non-profit non-academic organizations, such as independent museums, observatories, research laboratories, professional societies and similar organizations in the US that are directly associated with educational or research activities, may submit proposals.

- **PI Eligibility Limit:**

  This year, an individual may appear as PI, co-PI, other senior personnel, or paid consultant on only one ITR

proposal, which includes a proposal submitted by a lead organization, any sub-award submitted as part of a proposal, or any collaborative proposal. This means that an individual can have only one role (whether it is PI, co-PI, other senior personnel or paid consultant) on only one proposal (whether it is a lead or collaborative proposal or a subaward.) This limitation is a change from last year when an individual could participate in two proposals in the ITR competition and possibly play two roles (e.g., PI on one proposal and co-Investigator on another.)

- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 80 to 100 - The number and types of awards are dependent upon available funding. Please see Section IV for more information.
- **Anticipated Funding Amount:** $90,000,000 - NSF intends to spend approximately $90 million in Fiscal Year 2004, pending the availability of funding for the ITR activity.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard 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.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Letters of Intent *(required)*:**
  January 14, 2004
- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
  February 24, 2004

Proposal Review Information

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

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

The number of information systems, computing devices, data archives and other IT resources that are interconnected in complex, distributed systems is exploding. The resulting systems have the potential to transform both science and engineering research (e.g., with environmental and geological systems, remote observing systems, or embedded sensor systems for research on materials) and expectations about how we live, learn and work (e.g., with transportation and telecommunications networks, power generation and distribution systems, or distributed life long learning systems.) As a nation, harnessing the capabilities and sophistication of these resources will enable us to engage in endeavors that were never before possible. At the same time, when complex interactions and interdependencies within and among disparate systems result in failure, such as last summer's electric power grid outage, the many research challenges still confronting the Nation become more urgent. Understanding and predicting the possible behaviors of such systems, and developing better design strategies for these systems (e.g., based on a better understanding of complex systems) are critical to achieve long-term national goals that depend on reliable, high confidence, distributed systems. A better understanding of how failures cascade, how scalability and interoperability among heterogeneous systems can be ensured, how inherent complexity can be managed, and how people and society interact with these systems is necessary.

Through this competition, NSF seeks to support projects targeting one or more National Priority Areas that increasingly depend on such systems. These are:

- **Advances in Science and Engineering (ASE);**
- **Economic Prosperity and Vibrant Civil Society (ECS); and**
- **National and Homeland Security (NHS)**.

Particular emphasis is placed on the scientific and engineering research and education associated with the distributed systems and networks that support these National Priorities.

The NSF research community has an important role to play in developing groundbreaking concepts to enable the open, interoperable, and policy-governed technologies needed to make progress in these National Priority Areas. Only through investment in long-term research that is both high-risk and high-payoff can groundbreaking innovation enable future systems to achieve real progress in areas of National Priority. Performance evaluation and metrics should be important components of proposals collecting and analyzing empirical data, while theoretical proposals should provide examples of the types of systems to which the theories might prove useful.

ITR funding will support long-term interdisciplinary research and education projects with durations of up to five years. International collaboration in pursuit of these goals is encouraged.

II. PROGRAM DESCRIPTION

In FY 2004, the Information Technology Research (ITR) Program is focusing on Information Technology Research in support of ***National Priorities,*** where National Priorities are defined as:

- **Advances in Science and Engineering (ASE);**
- **Economic Prosperity and Vibrant Civil Society (ECS); and**
- **National and Homeland Security (NHS).**

NSF encourages the submission of proposals targeting one or more of these National Priorities.

Today, networks link people, software, hardware, computational resources and data archives, and they enable unprecedented communications, coordination and collaboration among them. Powerful distributed applications enable new forms of science by collecting, disseminating, and analyzing observational or experimental data, or data from models or simulations. Other powerful applications include the networked services essential to our daily lives, such as cell phones, email, banking systems, transportation systems, critical infrastructures, distributed inventory control systems, and modern environmental observing systems. New knowledge is needed to improve the design, use, behavior, and stability of these widely distributed systems. A better understanding of this historical shift towards increasing connections and interdependencies among heterogeneous systems and how to harness their potential in service to society is necessary.

The three National Priority Areas encompass a broad range of science and engineering research and education topics. A number of Technical Focus Areas cut across these National Priorities, including:

- **Int**egration of computing, networking, human-computer interfaces, and information management to support reliable, complex, distributed systems (**int**);
- Innovative approaches to the integration of **d**ata, **m**odels, **c**ommunications, analysis, and/or control systems,

including dynamic, data-driven applications for use in prediction, risk-assessment and decision-making (**dmc**);

- Interactions and complex interdependencies of information systems and **soc**ial systems (**soc**); and
- Innovation in computational modeling or **sim**ulation in research or education (**sim**).

In this competition, proposers must identify at least one of the Technical Focus Areas described above, although proposers are encouraged to work over more than one area where applicable.

Proposers must identify the area(s) of 1) National Priority, and 2) Technical Focus that their projects target in the Letter of Intent and in the Project Summary of the Full Proposal. (See Proposal Preparation Instructions in Section V.A.) Proposals should describe the potential social, legal, and economic impact of the proposed research where this is appropriate.

Proposals can be sent to any NSF division (in any directorate or office) with secondary and tertiary divisions also indicated. The Directorate for Education and Human Resources (EHR) has additional requirements. If you intend to submit a proposal to divisions in EHR, see the Notice below at the end of the section entitled "National Priority Areas."

National Priority Areas

Advances in Science and Engineering (ASE): NSF is soliciting proposals for projects that develop or exploit algorithms, software, data resources, or other Information Technology tools to enhance the design or use of widely distributed information systems in advancing science and engineering research and education. Examples of widely distributed systems might include those that collect, disseminate, and analyze observational or experimental data, or data from models or simulations. Projects should either be focused on the use of widely distributed computing and information systems to advance the frontiers of science and engineering research and education, or on the enhancement of distributed systems in ways that will make innovative research in science and engineering possible. Projects that could form the basis of future deployed information technology infrastructure for science and engineering are particularly encouraged. Projects should exhibit a strong connection with a science or engineering research or education topic (or topics).

Economic Prosperity and Vibrant Civil Society (ECS): NSF is soliciting proposals for projects that investigate the human and socio-technical aspects of current and future distributed information systems for economic prosperity and a vibrant civil society. New knowledge is needed to design, integrate, and sustain these systems and to maximize the benefits for all. Examples of topics include human and social aspects of distributed information systems for innovation, business, work, health, government, learning, and community, and their related policy implications.

National and Homeland Security (NHS): The Nation requires robust Information Technology to revitalize and control its critical infrastructures and to support the understanding of threats to national security. Current infrastructures are limited in their capacity, vulnerable in real-time operation and coordination, as well as uncertain in their ability to rapidly adapt to changes in times of crisis. NSF is particularly interested in critical infrastructure projects that will spur the transformation of current systems into more coherent, integrated and reliable ones that are both fault-tolerant and interoperable. Prototypes, test beds or simulations may demonstrate this potential. Examples of topics that could further understanding of threats to national and homeland security include: collaborative knowledge environments for the management of dynamic information, knowledge discovery, disease informatics, information extraction and fusion, machine translation, speech processing, social network analysis, search and rescue robots, underwater autonomous vehicles, and biometrics.

ITR is an activity that includes all NSF Directorates and programmatic Offices, and the ITR Program places particular emphasis on interdisciplinary research and education projects.

Notice: *It is expected that most proposals will work to integrate research and education activities. For proposals that have education as a primary focus, proposers may choose to submit to divisions in the Directorate for Education and Human Resources (EHR). In that case, additional EHR criteria will be applied to proposal evaluation. EHR encourages the*

submission of ITR proposals that are responsive to the general goals of the FY 2004 ITR program, ***and*** *to the specific goals of EHR programs, which include:*

- *ROLE:* http://www.ehr.nsf.gov/rec/programs/research/*,*
- *NSDL:* http://www.ehr.nsf.gov/due/programs/nsdl/*, and*
- *IERI:* http://www.nsf.gov/pubs/2002/nsf02062/nsf02062.pdf

Proposers should select the program that matches the size and scope of their proposal. For example, an IT-enabled mathematics or science intervention using IT in an essential manner intended to scale for High School students must satisfy the methodological rigor and other qualities required of IERI proposals and meet the budget guidelines for IERI proposals. A Digital Library proposal must use IT in an essential manner and also satisfy the budget and subject areas of the NSDL program guidelines. Finally, a ROLE proposal must use IT in an essential manner and satisfy the ROLE research and budget guidelines.

INTEGRATING RESEARCH AND EDUCATION, AND INTEGRATING DIVERSITY INTO NSF PROGRAMS, PROJECTS, AND ACTIVITIES

A significant portion of the ITR budget this year will be used to fund proposals that include major activities integrating research and education or fostering the development of a diverse IT workforce. NSF encourages PIs to be innovative in their approaches. Examples of possible activities include but are not limited to: offering summer research sites for faculty or graduate students from institutions that serve underrepresented groups; organizing workshops and support activities for faculty to adapt or adopt best practices in research or pedagogy; piloting and testing new tools and technologies in classrooms at diverse educational sites; developing and testing materials and tools to support faculty development; organizing summer research and school year outreach to K-12 schools and teachers; developing curricula and standards for moving emerging technologies into the classroom; providing industrial mentors for faculty and students; promoting knowledge transfer; and reaching diverse populations to promote diversity in the IT workforce.

SUCCESS RATE

In previous years, NSF's ITR solicitation has generated a large number of high quality proposals. Last year, approximately 10% of the proposals submitted were funded. A similar success rate is anticipated this year.

III. ELIGIBILITY INFORMATION

- Organization Limit: Universities or colleges, including two- and four-year colleges and community colleges, acting on behalf of their faculty members may submit proposals. In addition, non-profit non-academic organizations, such as independent museums, observatories, research laboratories, professional societies and similar organizations in the US that are directly associated with educational or research activities, may submit proposals. NSF encourages proposals for collaboration with international researchers, for-profit corporations, and national laboratories. For-profit organizations, government laboratories of other agencies, and foreign institutions may not apply directly, however; they may participate in subawards. Such subawards should be justified by explaining the unique capabilities being made available.
- PI Eligibility Limit: This year, an individual may appear as PI, co-PI, other senior personnel, or paid consultant

on only one ITR proposal, which includes a proposal submitted by a lead organization, any subaward submitted as part of a proposal, or any collaborative proposal.

Thus, an individual can have only one role (whether it is PI, co-PI, other senior personnel or paid consultant) on only one proposal (whether it is a lead or collaborative proposal or subaward.) This limitation is a change from last year when an individual could participate in two proposals in the ITR competition and possibly play two roles (e.g., PI on one proposal and co-Investigator on another.)

In order to treat everyone fairly and consistently, we will strictly enforce this rule. In the event that a PI, co-PI, other senior personnel or paid consultant does appear in any of these roles on more than one proposal, all proposals that include that person will be returned without review. Proposers can avoid having proposal(s) returned without review by a) ascertaining prior to proposal submission exactly who is on their project team, b) making certain that everyone is in compliance with this rule, and c) making certain that no one is included in a proposal without his or her permission. Workarounds after the ITR submission deadline to circumvent this rule will not be allowed. For example, no proposal can be substantively modified after the ITR deadline to delete any project personnel from the proposal; nor will withdrawing one proposal (after the ITR deadline) have the effect of allowing another proposal to enter the competition.

- Limit on Number of Proposals: There is no limit on the number of proposals that an institution may submit.

IV. AWARD INFORMATION

NSF expects to make the following type of award(s): Standard or Continuing Grant or Cooperative Agreement. NSF intends to spend approximately $90 million in Fiscal Year 2004 on proposals received in response to this solicitation, pending the availability of funding for the ITR activity. The estimated number of awards will be 80 to 100. The anticipated award date is September 01, 2004.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent *(required):*

Letters of Intent (LOI) are required and must be submitted via a web-form at http://www.nsf.gov/home/crssprgm/itr/ by January 14, 2004. Full Proposals from PIs who did not submit a LOI by this deadline will be returned without review.

For research teams involving subawards or a collaborative set of proposals, the lead PI should submit one LOI for the entire project. The letter should include all relevant information for all institutions as described below. If, after an LOI has been submitted and before the Full Proposal deadline, a collaborative research team should find that it wants to split into several projects, be aware that only one Full Proposal can be submitted. In summary, an LOI can result in at most one Full Proposal, and every Full Proposal has a unique LOI affiliated with it.

Prior to the submission of the LOI, the PI is responsible for providing the LOI information to his or her Sponsored Research Office (SRO) so that SRO staff can monitor compliance. The information required for the LOI is described below and should be provided to the SRO before it is submitted to NSF.

NSF requires that the following information be provided on the web-form by the LOI deadline:

- Primary and, if applicable, secondary or tertiary NSF divisions must be identified. Since the most promising proposals are likely to be interdisciplinary, NSF encourages the selection of secondary and tertiary divisions. If you have any questions about the appropriate divisions for proposal submission, please contact the Cognizant Program Officers listed in this solicitation. (CISE has reorganized. Some division names have changed. If you plan to submit to a CISE division, go to http://www.cise.nsf.gov for more information.)

- The title of the project must be provided (up to 100 characters).

- A brief project description must be provided (up to 2500 characters).

- The names and affiliations of the Principal Investigator, co-Principal Investigators, other senior personnel, and paid consultants from all institutions involved, including those on collaborative proposals or subawards, must be provided.

- The email addresses of all those listed above must be provided.

- From the list below, one or more National Priority Areas must be identified:

    - Advances in Science and Engineering = **ASE**

    - Economic Prosperity and Vibrant Civil Society = **ECS**

    - National and Homeland Security = **NHS**

- From the list below, one or more Technical Focus Areas must be identified:
    - **Int**egration of computing, networking, human-computer interfaces, and information management, to support reliable, complex, distributed systems = **int;**

    - Innovative approaches to the integration of **d**ata, **m**odels, **c**ommunications, analysis, and/or control systems, including dynamic, data-driven applications for use in prediction, risk-assessment and decision-making = **dmc;**

    - Interactions of information systems and **soc**ial systems = **soc;** and

    - Innovation in computational modeling or **sim**ulation in research or education = **sim.**

The PI will receive an email acknowledgement, which will include a copy of the information that was submitted. If an email acknowledgement is not received, please notify the ITR Program immediately at itr@nsf.gov. Please save the email acknowledgement. PIs must upload the acknowledgement into the supplementary documents section of the Full Proposal.

Full Proposal Instructions:

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 Website at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

Full Proposals submitted in response to this solicitation must be submitted through FastLane by 5 p.m. proposer's local time on February 24, 2004. In FastLane, Program Solicitation # **NSF 04-012** must be selected; then, the primary NSF division for consideration of the proposal must be selected. After choosing the primary division, the program "ITR for National Priorities" will automatically be selected for you. (For this to happen, it is imperative that you select Program Solicitation # **NSF 04-012**). You may then choose to select a secondary and/or tertiary division or office. (Scroll down the screen to the "Show All NSF Units" button, and select the most appropriate division or office.) Since one of the objectives of the ITR competition is to encourage collaborations across traditional disciplinary boundaries, it is anticipated that most proposals will identify

secondary and/or tertiary organizational units. **DO NOT** choose ITR Small, Medium, or Large for any of your organizational/ program units as they are not relevant this year. CISE has reorganized. Some division names have changed. If you plan to submit to a CISE division, go to http://www.cise.nsf.gov for more information. If you have any questions about the appropriate divisions for proposal submission, please contact the Cognizant Program Officers listed in this solicitation.

NSF expects to use the information on selected organizational units to assign proposals for review. Typically, the organizational units spanning the fields of science and engineering involved in the proposal jointly review that proposal. NSF reserves the right to reassign proposals as needed to obtain the best merit review.

The following information and instructions supplement the GPG guidelines:

1. Proposal Titles: "If you submit a proposal as part of a set of collaborative proposals, the title of the proposal should begin with "ITR: COLLABORATIVE RESEARCH:". This should be followed with a key for the National Priority Area(s) and Technical Focus Area(s) identified for the project, as indicated below. If you are submitting a single proposal, proposal titles should begin with "ITR-" and be followed by the key for the National Priority Area(s) and Technical Focus Area(s) and Technical Focus Area(s) as indicated below:"

- **National Priority Areas**
  - Advances in Science and Engineering = **ASE**
  - Economic Prosperity and Vibrant Civil Society = **ECS**
  - National and Homeland Security = **NHS**
- **Technical Focus Areas**
  - **Int**egration of computing, networking, human-computer interfaces, and information management, to support reliable, complex, distributed systems = **int**
  - Innovative approaches to the integration of **d**ata, **m**odels, **c**ommunications, analysis, and/or control systems, including dynamic, data-driven applications for use in prediction, risk-assessment and decision-making **= dmc**
- Interactions and complex interdependencies of information systems and **soc**ial systems = **soc**
- Innovation in computational modeling or **sim**ulation in research or education = **sim**

  Based on the keys indicated above, an ITR proposal submitted this year might have a title like this: "ITR - (ASE+EVS) - (dmc): Advancing the understanding of harbor snark ecology and economic prosperity by the integration of data from quadrillions of widgets into the predictive modeling of harbor snark behavior and the productivity of coastal fishing communities."

2. Project Summary: Project Summaries must be written carefully to explicitly point to and detail the two NSF evaluation criteria -- intellectual merit and broader impacts -- in **separate, labeled paragraphs.** The National Priority Area(s) and Technical Focus Area(s) must be identified in the intellectual merit paragraph(s). A summary or justification of how the project will impact the identified National Priority Area(s) must be included in the broader impacts paragraph(s).

3. Project Description: Project Descriptions are limited to 15 pages total, except for the Coordination Plan, which may take up to three additional pages as described below in the third bullet. More details are included below.

- **Prior Results**: Proposals must include relevant prior results from NSF support within the 15-page limit.
- **Description of Research and Education Activities:** The description should provide a clear statement of the research and education activities to be undertaken, including 1) objectives for the period of the proposed work and expected significance, 2) relation to longer-term goals of the project, and 3) relation to the present state of knowledge in the field, to work in progress by the PI under other support and to work in progress elsewhere. Where appropriate, a clear description of experimental methods and procedures and plans for preservation, documentation, and sharing of data, samples, and physical collections should be provided. The broader impacts of the proposed activities should be an integral part of the narrative.
- **Coordination Plan:** Each proposal must contain a coordination plan, which includes 1) the specific roles of the PI, co-PIs, other senior personnel and paid consultants at all institutions involved, 2) how the project will be

managed across institutions and disciplines, 3) identification of the specific coordination mechanisms that will enable cross-institution and/or cross-discipline scientific integration (e.g., yearly workshops, graduate student exchange, project meetings at conferences, use of the grid for videoconferences, software repositories, etc.), and 4) pointers to the budget line items that support these coordination mechanisms. If budget cuts are necessary, NSF staff will make every effort not to reduce the budget for project coordination other than proportionally. As indicated above, proposers may take up to three (3) additional pages to address project coordination issues beyond the standard 15 page project description limit.

- **International Collaborations**: Proposals must address the international aspects of the work, if any. This may be part of the coordination 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.

4. Supplementary Documents:

- **List of All Personnel Associated with the Proposal:** Each lead proposal must include the names and institutional affiliations of the PI, co-PIs, other senior personnel and paid consultants associated with that project, including all collaborative proposals and subawards, together with their primary thesis and post-doctorate advisors and their collaborators within the last 48 months. This information provides NSF with a master list of all non-student personnel affiliated with each project and helps to ensure that prospective reviewers do not have conflicts-of-interest. This information must be uploaded into the Supplementary Documents section of the lead proposal.
- **Copy of Letter of Intent Acknowledgement:** All proposals must include a copy of the Letter of Intent acknowledgement of receipt from NSF in the Supplementary Documents section of the proposal.

Proposers are reminded to identify the program announcement/solicitation number (04-012) 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:

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Due Dates

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

Letters of Intent *(required):*

January 14, 2004

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

February 24, 2004

Full Proposal 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 announcement/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 announcement/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 National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 (NSB 97-72). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued Important Notice 127, Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

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 Applications to National Priorities

As a part of the intellectual merit of a Full Proposal, ITR emphasizes the importance of innovative, high-risk, and high-impact research. Is the proposal highly innovative, rather than an incremental improvement on standard ideas? How strong is the potential contribution, however risky, to the selected National Priority or Priorities?

Proposals Submitted to Divisions in EHR

It is expected that most proposals will work to integrate research and education activities. For proposals that have education as a primary focus, proposers may choose to submit to divisions in the Directorate for Education and Human Resources (EHR). EHR encourages the submission of ITR proposals that are responsive to the general goals of the FY 2004 ITR program, **and** to the specific goals of EHR programs, which include:

- *ROLE:* http://www.ehr.nsf.gov/rec/programs/research/*,*
- *NSDL:* http://www.ehr.nsf.gov/due/programs/nsdl/*, and*
- *IERI:* http://www.nsf.gov/pubs/2002/nsf02062/nsf02062.pdf

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 Ad Hoc 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 names of the 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 date of receipt. 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 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 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 Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website 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 Website 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.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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. 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 this program should be made to:

- Manfred D. Zorn, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: mzorn@nsf.gov
- C. Suzanne Iacono, ITR Program Director, Directorate for Computer & Information Science & Engineering, Division of Information and Intelligent Systems, 1115 N, telephone: (703) 292-8930, fax: (703) 292-9073, email: siacono@nsf.gov
- John C. Cherniavsky, Senior EHR Advisor for Research, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5136, fax: (703) 292-9046, email: jchernia@nsf.gov
- Suvrajeet Sen, Program Director, Directorate for Engineering, Division of Design, Manufacture, & Industrial Innovation, 550 S, telephone: (703) 292-7081, fax: (703) 292-9056, email: ssen@nsf.gov
- Stephen Meacham, ITR Progam Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8527, fax: (703) 292-9022, email: smeacham@nsf.gov
- Mark Suskin, Program Manager, Directorate for Social, Behavioral & Economic Sciences, Office of International Science and Engineering, 935 N, telephone: (703) 292-8702, fax: (703) 292-9067, email: msuskin@nsf.gov
- Hans G. Kaper, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4879, fax: (703) 292-9032, email: hkaper@nsf.gov

- Vladimir Papitashvili, Program Manager, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8033, email: vpapita@nsf.gov

- Daniel H. Newlon, Program Director/Cluster Coordinator, Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 995 N, telephone: (703) 292-7276, fax: (703) 292-9068, email: dnewlon@nsf.gov

For questions related to the use of FastLane, contact:

- telephone: 1-800-673-6188, email: 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 Website 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, although some programs may have special requirements that limit eligibility.

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 GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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 or (800) 281-8749
- **To Order Publications or Forms:**

  Send an e-mail to: pubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; 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.

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, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.

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