Information Technology Workforce (ITWF)

**Program Announcement**

**NSF 01-33**

DIRECTORATE FOR COMPUTER AND INFORMATION SCIENCE AND ENGINEERING

DEADLINE(S) :

March 19, 2001   **Future ITWF deadlines will be the first Monday in November, starting on November 5, 2001.**

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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Information Technology Workforce (ITWF)

Synopsis of Program: The U.S. risks losing the scientific, economic and human resource advantages it now enjoys without an IT workforce that is large enough to meet both the public and private sectors' growing demand, and that is adept at using and producing information technologies. In this respect, the under-representation of women and minorities in computer science and engineering (CS&E) is a serious national problem. There is agreement among some of the nation's leading researchers and scientists that systematic research efforts are needed to address this problem. CISE is continuing its research program on the IT workforce (ITWF) and will support a broad set of scientific research studies focussed on the under-representation of women and minorities in the IT workforce.

Cognizant Program Officer(s):

- Caroline Wardle, CISE, Experimental and Integrative Activities, Room 1160, telephone: 703-292-8980, e-mail: cwardle@nsf.gov.

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

- 47.070 --- Computer and Information Science and Engineering

ELIGIBILITY INFORMATION

- **Organization Limit:** None

- **PI Eligibility Limit:** None

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

AWARD INFORMATION

- **Anticipated Type of Award:** Standard or Continuing Grant

- **Estimated Number of Awards:** 15-20

- **Anticipated Funding Amount:** $5 million

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** Standard Preparation Guidelines

  - Standard GPG Guidelines apply.

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

- **Letter of Intent Due Date(s):** None

- **Preproposal Due Date(s):** None

- **Full Proposal Due Date(s):**

March 19, 2001   Future ITWF deadlines will be the first Monday in November, starting on November 5, 2001.

D. FastLane Requirements

- **FastLane Submission:** Full Proposal Required

- **FastLane Contact(s):**

  - Helen Walston, CISE, Senior Program Assistant, Experimental and Integrative Activities, telephone: 703-292-4775, e-mail: hwalston@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:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Federal government is increasing its investments in fundamental, long-term research in information technologies (IT) and new applications of IT in all scientific, engineering, and educational areas, encouraging, in particular, research focussed on issues related to attracting and sustaining a strong IT workforce. To help ensure that the United States continues its worldwide leadership in IT, we need to strengthen the technological workforce and to produce a continuous supply of well-trained high-quality professionals in engineering and computer and information science (President's Information Technology Advisory Committee Report, http://www.ccic.gov/ac/report/). Without an IT workforce that is large enough to meet both the public and private sectors' growing demand, and that is adept at using and producing information technologies, we surely risk losing the scientific, economic and human resource advantages we now enjoy.

In this respect, the under-representation of women and minorities in the IT workforce is a serious national problem. There is agreement among some of the nation's leading researchers and scientists that systematic research efforts are needed to address this problem. Hence, the National Science Foundation is announcing a continuation of its special emphasis on the IT workforce (see Dear Colleague Letter: http://www.nsf.gov/pubs/2000/nsf0077/nsf0077.htm) that will support a broad set of scientific research studies focussed on the under-representation of women and minorities in the IT workforce.

II. PROGRAM DESCRIPTION

The Information Technology Workforce (ITWF) program welcomes proposals that address important research questions related to the under-representation of women and minorities in the IT workforce. The research may address issues related to the under-representation of women, the under-representation of minorities, or the under-representation of both women and minorities in the IT workforce. While there is no consensus on a single definition of the IT workforce, we encourage researchers to carefully articulate and justify their own definition of the IT workforce model. Anticipated research topics revolve around three basic themes:

- Environment and Culture: How the environment, culture and other social contexts (e.g., households, neighborhoods, communities) shape interest in IT, and how interest in and use of IT shapes the environment, with particular emphasis on increasing our understanding of developmental issues at different ages.

- IT Educational Continuum: Understanding how the overall educational environment influences students' progress along the educational continuum from grade school to entry into the workforce, and why students who have the potential to succeed in the study of IT disciplines take educational paths that preclude or make it difficult to enter the IT workforce.

- IT Workplace: Why women and minorities who have the potential to succeed in the IT workforce take alternative career paths, what barriers and obstacles they must overcome, and how the IT workplace can foster increased retention and advancement of women and minorities.

ITWF requires multi-disciplinary collaboration among researchers in IT, the social sciences and/or education. The research can address issues at the individual level, at the societal level, at the institutional level, or across levels of analysis. All proposals should take into consideration existing relevant research on the IT workforce. Small projects (one to two investigators) as well as medium-sized multi-site team projects (three to five investigators) will be supported.

ITWF encourages research using a variety of methods. These include tools design, development and experimental evaluation, simulation and modeling, survey analysis, statistical models, ethnographic work to test models, case studies, and the development of new methods for understanding increasingly complex processes and dynamics of transformation. Formal meta-analysis methodologies across previous studies and intervention programs will be supported in order to build on the results of earlier work and to add to the research base.

ITWF will also support the analysis and assessment of existing information tools and technologies and their possible differential uses and implications for Women and Minorities in IT. It will also support the design, development, and assessment of prototypes of new information tools and technologies that will benefit women and minorities in IT.

A suggested, but not exhaustive, list of possible research questions follows:

Theme 1: Environment and Culture

- Given the relative newness of computing technologies in the world today and the strong demand for skilled IT workers in the US, why are women and minorities under-represented in various sectors of the IT workforce?

- How does access to computer technology affect interest in IT careers?

- What role does socialization play in the development of individual attitudes, stereotypes, aspirations, educational and career choices related to IT? Do expectations and ethnic values transmitted through family, peers, teachers, and role models influence educational and career choices related to IT?

- How does popular culture through media, toys, games, and the entertainment industry influence educational and career choices related to IT?

- What are the design principles for information tools and technology that encourage and support the interest and participation of women and minorities in IT?

- How do household investments in IT education and equipment for children affect the choices these children make later in life?

Theme 2: IT Educational Continuum

- Why do students who have the potential to succeed in the study of IT disciplines take educational paths that preclude or make it difficult to enter the IT workforce?

- How does the overall educational environment influence such students' progress along the educational continuum from grade school to entry into the workforce?

- The importance of taking appropriate courses in mathematics and science has long been recognized as an integral part of preparation for IT careers. Why are minorities still under-represented in the study of mathematics and science? What role is played by counselors, teachers, and parents in aptitude identification and encouragement of students to persist in studies necessary for IT?

- IT is increasingly being integrated into K-16 education. What is the impact on women and minorities of efforts to provide access to and general use of computers in K-16 education?

- The traditional focus of entry level computer courses is on programming with extensive work in computer laboratories, and with sequential course prerequisites. What is the impact on women and minorities, of different teaching methods and learning styles in IT education?

- What is the impact of the perception of relevance and social benefit of computing in attracting and retaining women and minorities?

- A variety of information technologies are used in educational settings. What role do they play in attracting and retaining women and minorities in IT?

- Are there common characteristics among women and minorities with advanced degrees in IT that explain their persistence and success in IT fields?

- There are a number of intervention programs in place designed to attract and retain women and minorities in IT disciplines. What are the effects of interventions on the retention and success of women and minorities in IT?

- There are many ways of mentoring students, faculty and workers in the IT fields. What are the effects on the retention and success of women and minorities in IT, of the different mentoring models and strategies? How should issues of replication, scalability and delivery be addressed?

- How can educational institutions be structured and managed to ensure diversity? What is necessary to attract and retain women and minorities as IT faculty? Is there knowledge to be gained from multidisciplinary studies across fields such as engineering, medicine and law, by comparing models of intervention that have been successful in attracting and retaining women and minorities?

- The rapid and continuing changes in the IT work environment fuels the need for IT workers to participate in lifelong education, training and self-development. What is the appropriate balance among these?

Theme 3: IT Workplace

- Why do women and minorities who have the potential to succeed in the IT workforce take alternative career paths? What barriers and obstacles must be overcome?

- How can the IT workplace foster increased retention and advancement of women and minorities?

- Do quality of life issues related to IT careers such as burnout, long workdays, and lack of social interaction influence retention and career mobility of women and minorities in the IT workforce?

- How do evaluation, reward structures and family-friendly practices impact the retention of workers in the IT workforce?

- Do stereotypes and the status of the IT profession affect the recruitment and retention of women and minorities into IT careers? What are the effects of traditional and non-traditional entry and career paths on retention and career mobility? What are the formal qualifications and desired characteristics of IT workers that are necessary to be successful in IT occupations? How do degrees (or lack thereof) impact career paths and advancement? Do the desired characteristics fit men more so than women, non-minorities more so than minorities?

- Prior empirical work has shown that market as well as environment and culture influence students' and professionals' career choices. What can be learned from investigations of the IT labor markets that might explain the under-representation of women and minorities in IT?

Proposals Involving Human Subjects

Investigators proposing projects involving human subjects are reminded that they must either (1) have approval from the organization's Institutional Review Board (IRB) before issuance of an NSF award; or (2) identify the applicable subsection exempting the proposal from IRB review, as established in the Common Rule (Federal Policy for the Protection of Human Subjects, 45 CFR Section 690), see the Grant Proposal Guide for more details.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

ITWF awards may be funded for up to 3 years and will generally range from $75,000 to $250,000 per year. Depending on the availability of funding, between 15 and 20 proposals may be selected for support per funding cycle.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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 Web Site at: http://www.nsf.gov/cgi-bin/getpub?nsf012. 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.

Proposers are reminded to identify the program solicitation number (NSF 01-33) in the program announcement/solicitation block on the NSF Form 1207, *Cover Sheet For Proposal to the National Science Foundation*. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

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

C. Deadline/Target Dates

Proposals submitted in response to this announcement/solicitation must be submitted by 5:00 PM, local time on the following date(s):

March 19, 2001   Future ITWF deadlines will be the first Monday in November, starting on November 5, 2001.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Announcement 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 1-800-673-6188.

Submission of Signed Cover Sheets. The signed copy of the proposal Cover Sheet (NSF Form 1207) must be postmarked (or contain a legible proof of mailing date assigned by the carrier) within five working days following proposal submission and be forwarded to the following address:

National Science Foundation
DIS – FastLane Cover Sheet
4201 Wilson Blvd.
Arlington, VA 22230

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.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal and for which he/she is qualified to make judgements.

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

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

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration 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
As part of the intellectual merit of an ITWF proposal, reviewers will be asked to determine that the proposed work uses an appropriate research method, and that there is a multi-disciplinary collaboration among researchers in IT, the social sciences and/or education.

A summary rating and accompanying narrative will be completed and signed 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.

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.

NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used by the program. 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 its 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.

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 Information Technology Workforce should be made to:

- Caroline Wardle, CISE, Experimental and Integrative Activities, Room 1160, telephone: 703-292-8980, e-mail: cwardle@nsf.gov.

For questions related to the use of FastLane, contact:

- Helen Walston, CISE, Senior Program Assistant, Experimental and Integrative Activities, telephone: 703-292-4775, e-mail: hwalston@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.

OMB control number: 3145-0058.
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