

# Information Technology Experiences for Students and Teachers (ITEST)

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## Program Solicitation

**NSF 07-514**

*Replaces Document(s):*

**NSF 05-621**



**National Science Foundation**

Directorate for Education & Human Resources

Division of Elementary Secondary & Informal Education

### **Preliminary Proposal Due Date(s) (required):**

January 05, 2007

January 04, 2008

and the first Friday in January thereafter

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

May 10, 2007

May 08, 2008

and the second Thursday in May thereafter

## **REVISION NOTES**

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

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

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

The following item is a major revision to the previous Program Solicitation:

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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#### Program Title:

Information Technology Experiences for Students and Teachers (ITEST)

#### Synopsis of Program:

Information technologies are integral to both the workplace and everyday activities of most Americans. They are part of how people learn, how they interact with each other and information, and how they represent and understand their world. Attaining a basic understanding of these technologies and mastery of essential technical skills is a requirement for anyone to benefit from innovation in the modern world. The technological growth of the nation depends on a technologically literate citizenry. ITEST is designed to increase the opportunities for students and teachers to learn about, experience, and use information technologies within the context of science, technology, engineering, and mathematics (STEM), including Information Technology (IT) courses. It is in direct response to the concern about shortages of information technology workers in the United States. Supported projects are intended to provide opportunities for middle and high school children and teachers to build the skills and knowledge needed to advance their study, and to function and to contribute in a technologically rich society. Additionally, exposure to engaging applications of IT is a means to stimulate student interest in the field and an important precursor to the academic preparation needed to pursue IT careers. The ITEST program seeks projects that demonstrate innovative and creative applications of IT in school and non-school contexts and is committed to preparing learners to benefit from and contribute to the growing national cyberinfrastructure.

ITEST has four components: (a) youth-based projects with strong emphases on career and educational pathways (b) comprehensive projects for students and teachers (c) renewals of existing projects (d) and an ITEST Resource Center.

*This solicitation complements and is not intended to overlap with the Advanced Technological Education (ATE) program ([http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5464&org=ESIE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464&org=ESIE&from=home)).*

*Information Technology (IT) is within the scope of the ATE program, so proposals for the development of IT classroom materials for students or teachers, or for professional development of IT teachers in support of technical careers, should be submitted to the ATE program.*

#### Cognizant Program Officer(s):

- Sylvia James, Program Director [ITEST Lead], 890 S, telephone: (703) 292-5333, fax: (703) 292-9044, email: [sjames@nsf.gov](mailto:sjames@nsf.gov)
- David Campbell, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5093, fax: (703) 292-9044, email: [dcampbel@nsf.gov](mailto:dcampbel@nsf.gov)
- Julia Clark, Program Director [Youth-Based Projects], 885 S, telephone: (703) 292-5119, fax: (703) 292-9044, email: [jclark@nsf.gov](mailto:jclark@nsf.gov)
- Arlene de Strulle, Program Director [Youth-Based Projects], 890 S, telephone: (703) 292-5117, fax: (703) 292-9044, email: [adestrul@nsf.gov](mailto:adestrul@nsf.gov)
- Michael Haney, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5102, fax: (703) 292-9044, email: [mhaney@nsf.gov](mailto:mhaney@nsf.gov)
- David Hanych, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5124, fax: (703) 292-9044, email: [dhanych@nsf.gov](mailto:dhanych@nsf.gov)

- Sharon Locke, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-7322, fax: (703) 292-9044, email: [slocke@nsf.gov](mailto:slocke@nsf.gov)
- Glenn Markle, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5096, fax: (703) 292-9044, email: [gmarkle@nsf.gov](mailto:gmarkle@nsf.gov)
- Mary Ann Steiner, Program Director [Youth-Based Projects], 896 S, telephone: (703) 292-5128, fax: (703) 292-9044, email: [msteiner@nsf.gov](mailto:msteiner@nsf.gov)
- Angelicque Tucker Blackmon, Program Director [Youth-Based Projects], 885 S, telephone: (703) 292-5092, fax: (703) 292-9044, email: [atucker@nsf.gov](mailto:atucker@nsf.gov)
- Ron Tzur, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5110, fax: (703) 292-9044, email: [rtzur@nsf.gov](mailto:rtzur@nsf.gov)
- Karen Zuga, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5112, fax: (703) 292-9044, email: [kzuga@nsf.gov](mailto:kzuga@nsf.gov)
- Rosalind Douglas, ITEST Program Specialist, 890S, telephone: (703) 292-7880, email: [rdouglas@nsf.gov](mailto:rdouglas@nsf.gov)
- Daphne Marshall, ITEST Senior Program Assistant, 885S, telephone: (703) 292-5114, email: [dmarshall@nsf.gov](mailto:dmarshall@nsf.gov)

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

- 47.076 --- Education and Human Resources

**Award Information**

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**Anticipated Type of Award:** Standard Grant or Continuing Grant or Cooperative Agreement

**Estimated Number of Awards:** 14 to 17 to include 6-7 each for Youth-based and Comprehensive projects; 1-2 renewals; 1 ITEST Resource Center

**Anticipated Funding Amount:** \$20,000,000 pending availability of funds.

**Eligibility Information**

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**Organization Limit:**

Proposals may only be submitted by the following:

- Only U.S. organizations located in the U.S. are eligible to apply; see the Grant Proposal Guide for further information. All organizations with an educational mission are eligible.

Proposals targeting minorities, persons with disabilities and women are especially encouraged.

**PI Limit:**

None Specified

**Limit on Number of Proposals per Organization:**

None Specified

## Limit on Number of Proposals per PI: 1

An individual may serve as the Principal Investigator (PI) for no more than one proposal in each proposal cycle under this solicitation.

## Proposal Preparation and Submission Instructions

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### A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
  - Full Proposals submitted via FastLane: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>)

### B. Budgetary Information

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

### C. Due Dates

- **Preliminary Proposal Due Date(s) (required):**

January 05, 2007

January 04, 2008

and the first Friday in January thereafter

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

May 10, 2007

May 08, 2008

and the second Thursday in May thereafter

## Proposal Review Information Criteria

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**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**

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**Award Conditions:** Standard NSF award conditions apply

**Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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## **I. INTRODUCTION**

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Information Technology (IT) -- defined to include computer hardware, software, and communications networks, as well as technology interfaces and human-computer interfaces -- includes many of the fastest growing occupational sectors in the country. The U.S. Department of Labor, Bureau of Labor Statistics predicts that computer scientists and database administrators, computer systems analysts, computer and information managers, support specialists, and systems administrators will be among the fastest growing occupations in 2004-2014. The fastest job growth will be realized among computer software engineers and computer systems analysts (Bureau of Labor Statistics, 2005). Most of these professions require a bachelor's degree or higher. Overall, computer and mathematics occupations will add nearly one million jobs by 2014 (Hecker, 2005). The ability to meet the demand for individuals with the IT skills necessary to enter the IT workforce is aggravated by the limited involvement of segments of the population that are severely underrepresented and underserved in IT occupations. Black and Hispanic Americans represent less than 10% of the computer systems analysts and scientists, and less than 10% of computer programmers (U.S. Department of Commerce, Office of Technology Policy, 1998). The demand for workers who can use IT fluently can be met only if the needs to diversify the IT workforce and encourage underrepresented groups to pursue careers in IT and IT-intensive fields are addressed.

Because of the success enrichment programs have had in increasing student interest, the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development (2000) recommends that these programs be made available to all students. Increasing interest alone is not sufficient, however, because many other factors are needed to *sustain* interest and aid youth in making often-difficult transitions from middle school to high school, and high school to college. It is anticipated that projects funded under the ITEST program will not only increase interest in IT through the creation of effective student education programs in both school and non-school contexts, but also maintain interest through supportive activities that include parental involvement, career exploration, externships, research, and multi-year programs.

NSF has taken the lead in preparing the nation for a ubiquitous technological infrastructure that supports many types of activities, such as research, work, and communication. As noted in the Executive Summary by the Blue Ribbon Advisory Panel on Cyberinfrastructure (2003) entitled *Revolutionizing Science and Engineering Through Cyberinfrastructure*, “These new environments can contribute to science and engineering education by providing interesting resources, exciting experiences, and expert mentoring to students, faculty, and teachers anywhere there is access to the Web. The new tools, resources, human capacity building, and organizational structures emerging from these activities will also eventually have even broader beneficial impact on the future of education at all levels and likely on all types of educational institutions.” While proposals from all IT areas are desired, projects are especially encouraged that incorporate and build upon the key elements of cyberinfrastructure. For the purposes of ITEST, these include access to and use of powerful, shared computing resources; large data and visualization tools; and robust communications for access, sharing, and collaboration.

In a report to the National Science Foundation entitled *Cyberinfrastructure for Education and Learning for the Future (CELF): A Vision and Research Agenda*, the Computing Research Association (2005) noted the following “Learners of all ages would be able to reap the full benefits of the nation’s scientific Cyberinfrastructure by engaging with scientific data sets, instruments, models, and simulations. [...] Although the envisioned Cyberinfrastructure alone cannot cure the problems of lagging performance and inadequate enrollments in STEM fields, it could have a significant impact if it is properly informed by learning sciences research and linked to educational practice. By transcending the boundaries of formal and informal learning—and by helping students experience what it is like to engage in scientific inquiry, evidence-based argumentation, and engineering design and practice—we can engage their interests and motivate them to pursue scientific and technical careers. At the very least, we can encourage them to participate more meaningfully in deliberations and decision making involving the STEM disciplines that are essential to the democratic ideals of an educated society.” The ITEST program may contribute to the understanding of the nation’s growing cyberinfrastructure, as well as information technology, through the support of innovative projects for students and teachers.

**ITEST has four components:** (a) youth-based projects with strong emphases on career and educational pathways; (b) comprehensive projects for students and teachers; (c) renewals of existing projects; and (d) an ITEST Resource Center.

Any proposal submitted for youth-based or comprehensive projects should include the critical workforce skills. These are described by the Secretary’s Commission on Achieving Necessary Skills (SCANS) of the U.S. Department of Labor in *What Work Requires of Schools: A SCANS Report for America 2000* (U.S. Department of Labor, 1991). Such skills include computation and literacy, and the application of this knowledge; working habits, such as the ability to work on teams; the ability to solve complex problems in systems; and the understanding and use of technology.

## 1. Youth-Based Projects

ITEST will support year-round, youth-based projects that include a summer component. Projects should include activities (after-school and/or weekends) that focus on IT or IT-intensive STEM subject areas. Projects may include the creation of new instructional materials or may adopt or adapt existing curriculum materials and tools, including software, for use in an informal science education environment. For the purposes of ITEST, the definition of informal learning is that it is voluntary, primarily self-directed and independent learning.

Creation of innovative and creative models for engaging students in meaningful learning experiences is a priority. Projects must use well-designed strategies. Single-event, short-term workshops and camps alone are not sufficient; rather, projects must be designed to engage students for two-or-more consecutive years, address the developmental needs of youth, and expose participants to the workplace and workplace skills. Parental involvement and college preparatory support are also essential.

## 2. Comprehensive Projects for Students and Teachers

ITEST will support projects that infuse appropriate information technologies into STEM courses to expand IT experiences that are commonly available in schools. Development of teacher materials on information technologies is encouraged, whether linked to core STEM courses or providing a broader range of resources and applications. Teachers should receive an appropriate level of professional development to enhance their skills in incorporating information technologies into their core STEM courses. Teachers

should then be provided with an opportunity to put into practice what they have learned, by working with students (grades 7-12) in a summer laboratory experience.

For schools to support growing competence in information technology among students, teachers themselves must become fluent with technical tools and resources that support their teaching priorities. Because it is unlikely that many schools would introduce additional courses to the already crowded list of existing offerings, the focus of this component is on technologies that would support learning and teaching within the context of the core curriculum.

### 3. Traditional Renewals

Existing ITEST projects that have demonstrated success may apply for a two-year renewal of funds. While every project should have a viable sustainability plan to continue activities beyond the NSF funding period, a small number of exemplary projects may be eligible for additional funding to continue youth programming, teacher professional development, and project evaluation. ITEST grantees that are completing their second or third year of funding may apply for a two-year renewal provided they can demonstrate success in meeting project goals, identify strategies for incorporating evaluation findings into future work, demonstrate the creation of a replicable model, and have a feasible plan for institutionalizing of major project components. In general, such renewals will be restricted to those projects whose importance transcends the immediate community served and from which the program can demonstrate how to reach more learners effectively. Renewals must be submitted at least six months before the additional funding is required.

### 4. ITEST Resource Center

The ITEST Resource Center is designed to provide technical assistance to the ITEST projects, help bridge the gap between research and practice, create a national presence for ITEST, and build the grantee capacity to use technology as a tool for learning. The Resource Center should also provide a comprehensive evaluative research plan that includes the collection and analysis of data on program effectiveness. Because the ITEST portfolio addresses the learning of IT in both formal and informal education contexts, the Center should have the capacity to support the diverse needs of the grantee institutions represented.

## II. PROGRAM DESCRIPTION

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### A. Youth-Based Projects

#### 1. Project Goals

The goal of ITEST youth-based programming is to provide middle- and high-school students, particularly those from disadvantaged urban and rural communities, access to year-round IT enrichment experiences and opportunities to explore related education and career pathways. Projects should create high-quality learning strategies and curriculum models for use in after school, weekend, and/or summer settings. Youth-based projects should include hands-on, inquiry-based activities with a strong emphasis on non-traditional approaches to learning and the intensive use of information technologies. Cooperative learning and socially relevant problem solving are alternatives to consider.

#### 2. Project Characteristics

Current IT standards for schools focus primarily on the use of computers and the associated software as tools (National Research Council, 1999). Such projects generally include computer hardware, software, and popular applications such as word processing, database design and management, spreadsheets, desktop publishing, presentation software, and various Internet functions such as e-mail and information retrieval. ITEST projects should exceed these basic applications and introduce fundamental concepts of IT, such as algorithms, data organization, modeling, and abstraction, as well as some of the more exciting applications of IT that might be inaccessible to students in a home or school environment. For example, Web page design, animation, and multimedia authoring are all specialized skill areas in IT. The goal is not to duplicate or extend formal education classes, but to capitalize on the strength of voluntary, self-directed, and exploratory learning, while introducing content in a novel manner that will engage participants.

Projects should build on lessons learned from prior efforts and the educational research literature.

- a. *Content Focus.* All projects should focus specifically on IT or IT-intensive STEM subject areas and clearly show the relevance of the proposed work to learning and acquiring IT concepts and skills. If the project is focused on one technology, the proposal should show how, through this focus, participants would learn a broader range of IT skills and STEM concepts. These activities should be informal education, and not replace formal education courses. The narrative should provide sufficient detail on the STEM content area to be addressed and the intended outcomes for participants related to acquisition of concepts and skills in pertinent subject areas. Proposals should include a description of how the content will be aligned with appropriate national and/or state standards.
- b. *Project Design.* ITEST will support year-round projects that provide opportunities for 50 or more participants in grades 7-12 in two consecutive years of programming. Programs must provide 120 hours of informal education (out of school time) engagement each year. In order to achieve the minimum participant levels and account for potential attrition across two years, projects are encouraged to enroll at higher levels at startup.

Projects must provide a clear program pedagogy or model approach for engaging participants in IT content or IT intensive STEM content. This model should take into account the informal learning environment and clearly describe the strategies used to provide the most compelling participant experience possible.

Each ITEST program must include an intensive summer experience such as externships or summer institutes allowing for hands-on experiences and direct interaction with IT/STEM professionals. The summer component ensures year round opportunities for participants and allows for in-depth participation in research institutes, externships, or other field-based experiences. In addition, projects must describe program elements that will support participant understanding of IT and STEM careers and guidance on preparation for college and school-to-work training. A strong parent component is central to the ITEST program design in order to support the continued engagement and support of the young people outside of the program experience. Projects should clearly describe how and when parents will be involved in the program design and address their needs and interests, potential risks to successful involvement, and strategies to address those risks.

Proposals should describe a recruitment plan, which outlines strategies for recruiting and retaining participating youth. Modest stipends are permitted as an incentive for participation. Additionally, the proposal should address student transportation and language needs. Each project is expected to develop an informative website that represents the work of the project and will be compatible with the ITEST Resource Center website.

- c. *Lead Organization.* Although Youth-Based Projects are closely aligned with informal science education, all organizations with an educational mission are eligible. Such organizations include, but are not limited to, two- and four-year colleges and universities, businesses, informal science education organizations, professional societies, middle and secondary schools, and community agencies. Additionally, the ITEST program emphasizes the role that informal learning can have in influencing and nurturing interest in IT. Informal science education organizations include museums, science and technology centers, botanical gardens, zoos, and aquariums. These organizations already provide creative examples of IT applications in exhibitions, programs, research, and administration. They are expected to be excellent partner resources for program design and management, and often have longstanding relationships with schools and community-based organizations.
- d. *Partners and Collaborative Relationships.* Projects must demonstrate evidence of public/private partnerships to enhance resources and exposure to careers in science and technology. Technology-based business partners are required for all ITEST projects. These partnerships can provide support for activities such as career exploration and mentoring, opportunities to work directly with IT and STEM professionals, and enable youth to see examples of workplace applications firsthand. Because considerable emphasis is placed on providing students with guidance on academics, as well as college preparation and school-to-work transitions, it is also expected that the lead organization and/or partners will include two-year colleges, universities, businesses, industry, informal science education, or



community-based organizations, as appropriate, to provide content expertise, externships, and research experiences for participants.

- e. *Impact.* Projects may have a local or regional focus (either a community or metropolitan area), and should provide a plan for year-round activities in which content is introduced in an engaging manner.
- f. *Evaluation Plan.* The proposal must include plans for formative and summative evaluation of the project to assess the impact of the project's activities, progress, and success in meeting goals. An external evaluator who handles at least the summative evaluation should be identified in the proposal. Evaluations must develop indicators of impact on students and include a clear presentation of the questions that will guide the evaluation, how the data will be collected, indicators that will be measured, methods of analysis, basis for comparisons, and the timeline for the evaluation process. If materials are developed, appropriate plans for evaluation and field-testing of materials should be included. Each project is required to support the evaluative research on the impact of the ITEST program that will be conducted by the ITEST Resource Center. Youth-Based Projects are responsible for providing requested data to the ITEST Resource Center.
- g. *Sustainability.* Proposals should include plans for ensuring continuation of critical aspects of the project after the period of NSF support.

## B. Comprehensive Projects for Students and Teachers

### 1. Project Goals

The goal of Comprehensive Projects for Students and Teachers is to provide intensive teacher professional development in IT concepts, skills, and applications that will align classrooms with the ubiquitous cyberinfrastructure that surrounds schools. These should include pedagogical strategies that promote student use of technological resources, data and communications, as well as investigation, inquiry, and awareness of IT career and educational paths for students. The inclusion of guidance counselors to assist with the development and dissemination of IT-related career materials is encouraged. This component will create opportunities for teachers to put into practice what they have learned via summer laboratory experiences with students in grades 7-12. Additionally, projects should provide visible and transferable models of the effective use of IT and or appropriate elements of cyberinfrastructure by teachers in classrooms. Understanding IT concepts and mastering IT skills are just part of what is needed to enhance intellectual capabilities. Information technology addresses how information is acquired and modeled, as well as how understanding can emerge.

### 2. Project Characteristics

Proposed projects should include summer institutes that provide intensive teacher professional development in information technology and related STEM content domains. They should emphasize pedagogical strategies that address the needs of students, as well as diverse learning styles and facility within IT and increased student investigation and inquiry. Part of the experience should make teachers aware of related career and educational paths for students through direct interactions with practitioners and business professionals. Projects should also provide opportunities for teachers to put into practice what they have learned with grades 7-12 students in summer institutes and in their STEM courses. Thus, projects should include both teacher enhancement and a summer institute for students. The student summer activities should be led by participating teachers with support from faculty or partner mentors. Although all of the proposed projects will include summer activities, the total experience is expected to be year-round in nature.

- a. *Focus.* Appropriate themes are those that will directly lead to teaching that focuses on IT and incorporates information technology and elements of cyberinfrastructure into STEM courses. Examples of IT supporting content domains include computational science or computational mathematics, cryptography, mapping and visualization, bioinformatics, robotics, and computer graphics. Because it is expected that teachers will use what they learn when they return to their schools or informal institutions, projects must demonstrate the need for, and curricular relevance of, what is proposed. For school-based projects, this should include ties

to national or state standards. Linkages between IT and STEM content must be explicit.

- b. *Project Design.* The activities, both for teachers and students, should use methodologies that are consistent with the intent of the project, to move more students to consider technology-intensive career paths. Consequently, such workshops should support and use investigation, collaboration, technical resources, and other techniques that are part of the accepted way workers use technology. Moreover, IT should be an integral part of the methodology and delivery of the summer and year-round activities of the project. Special activities such as teacher internships with business and industry partners could be considered. Workforce issues are severe in IT so projects are expected to include innovative strategies for engaging underserved students. Proposals should provide sufficient detail on the format, content, goals, objectives, and pedagogical strategies for workshops and related professional development activities.

The project design must provide a minimum of 120 contact hours per participating teacher and include at least two weeks in the summer as well as school year activities. (Contact hours refer only to periods in which participants (teachers) are engaged as learners guided by designated experts. That is, the term "contact" refers to participants' interaction with a person who serves as their instructor. Thus, for example, contact hours do not include periods when a teacher simply serves in the role of instructor to students; however, they do include periods when teachers reflect with a designated expert on their teaching experiences.) Comprehensive Projects for Students and Teachers must serve a minimum of 50 teachers; in order to achieve the minimum participant levels and account for potential attrition, projects are encouraged to enroll at higher levels at startup. Whenever possible, continuing education or graduate credit should be arranged for participating teachers. The proposal should also include a description of the fundamental components (concepts and skills), as well as the intellectual capabilities, that the project intends to enable in participants and a clear description of the end goals (what participants will know or be able to do as a result of the project) within the broader goals of the program (more people competent in IT and pursuing careers that include IT components). The strategies used such as workshops, supporting materials, and collaborations should be logically tied to the project goals. A description of how the project enables teachers and students to access and use the nation's growing cyberinfrastructure should also be included as appropriate.

Successful projects should embrace approaches and methodologies that attract, encourage, and support those students and classrooms (through their teachers) that have benefited least from the advent of information technologies. Attention should be given to pedagogical strategies that promote inclusion so all participants will learn "to apply information technology in sophisticated ways to solve problems across disciplines and subject areas..." (American Association of University Women, 2000). All Comprehensive Projects must include a summer youth component (minimum one week) where the participating teachers pilot new ideas and strategies either by teaching or working collaboratively with youth, whichever is appropriate to the project goals. Designs for ongoing support are left to the project, but might include using mentors; providing collaborative groups for reflection, visits, and follow-up meetings; online sharing; access to expanding teacher collections of activities and comments; and so forth.

Each project is expected to develop an informative Web site that represents the work of the project and will be compatible with the homepage created by the ITEST Resource Center.

- c. *Recruitment.* Recruiting strategies should be consistent with the project goals. Projects that propose to reach communities that have fewer opportunities, or that have a clear plan to increase the diversity of the IT workforce are particularly encouraged.

- d. *Partnerships.* Technology-based business, industry, or research partners are required for all ITEST projects. It is anticipated that these partnerships can provide technical expertise as well as support for activities such as career exploration and mentoring.
  
- e. *Evaluation Plan.* The proposal must include plans for formative and summative evaluation of the project to assess the impact of the project's activities. An external evaluator who handles at least the summative evaluation responsibilities should be included in the proposal. For teachers, it is expected that both what they teach (the infusion of IT in STEM courses) and how they teach (access to resources, supporting models, pedagogical approaches, etc.) will change. The evaluation plan must therefore be multidimensional. In addition to determining the immediate results of the professional learning opportunities or student workshops, the evaluation should determine if teaching practices in the school or informal institution has changed in ways that are promoted by the project. If curriculum materials or modules are developed, appropriate evaluation and field-testing of prototypes should be included. The basis for any comparisons should be described.

Each project should commit to cooperating with the Resource Center's evaluative research on the impact of the ITEST program that is funded independently by NSF. As part of this evaluation study, Comprehensive Projects for Students and Teachers will be responsible for providing requested data to the ITEST Resource Center.

- f. *Other.* Projects can also support the development of appropriate instructional modules and other materials for use by students, including those that promote an awareness of IT-careers, and/or professional development materials for use by teachers. Given the modest size of the ITEST program, these materials will be limited to small modules used to augment STEM courses.

### C. Traditional Project Renewals

A limited number of ITEST projects may be funded as renewals based on successful accomplishment of the goals identified in their original proposal. NSF expects all awardees to achieve their project goals. Therefore, although achievement of project goals identified in the original proposal is a necessary criterion for consideration for supplemental funding, it is not a sufficient demonstration of an exemplary project by itself. Rather, renewals will be awarded to only those projects of national importance that exhibit the potential to make significant contributions to the understanding of how to effectively engage diverse populations of students and teachers in IT learning. Projects completing their second or third year of funding may apply for a two-year renewal. It is recommended that the PI consult with a Program Officer prior to submission. The project description should fully address the criteria for Youth-Based or Comprehensive Projects (Goals and Characteristics), in addition to the following:

- a. Demonstrate success in meeting project goals in the original award
  
- b. Identify strategies for incorporating evaluation findings into future work
  
- c. Demonstrate the creation of a replicable model
  
- d. Describe a feasible plan for institutionalization and replication of major project components
  
- e. Demonstrate the ability of the work to transcend the immediate community and enable other projects to learn how to reach more learners effectively

### D. ITEST Resource Center

#### 1. Project Goals

One Resource Center will be funded to provide technical support for all ITEST projects. It is anticipated that the Resource Center will conduct comprehensive research and evaluation related to funded projects and have responsibility for national dissemination of program models, materials, and best practices.

## 2. Project Characteristics

Proposals for the ITEST Resource Center should strike a balance between technical support for grantees, program evaluation, and dissemination. It is also anticipated that proposals will reflect exemplary application of IT to the function of the Center itself.

- a. *Lead Institution.* It is anticipated that the lead institution for the ITEST Resource Center will be a service-oriented educational organization or institution with demonstrated capacity to plan, develop, and manage a national center that provides technical support for a diverse portfolio of ITEST projects across the United States. It should have known expertise of the targeted program areas of informal science education and/or teacher professional development. Finally, it is expected that the lead institution will have known expertise of the IT field, cyberinfrastructure, and the needs that the ITEST program is designed to address.
- b. *Technical Support.* The Resource Center is expected to provide technical support for the ITEST projects in various stages of implementation. This may include, but is not limited to, organizing and holding meetings, and identifying resources -- including print and electronic -- and professionals in the field that may augment or enhance projects in meeting their goals. In addition, the Resource Center is expected to support discussions, provide supporting materials to projects, and disseminate ideas and materials from the projects to the field.
- c. *Evaluation and Research.* The Resource Center is expected to carry out evaluation and research on the ITEST program. While each project will have its own individual evaluation plan, the Resource Center is tasked with developing a plan to collect data across projects and to address overall impact, success in meeting ITEST goals, and best practices.
- d. *Dissemination.* The primary responsibility for the dissemination of project findings to the field rests with the Resource Center. In addition to submitting a comprehensive report to NSF, the Center should include a plan for dissemination of findings to both formal and informal science education professionals.

## E. REFERENCES

American Association of University Women (2000). *Tech-savvy: Educating girls in the new computer age*. Washington, DC.

Bureau of Labor Statistics, U.S. Department of Labor (2005). *Occupational outlook handbook, 2006-07 Edition*. <http://www.bls.gov/oco/ocos042.htm>

Computing Research Association (2005). *Cyberinfrastructure for education and learning for the future: A vision and research agenda*. <http://www.cra.org/reports/cyberinfrastructure.pdf>

Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development (2000, September). *Land of plenty: Diversity as America's competitive edge in science, engineering and technology*. Washington, DC.

Hecker, D.E. (2005, November). Occupational employment projections to 2014. *Bureau of Labor Statistics Monthly Labor Review*. <http://www.bls.gov/opub/mlr/2005/11/art5full.pdf>

National Research Council, National Academy of Sciences (1999). *Being fluent with information technology*. Washington, DC: National Academy Press.

National Science Foundation (2003). *Revolutionizing science and engineering through cyberinfrastructure: Report of the National Science Foundation Blue Ribbon Advisory Panel on cyberinfrastructure*. <http://www.>

U.S. Department of Commerce, Office of Technology Policy (1998). Update: America's New Deficit. Washington, DC.

U.S. Department of Labor (1991). *What work requires of schools: A SCANS report for America 2000*. Washington, DC: The Secretary's Commission on Achieving Necessary Skills. <http://www.scans.jhu.edu/NS/HTML/AboutCom.htm>

Proposal Writing Tips:

NSF 04-016 - [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf04016](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04016): A Guide for Proposal Writing

NSF 02-057 - [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf02057](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf02057): The 2002 User-Friendly Handbook for Project Evaluation

### III. AWARD INFORMATION

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#### Duration and Funding Level

Project duration for both Youth-Based Projects and Comprehensive Projects for Students and Teachers is expected to be three years. The funding level for Youth-Based Projects is up to \$900,000 (an annual average of \$300,000), while Comprehensive Projects for Students and Teachers will be funded up to \$1,200,000 (an annual average of \$400,000). Project duration for Renewals is two years. The funding level for Renewals is up to \$300,000 per year for Youth-Based Projects and up to \$400,000 per year for Comprehensive Projects for Students and Teachers. The Resource Center will be funded for up to five years at a maximum total funding level of \$5 million; annual average of approximately \$1,000,000.

### IV. ELIGIBILITY INFORMATION

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#### Organization Limit:

Proposals may only be submitted by the following:

- Only U.S. organizations located in the U.S. are eligible to apply; see the Grant Proposal Guide for further information. All organizations with an educational mission are eligible.

Proposals targeting minorities, persons with disabilities and women are especially encouraged.

#### PI Limit:

None Specified

#### Limit on Number of Proposals per Organization:

None Specified

#### Limit on Number of Proposals per PI: 1

An individual may serve as the Principal Investigator (PI) for no more than one proposal in each proposal cycle under this solicitation.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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#### **Preliminary Proposals (required):**

Preliminary proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

The instructions below are specific to ITEST and supplement the GPG instructions:

A preliminary proposal is required prior to the submission of a full proposal for a project grant. **Preliminary proposals are required for Youth Based projects, Comprehensive Projects for Students and Teachers, Renewals, and the ITEST Resource Center.** (In FastLane the preliminary proposal is termed preproposal.)

A full proposal will be "encouraged" or "discouraged" based on the review of the preliminary proposal. It is recommended that only those preliminary proposals encouraged by ITEST staff be prepared as full ITEST proposals unless the PI is certain that the weaknesses cited can be fully addressed.

**Cover Sheet:** Be sure to check the preliminary proposal box.

**Project Summary:** An abstract should provide a clear overview of the project succinctly describing its major features. It **must** specifically summarize the project's *intellectual merit* and *broader impacts* in separate statements. If the Summary does **not** specifically address *intellectual merit* and *broader impacts*, the proposal **will be returned without review**. This Project Summary is limited to one single-spaced page. **Clearly indicate if the submission is a Youth-Based Project, Comprehensive Project for Students and Teachers, Resource Center or Renewal.**

**Project Description:** The narrative is limited to six pages in length. It should sketch, in broad strokes, the essential features of the project including:

**Need:** Describe the need being met (the educational, not organizational, need), the target population, and the plan to reach that population.

**Goals:** Describe the major goal(s) of the project, anticipated outcomes, and their alignment with ITEST program goals.

**Description of the Activity:** Describe the design of the project, identify major components and include a timeline. Describe the underlying principles that inform the design of the activities and the research and beliefs on which these are based. What is the proposed life span of the project/activity? Provide general information on the content area, target population, and number of students and/or teachers to be impacted. When appropriate, indicate how the activity will be sustained following the NSF-funded period.

**Evaluation:** Plans for evaluation, including formative and summative, as appropriate.

**Key Personnel:** Identify each key staff member, consultant, and/or advisor involved in the project, and provide a one-sentence description of the qualifications for each and the percentage of time that person will devote to the project.

**Dissemination & Supplemental Materials:** Describe plans for the broad dissemination of the products of the project, as appropriate. Describe any planned ancillary materials that are to be made available to the general public.

**Budget:** The total budget should be entered as the Year 1 budget in FastLane. A one-page narrative budget explanation should be included in the Budget Justification.

**Supplemental Materials:** These are NOT permitted for preliminary proposals.

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

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

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

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

The instructions below are specific to ITEST and supplement instructions in the GPG or NSF Grants.gov Application Guide:

**Cover Sheet:** The Cover Sheet must contain all requested information. If project funds are requested from another Federal agency or another NSF program, it must be indicated on the cover sheet. If such funds are requested subsequent to proposal submission, a letter should be sent to the attention of the ITEST program, identifying the proposal by its NSF number. The related preliminary proposal number must be entered on the cover sheet as well.

**To avoid delays in processing, it is also suggested that PIs begin the process of obtaining appropriate Institutional Review Board (IRB) approvals or exemptions as needed for projects involving human subjects.**

**Project Summary:** A one-page Project Summary should be prepared, suitable for publication, which presents a self-contained description of the activity that would result if the proposal were funded. The initial sentences should describe the ITEST program component to which the proposal is submitted (**Youth-Based Project, Comprehensive Project for Students and Teachers, Resource Center or Renewal**), content area, targeted participant population(s), the number of participants (students and/or teachers), and the number of contact hours for each group. The summary should be written in the third person, the present tense, and include an indication of the need being addressed, a statement of objectives, methods to be employed, potential contribution to the public understanding of STEM or the outcomes resulting from the project. The Summary **must** specifically address the project's *intellectual merit* and *broader impacts* in separate statements. If the Summary does **not** specifically address *intellectual merit* and *broader impacts*, in separate statements, the proposal **will be returned without review**.

**Project Description:** (including results from prior NSF support and data sheet). Most of the information that determines whether or not a grant will be awarded is included in the Project Description. Competitive ITEST proposals will include all information listed in Section II. Reviewers will use this information in judging the merit of the proposal as described in this document. The maximum number of pages allowable for the *Project Description* is 15 pages. Page format should be single-spaced with a clear and legible type size of not smaller than 12-point type and with no less than 2.5 cm margins on all sides.

The narrative section of a competitive ITEST project proposal should include a project overview, goals and objectives, a explanation of principles that guided the project design, a detailed project description, qualifications of key personnel who will be coordinating the project, anticipated results, and evaluation and dissemination plans as indicated below. Substantive information essential to understanding the details of complex projects should be placed in appendices with explicit references in the narrative.

**Statement of Need:** This should be stated in terms of the educational need, not the organization's need.

**Target Audience and Impact:** Specify the intended primary audience and if the impact will be local or regional.

**Project Goals:** State the project goals in terms of the intended impact on the target audience.

**Focus:** See *Characteristics* under Youth-Based Projects, Comprehensive Projects for Students and Teachers, Renewals, and ITEST Resource Center in Section II. Please indicate the project type in the Project Summary.

**Project Design:** Describe the underlying principles that inform the design of the activities and the research and beliefs on which these are based. How does it build on prior practice and educational research? Describe the overall approach and components of the project and how these realize the design principles. Discuss the scope and depth of the science, and the manner and style in which it will be presented. What is the target audience's expected experience as they participate in the project? What are the project deliverables?

Competitive proposals should be cost effective. For Youth-Based Projects and Comprehensive Projects for Students and Teachers, the design should maximize participation levels for in-depth activities. All projects must have a minimum of 50 participants that receive at least 120 contact hours each (participants in Youth-Based Projects are defined as middle and high school students, while teachers are the targeted participants in Comprehensive Projects for Students and Teachers). The total cost per participant (calculated by total project cost divided by the number of participants who receive at least 120 hours of contact time) is a consideration in the review process. Resource Center proposals should address the entire portfolio of active projects as well as new projects that are added annually, identifying strategies for technical support and evaluation that will support the creation of a robust community of practice.

**Recruitment:** Provide an appropriate recruitment and retention plan for the target audience (teachers and/or students), articulate potential recruitment difficulties, and explain how they will be addressed; also see *Characteristics* under Youth-Based Projects and Comprehensive Projects for Students and Teachers.

**Key Staff, Consultants, and Advisors:** Provide a description of the responsibilities, qualifications, and level of effort of the key personnel involved in the project, including the role of consultants and advisors at each stage of the project.

**Partners:** Provide documentation of collaborative relationships and partnerships that are essential to the project. Typically, letters of commitment are included in the Supplementary Documents section of the proposal for this purpose. Technology-based business partners are required for all ITEST projects to enable participants to understand the correlation between the STEM and IT content and workforce applications.

**Ancillary Material.** Describe any ancillary material that will be produced such as curricula, DVDs, websites, and educational modules.

**Evaluation:** It is expected that ITEST projects will include, at a minimum, two stages of evaluation at a level commensurate with the nature and scope of the propose project. Elements to be addressed in the Evaluation Section of a Proposal:

- Name, credentials, and responsibilities of the evaluator/s.
- Strategies used for the various phases of the project.
- General information about the evaluation processes including sample sizes, instruments used, nature of the data (quantitative and qualitative), and analytical methods.
- Timeline: When, during the various phases of the project, will the evaluation work take place? Be sure to allot adequate time for all phases including an adequate and thorough summative evaluation.
- Budget: The budget should be adequate to enable the evaluator to conduct a thorough project evaluation.

**Dissemination:** Describe, as appropriate, how information about the project and any knowledge gained in developing the project will be conveyed to the field.

**Timeline:** Provide a detailed (e.g. quarterly) schedule for each year of the project that indicates the major developmental steps for all the aspects of the project.

**Sustainability:** Describe the plans to sustain the project efforts beyond the period of the grant, as appropriate.

**Results from Prior Support:** If the prospective PI or CoPI (s) received support for related NSF activities within the past five



years, a description of the project(s) and outcomes must be provided in sufficient detail to enable reviewers to assess the value of results achieved. Past projects should be identified by NSF award number, funding amount, period of support, title, summary of results, and a list of publications and formal presentations that acknowledge the NSF award (do not submit copies of the latter). Evaluation data should be clearly described. Details regarding evaluation data should be put into an appendix. PIs and CoPIs with overdue Final Reports on previous NSF awards (i.e., Final Reports not submitted within 90 days after those previous NSF awards expired) may not receive any new grants until those Final Reports have been submitted to NSF.

**References Cited:** Any literature cited should be specifically related to the proposed project, and the Project Description should make clear how each reference has played a role in the motivation for, or design of, the project.

**Biographical Sketches:** Biographical information (no more than two pages) must be provided for each senior person listed on the budget forms, including consultants, and advisors. Include career and academic credentials, as well as e-mail and mailing address.

**Supplementary Documents:** Reviewers are often asked to read and assess a substantial number of competing proposals. For this reason, the project description alone must provide sufficient information so that a reviewer unfamiliar with the context of the project can make an informed judgment. In some cases, it may be critical to convey more detailed information to demonstrate levels of competence or expertise, to document commitment of personnel or other resources, to demonstrate the quality of instructional materials, or to provide other relevant information. Such material can be included in appendices that are clearly referenced in the proposal. Additionally, the proposal may refer to Web sites that contain this type of supplementary material. Letters of commitment from each partner indicating their role in the proposed project, may also be included in this section.

Presentation of such materials should be thoughtful and concise. Supplementary materials that cannot be submitted electronically must be mailed directly to the ITEST program (ITEST Program; NSF-EHR; Suite 885; 4201 Wilson Blvd; Arlington, VA 22230.)

**Supplemental materials are limited to 75 pages. NSF does not require reviewers to read appendices or to review information on Web sites.**

## **B. Budgetary Information**

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

### **Other Budgetary Limitations:**

Additional limitations to consider include the following:

- If materials are developed as part of a project, modest additions of up to 20% can be made to the budget limitations (e.g., up to 20% of \$300,000 per year for Youth-Based projects, up to 20% of \$400,000 per year for Comprehensive Projects for Student and Teacher projects), provided the materials will be field-tested and distributed broadly.
- NSF support for stipends for teachers is permitted up to \$100 per day. The daily rate is based upon the requirement that all projects include a minimum of 50 teachers.
- Equipment purchase is not supported. Specifically personal and laptop computers, servers, and other hardware, as well as major research equipment, may not be purchased under ITEST projects.
- Modest support within the budget limits will be provided for the purchase of teacher materials and supplies in Comprehensive Projects for Student and Teacher projects.

## **C. Due Dates**

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- **Preliminary Proposal Due Date(s) (required):**

January 05, 2007

January 04, 2008

and the first Friday in January thereafter

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

May 10, 2007

May 08, 2008

and the second Thursday in May thereafter

## D. FastLane/Grants.gov Requirements

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- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

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

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

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

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

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

## A. NSF Merit Review Criteria

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

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

### **What is the intellectual merit of the proposed activity?**

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

### **What are the broader impacts of the proposed activity?**

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

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

### ***Integration of Research and Education***

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

### ***Integrating Diversity into NSF Programs, Projects, and Activities***

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

### **Additional Review Criteria:**

#### **A. Youth-Based Project proposals:**

Additional review criteria used in evaluating **ITEST Youth-Based Project proposals** include:

- **Content Focus.** Does the content reflect a focus on IT or an IT-intensive STEM subject area? Do the content and instruction reflect the appropriate age and grade level(s) of targeted participants and allow for in-depth exploration of subject areas? Are the specific elements of the content plan presented or developed sufficiently and include a description of how content will be aligned with national standards?
- **Project Design.** What are the underlying principles that inform the design of the activities and the research and beliefs on which these are based? Are the participants engaged in meaningful year-round experiences? Do students participate for at least two consecutive years? Will investigations lead to knowledge and understanding of IT or IT-intensive STEM subject areas? Do activities relate to the development of workplace skills and include guidance on college preparation? Is the expected duration of student involvement in the program clearly stated, and appropriate to achieve the stated learning outcomes? Is there an opportunity to work with scientists and/or IT professionals?
- **Impact.** Will the project have significant local or regional impact on the availability of IT experiences for youth? What is the potential for strengthening the IT literacy?

- **Recruitment.** Does the proposal include a plan for identifying potential participants and for encouraging their ongoing participation? Are there mechanisms to facilitate access by students from disadvantaged urban and rural communities? If there are other targeted characteristics (e.g., age range, academic ability, economic status, ethnicity/gender), does the plan identify how those individuals are recruited and selected?
- **Institutional Capacity:** What involvement have the proposing institution and/or its partners had in creating high-quality youth programs? What is the expertise of key staff proposed for this project?
- **Partnerships.** Proposals will be assessed based on the reasonableness of working relationships among partners and clear evidence of collaboration demonstrated in preparing the proposal. What is the likelihood that the project will facilitate greater interactions among professionals in museums, science/technology centers, community organizations, universities, cooperating school systems, and business/industry? Is there evidence that long-term relationships are likely to be forged that can supplement and support IT enrichment programs in a variety of settings? Does the project include a business or industry partner?
- **Sustainability.** Does the proposal include plans for continuance of the program beyond NSF funding? What, if any, sustainability strategies will be employed?
- **Parental Involvement.** Are parents or primary caregivers included as partners in order to provide at-home continuity and support for students' learning experiences? Have feasible mechanisms for family involvement, that are sensitive to complexities/limitations of family schedules, been proposed? Is the parental interaction a meaningful part of the program implementation?
- **Research and Evaluation.** Does evaluation of overall project effectiveness include measures of students' learning outcomes and increased interest in pursuit of careers and further study in IT or IT-intensive STEM subject areas? If activity materials are developed, is there adequate testing of draft and prototype materials during the developmental stages?

#### B. Comprehensive Projects for Students and Teachers proposals:

Additional criteria used in evaluating proposals for **Comprehensive Projects for Students and Teachers** include:

- **Content Focus.** Does the content focus on IT and have the potential to improve STEM instruction? Are the content and instruction appropriate for the target grade levels? Does it include sufficient IT fundamentals as well as clear links to STEM instruction?
- **Project Design.** What are the underlying principles that inform the design of the activities and the research and beliefs on which these are based? Are participating teachers involved in year-round activities? Will they continue to learn, reflect, and share their learning and experiences with project staff, colleagues and other participants? Will investigations lead to knowledge and understanding of IT and its contribution to specific STEM subject areas? Do activities help prepare teachers to use IT-related approaches in their STEM teaching? Is the duration in the program clearly stated and appropriate to achieve the project goals? Is there an opportunity to work with scientists and/or IT professionals? Is the project likely to result in substantive changes in teachers' classrooms?
- **Institutional Capacity:** What involvement has the proposing institution and/or its partners had in the development of teacher professional development programs? What is the expertise of key staff proposed for this project? Does the key staff have demonstrated experience in IT and IT application in STEM courses?
- **Impact.** Will the project have significant impact on classrooms? Will it provide a useful model for others? Are there provisions for dissemination?
- **Recruitment.** Does the proposal include a plan for identifying potential participants and for sustaining their ongoing participation? Are there mechanisms to encourage participation by teachers and students in schools from disadvantaged urban and rural communities? Is the recruitment strategy (population, region, diversity, etc.) consistent with the project goals (content, strategy, support, etc.)?
- **Partnerships.** Does the project include the necessary partners to be successful? Are their roles and contributions clear and appropriate? Will the partners be accessible and have an ongoing role during the school year? Is there evidence that long-term relationships are likely to continue and support IT programs within the project and beyond?
- **Sustainability.** Does the proposal include plans for continuance of the program beyond NSF funding? What sustainability strategies will be employed to continue the project at the grantee institution, in the schools? Are there provisions for disseminating the project models and materials?
- **Research and Evaluation.** Does the project include evaluation of the overall project effectiveness? Will the project be able to gather data and measure the project's effects on

classrooms and student learning? Is the formative evaluation plan reasonable to support the project development? Is the summative evaluation designed to measure the success in reaching the project goals? If applicable, is the research that emanates from the project likely to be useful and informative? If activity materials are developed, is there adequate testing of draft and prototype materials during the developmental stages?

### C. ITEST Resource Center proposals:

Specific additional criteria used in evaluating **ITEST Resource Center** proposals include:

- **Lead Institution.** Does the lead institution demonstrate the capacity to plan, develop, and manage a national Center to support a diverse array of ITEST projects? Is the lead institution knowledgeable about IT and its applications in STEM, as well as of the formal and informal science education communities? Does the key staff have demonstrated expertise with research and IT, and its application in STEM in both formal and informal environments?
- **Project Design.** Does the project design provide a creative and comprehensive plan for ongoing technical support for ITEST projects? Are goals for various components, including organizing meetings, providing technical support, identifying resources, and disseminating information, clearly stated and pertinent to the overall program goals? Does the Resource Center model the exemplary use of IT throughout the project?
- **Research and Evaluation:** Does the narrative provide a clear and coherent plan for research on ITEST projects? Does the research add in a coherent way to the body of knowledge about IT and STEM learning, teaching and best practices in formal and informal settings? Does the project include an evaluation of the overall effectiveness of the Resource Center, as well as a plan for formative and summative evaluation?
- **Dissemination.** What strategies are planned to disseminate program outcomes, products and achievements to the field? Does the dissemination plan address the needs of formal and informal science education communities?

## B. Review and Selection Process

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

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

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

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

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

## VII. AWARD ADMINISTRATION INFORMATION

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### A. Notification of the Award

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

## B. Award Conditions

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An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); \* or Federal Demonstration Partnership (FDP) Terms and Conditions \* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

## C. Reporting Requirements

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

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

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

Additional reporting requirements may be included, e.g., to support program evaluation, as required.

## VIII. AGENCY CONTACTS

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General inquiries regarding this program should be made to:

- Sylvia James, Program Director [ITEST Lead], 890 S, telephone: (703) 292-5333, fax: (703) 292-9044, email: [sjames@nsf.gov](mailto:sjames@nsf.gov)
- David Campbell, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5093, fax: (703) 292-9044, email: [dcampbel@nsf.gov](mailto:dcampbel@nsf.gov)
- Julia Clark, Program Director [Youth-Based Projects], 885 S, telephone: (703) 292-5119, fax: (703) 292-9044, email: [jclark@nsf.gov](mailto:jclark@nsf.gov)

- Arlene de Strulle, Program Director [Youth-Based Projects], 890 S, telephone: (703) 292-5117, fax: (703) 292-9044, email: [adestrul@nsf.gov](mailto:adestrul@nsf.gov)
- Michael Haney, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5102, fax: (703) 292-9044, email: [mhaney@nsf.gov](mailto:mhaney@nsf.gov)
- David Hanych, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5124, fax: (703) 292-9044, email: [dhanych@nsf.gov](mailto:dhanych@nsf.gov)
- Sharon Locke, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-7322, fax: (703) 292-9044, email: [slocke@nsf.gov](mailto:slocke@nsf.gov)
- Glenn Markle, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5096, fax: (703) 292-9044, email: [gmarkle@nsf.gov](mailto:gmarkle@nsf.gov)
- Mary Ann Steiner, Program Director [Youth-Based Projects], 896 S, telephone: (703) 292-5128, fax: (703) 292-9044, email: [msteiner@nsf.gov](mailto:msteiner@nsf.gov)
- Angelicque Tucker Blackmon, Program Director [Youth-Based Projects], 885 S, telephone: (703) 292-5092, fax: (703) 292-9044, email: [atucker@nsf.gov](mailto:atucker@nsf.gov)
- Ron Tzur, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5110, fax: (703) 292-9044, email: [rtzur@nsf.gov](mailto:rtzur@nsf.gov)
- Karen Zuga, Program Director [Comprehensive Projects for Students and Teachers], 885 S, telephone: (703) 292-5112, fax: (703) 292-9044, email: [kzuga@nsf.gov](mailto:kzuga@nsf.gov)
- Rosalind Douglas, ITEST Program Specialist, 890S, telephone: (703) 292-7880, email: [rdouglas@nsf.gov](mailto:rdouglas@nsf.gov)
- Daphne Marshall, ITEST Senior Program Assistant, 885S, telephone: (703) 292-5114, email: [dmarshall@nsf.gov](mailto:dmarshall@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).

For questions relating to Grants.gov contact:

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

## IX. OTHER INFORMATION

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

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

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

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

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

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

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
  
- **For General Information** (NSF Information Center): (703) 292-5111
  
- **TDD (for the hearing-impaired):** (703) 292-5090
  
- **To Order Publications or Forms:**
  - Send an e-mail to: [pubs@nsf.gov](mailto:pubs@nsf.gov)
  - or telephone: (703) 292-7827
  
- **To Locate NSF Employees:** (703) 292-5111

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## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS



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

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

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

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The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA  
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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