

# NATIONAL SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY EDUCATION DIGITAL LIBRARY (NSDL)

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## *Program Solicitation*

*NSF 00-44*

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES  
DIVISION OF UNDERGRADUATE EDUCATION

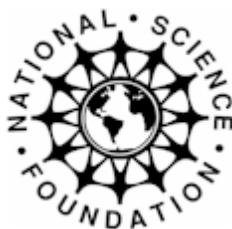
### **DEADLINES:**

***Letters of Intent (optional): March 13, 2000***

***Proposals: April 14, 2000***



NATIONAL SCIENCE FOUNDATION



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# SUMMARY OF PROGRAM REQUIREMENTS

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## GENERAL INFORMATION

- ◆ **Program Name:** National Science, Mathematics, Engineering, and Technology Education Digital Library (NSDL)
- ◆ **Short Description/Synopsis of Program:**

Building on work supported under the multi-agency Digital Libraries Initiative, this program aims to found a national digital library that will constitute an online network of learning environments and resources for science, mathematics, engineering, and technology (SMET) education at all levels. The program will accept proposals in four tracks: (1) *Core Integration System* projects are expected to focus on the coordination and management of the library's core collections and services and to develop the library's central portal. (2) *Collections* projects are expected to aggregate and manage a subset of the library's content within a coherent theme or specialty. (3) *Services* projects are expected to develop services which support users, collection providers, and the Core Integration System and which enhance the impact, efficiency, and value of the library. (4) *Targeted Research* projects are expected to explore specific topics that have immediate applicability to one of the other three tracks.
- ◆ **Cognizant Program Officers:** Dr. C. Dianne Martin and Dr. Lee L. Zia, Division of Undergraduate Education, Suite 835, telephone 703.306.1666, e-mail <[due-nsdl-program@nsf.gov](mailto:due-nsdl-program@nsf.gov)>
- ◆ **Applicable Catalog of Federal Domestic Assistance (CFDA) No.:** 47.076 — Education and Human Resources

## ELIGIBILITY

- ◆ **Limitation on the categories of organizations that are eligible to submit proposals:** None
- ◆ **PI eligibility limitations:** An individual may serve as the Principal Investigator (PI) on no more than one proposal submitted for this program deadline.
- ◆ **Limitation on the number of proposals that may be submitted by an organization:** None

## AWARD INFORMATION

- ◆ **Type of award anticipated:** Standard Grants and Continuing Grants
- ◆ **Number of awards anticipated in FY2000:** Approximately 20
- ◆ **Anticipated funds available in FY2000:** Approximately \$13 million, pending availability of funding
- ◆ **Anticipated date of award:** July 2000

## PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

- ◆ **Proposal Preparation Instructions**
  - **Letter of intent requirements:** A letter of intent (sent via e-mail to <[due-nsdl-program@nsf.gov](mailto:due-nsdl-program@nsf.gov)>) is requested, but not required, by March 13, 2000.

- **Preproposal requirements:** None
  - **Proposal preparation instructions:** Standard NSF *Grant Proposal Guide* (GPG) instructions
  - **Supplemental proposal preparation instructions:** A Project Data Form (NSF Form 1295) must be submitted (via FastLane) as part of all proposals.
  - **Deviations from standard (GPG) proposal preparation instructions:**
    - A Budget Justification (up to three pages) *must* accompany the budget forms and provide details about budget line items.
    - The signed proposal Cover Sheet should be forwarded to the address specified later in this solicitation instead of the address specified in the GPG.
- ◆ **Budgetary Information**
- **Cost sharing/matching requirements:** None
  - **Indirect cost (F&A) limitations:** None
  - **Other budgetary limitations:** None
- ◆ **FastLane Requirements**
- **FastLane proposal preparation requirements:** Use of FastLane is required.
  - **FastLane point of contact:** Ms. Romona Truesdale, Division of Undergraduate Education, Suite 835, telephone 703.306.1670, e-mail <duefl@nsf.gov>; or FastLane Help Desk, telephone 703.306.1142, e-mail <fastlane@nsf.gov>
- ◆ **Deadline/Target Dates**
- **Letter of intent deadline (optional):** March 13, 2000
  - **Full proposal deadline:** April 14, 2000, 5:00 p.m. (submitting institution's local time)

## PROPOSAL REVIEW INFORMATION

- ◆ **Merit Review Criteria:** Standard National Science Board approved criteria

## AWARD ADMINISTRATION INFORMATION

- ◆ **Grant Award Conditions:** GC-1 or FDP III
- ◆ **Special grant conditions anticipated:** None
- ◆ **Special reporting requirements anticipated:** None, except as noted later in this solicitation for Year 1 awards in the program's Core Integration System track

## INTRODUCTION

To catalyze and support continual improvements in the quality of science, mathematics, engineering, and technology (SMET) education, the National Science Foundation (NSF) has established the **National Science, Mathematics, Engineering, and Technology Education Digital Library (NSDL)** program. The resulting digital library, a network of learning environments and resources for SMET education, will ultimately meet the needs of students and teachers at all levels—K-12, undergraduate, graduate, and lifelong learning—in both individual and collaborative settings. It will serve not only as a gateway to a rich array of current and future high-quality educational content and services, but also as a forum where resource users may become resource providers. For example, users might contribute their expertise to produce new teaching modules from resources such as real-time experimental data or visualization software available through the network. Or they might evaluate and report on the efficacy of specific digital learning objects (such as Java applets or interactive electronic notebooks) and their impact on student learning. Beyond providing traditional library functions such as the intelligent retrieval of relevant information, indexing and online annotation of resources, and archiving of materials, the digital library will also enable users to access virtual collaborative work areas, hands-on laboratory experiences, tools for analysis and visualization, remote instruments, large databases of real-time or archived data, simulated or virtual environments, and other new capabilities as they emerge.

The NSDL program will foster the creation and development of a comprehensive infrastructure, including an integrated management structure for the digital library, standards for quality control and intellectual property management of resources, and policies and practices for the guaranteed stability and archiving of materials and products. It is expected that the library established by the NSDL program will enable the dynamic use of materials and tools for learning supplied by cooperating providers of resource collections and services. Users will enjoy the synergies made possible by seamless access to different kinds of resources. For example, a case study at one site of how climate-change scientists employ satellite imagery to determine surface water chemistry could be combined with computational and visualization tools from another collection, and used to analyze and display archived data housed in yet another collection. In addition, services available through the library will increase the accessibility and impact of all resources, by supporting effective search and discovery of content, flexible assembly of curricular and learning modules from component pieces, and communication and collaboration among users.

This program builds on previously and currently funded work supported under the multi-agency Digital Libraries Initiative (DLI) Phase I and Phase II (see <<http://www.dli2.nsf.gov/>>), and is intended to multiply the impact of efforts supported by NSF, other government agencies, the private sector, professional societies, and others working to improve SMET education nationwide. Projects funded under the NSDL program will be encouraged to coordinate their developed collections and services with those of other digital libraries for education, such as the U.S. Department of Education's Gateway to Educational Materials (GEM) at <<http://www.thegateway.org/>>. The concept of a national digital library for educational resources in SMET disciplines has been developed through a series of workshops and related publications supported by NSF, including:

- *Information Technology: Its Impact on Undergraduate Education in Science, Mathematics, Engineering, and Technology*, April 1996, NSF 98-82, <<http://www.nsf.gov/cgi-bin/getpub?nsf9882>>;
- *Developing a Digital National Library for Undergraduate Science, Mathematics, Engineering, and Technology Education*, August 1997, National Research Council, Center for Science, Mathematics, and Engineering Education, <<http://www.nap.edu/readingroom/records/0309059771.html>>;
- *Science, Mathematics, Engineering, and Technology Education Library Workshop*, July 1998, NSF 99-112, <<http://www.dlib.org/smete/public/report.html>>;
- *Serving the Needs of Pre-College Science and Mathematics Education: Impact of a Digital National Library on Teacher Education and Practice*, September 1998, National Research Council, Center for Science, Mathematics, and Engineering Education, <<http://www.nap.edu/books/NI000781/html/>>;
- *Digital Libraries and Education Working Meeting*, January 1999, <<http://www.dli2.nsf.gov/dljanmtg.pdf>>; and
- *Portal to the Future: A Digital Library for Earth System Education*, August 1999, <[http://geo\\_digital\\_library.ou.edu/](http://geo_digital_library.ou.edu/)>.

Further information may be found at <<http://www.ehr.nsf.gov/ehr/du/programs/nsdl/>>, including links to abstracts of current and previous projects. It is important that NSDL proposals be well-informed about relevant activities already funded under DLI.

Although the purpose of the NSDL program is to support improvements in SMET education in the United States, it is recognized that the program may also have an international impact. Conversely, international digital library efforts may have potential impact on achieving the goals of the NSDL program. Consequently, proposals to this program may be part of a larger effort that includes international elements funded by other domestic sources or programs administered by other countries. For further reference to potential international aspects, see <<http://www.dli2.nsf.gov/intl.html>>.

## PROGRAM DESCRIPTION

In recent years, innovative projects supported by NSF and many others have developed numerous examples of rich learner-centered educational environments. These feature a variety of advances, including the use of primary resources; computational tools for modeling, simulation, and visualization; remote access to scientific equipment; analysis of large, real-time or archived data sets; and network-supported collaboration. Modern information technologies—in particular, the World Wide Web—have shown great potential for supporting and conveying the very best of these new learning environments. The highly linked architecture of the Web matches the interconnected nature of knowledge, promotes the integration of research and education, permits the addition of the most current high-quality materials and practices, and encourages learners to become active participants in expanding their educational experience.

However, the many Web-based collections of resources and other additional collections of educational material do exhibit shortcomings—it is often difficult to find high-quality and appropriate resources; resources that are located can sometimes be unreliable or unstable; and interoperability and reusability of learning resources are more promise than reality. Furthermore, the construction of new learning objects with executable content from “building block” component pieces (e.g., Java applets and/or application software macros) demands additional coordination requirements for seamless performance. Through the NSDL program, NSF seeks to enable the discovery, creation, collection, organization, and delivery of quality teaching and learning resources appropriate for educators and learners at all levels. The resulting network of learning environments and resources would be managed actively to promote reliable “anytime, anywhere” access to content and services. In particular, the digital library should provide reusable, shareable, and interoperable resources that enable learners at all levels to access and use reviewed materials both within and across traditional SMET disciplinary boundaries. Such materials should also include assessment and evaluation tools and findings, and should harness new pedagogical content knowledge founded on a solid research base. The collections, digital rights management, and services of the library will facilitate the development and dissemination of new and tested materials and methods, thereby promoting continual improvements in SMET education at all levels.

To realize this vision, the NSDL program will accept proposals in four tracks: (1) **Core Integration System (CIS)**, (2) **Collections**, (3) **Services**, and (4) **Targeted Research**. In the **CIS** track, funding for 24-month pilot projects will be awarded during Year 1 of the program; in Year 2 it is anticipated that a single award will be made for up to 60 months. In the remaining three tracks—**Collections**, **Services**, and **Targeted Research**—awards for projects of up to 24 months in duration will be made in each of the first three years of the program. (See the table below.) For expected award amounts and anticipated numbers of awards in the different tracks in Year 1, please consult the section “AWARD INFORMATION” below. Program solicitations for subsequent years will be posted on the NSF Web site <<http://www.nsf.gov/>> as NSDL planning proceeds.

**SUMMARY OF ANTICIPATED AWARD SCHEDULE**

<i>NSDL Program Track</i>	<b>Year 1 Awards</b>	<b>Year 2 Awards</b>	<b>Year 3 Awards</b>
<i>Core Integration System (CIS)</i>	Multiple pilot projects (award durations up to 24 months)	Single CIS project (award duration up to 60 months)	
<i>Collections</i>	Multiple projects each year (award durations up to 24 months)		
<i>Services</i>	Multiple projects each year (award durations up to 24 months)		
<i>Targeted Research</i>	Multiple projects each year (award durations up to 24 months)		

Partnerships or collaborations are encouraged among digital library stakeholders, such as K-12 schools, two-year colleges, four-year colleges, universities, professional societies, industrial and business concerns (including commercial publishers), and other non-profit and for-profit organizations. Sustainability of projects beyond the period of NSF funding is expected, and projects are strongly encouraged to include a long-term management plan in their proposals.

Projects may have features that address more than one track. Also, because of the inherent synergy of efforts in all of these tracks, it is anticipated that funded projects will collaborate with one another and with current efforts already underway. To facilitate interaction and establish linkages, regular Principal Investigator (PI) meetings and/or workshops will be held throughout the course of the NSDL program, to which representatives of related projects will also be invited.

An operational network of learning environments and resources that will be the digital library is expected to be available for limited use by September 2002, and an expanded and richly populated network will be developed further in Year 3. Beyond this time, it is anticipated that NSF will provide ongoing support for certain core aspects of the digital library.

***Core Integration System Track***

The purpose of the Core Integration System (CIS) is to coordinate a distributed alliance of resource collection and service providers, and to ensure reliable and extensible access to and usability of the resulting network of learning environments and resources. Among its tasks, the CIS is expected to:

- maintain the premier gateway to the network;
- supplement and coordinate services developed in Collections track and Services track projects (see below) to enable effective use of and access to the network’s content;
- provide leadership in the development of standards for including resource collections and services in the network;
- work closely with resource collection providers to establish a variety of review systems (for materials) responsive to the needs of different user communities;
- coordinate efforts to formulate requirements—in conjunction with appropriate standards organizations and/or consortia—for interoperability, reusability, reliability, and stability of resources and services;
- provide leadership in developing and advocating flexible and responsive intellectual property and digital rights management policies and practices;
- seek out new resource collections to join fully, or otherwise be affiliated with, the library; and
- incorporate new services that enhance the functionality of the network.

The purpose of Year 1 of the CIS track is to identify requisite user services, management procedures, evaluation methods, models for sustainability, and other technical standards for the CIS. Year 1 CIS grants may have a duration of up to 24 months, but expected outcomes of the projects within 12 months of the award date are:

- a prototype central portal to the ultimate digital library; and
- a report to NSF detailing requisite user services, management procedures, evaluation methods, a strategy for achieving sustainability, and other technical standards for fully implementing a core integration system, with attention to the functional extensibility of the system to incorporate advances in information technology.

To inform its report, each project should identify one or several collections of high-quality K-16 educational resources with which to test features of the prototype portal, including representative user services. These collections should be comprehensive enough in scope to permit robust testing. In addition, CIS projects are encouraged to establish collaborations with projects funded under the Collections track.

Results from pilot projects funded in Year 1 will inform the development of the CIS, and NSF expects to make an award in Year 2 to support the establishment of the CIS. It is anticipated that Year 1 awardees will develop proposals, possibly in collaboration with each other and with other projects, for the Year 2 award in the CIS track. However, it is not necessary to have received a Year 1 award in order to submit a proposal for the full CIS. Proposers should be cognizant of major projects already underway both in the NSDL program and in related programs, and should establish strong linkages where appropriate.

While no new proposals in the CIS track will be accepted during Year 3 of the NSDL program, the library will continue to expand its network of resources and augment its functionality with new services. NSF also expects that outcomes from projects in the remaining three tracks (Collections, Services, and Targeted Research) will influence the development and operation of the CIS throughout the entire duration of the program.

#### **EXPECTED OUTCOMES OF THE CORE INTEGRATION SYSTEM TRACK**

Year 1	Year 2	Year 3
Multiple pilot projects	Single Core Integration System project	
<ul style="list-style-type: none"> <li>• Construct prototype portals.</li> <li>• Conduct initial tests of features and representative services.</li> <li>• Submit reports to NSF.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement primary portal and suite of integrated core services.</li> <li>• Promote technical and organizational standards.</li> <li>• Establish coordinated alliance of resource collection and service providers.</li> </ul>	<ul style="list-style-type: none"> <li>• Grow library by active recruitment of additional distributed collections.</li> <li>• Augment user services.</li> </ul>

#### ***Collections Track***

A project supported in this track is expected to aggregate and actively manage a subset of the digital library’s content within a coherent theme or specialty. Responsibilities would include the discovery of content, providing user services, classification and cataloguing, acquisition and/or linking, and referencing. While disciplinary-based themes or areas could define a natural corpus of content, other possibilities are encouraged as well. For example, collections could provide access to massive, real-time or archived data sets from a variety of areas of scientific inquiry; software tools for analysis, modeling, simulation, or visualization; remotely accessible experimental facilities; or commentary by scientists, teachers, and experts in learning theory and pedagogy. Other collections might specialize in providing rapid access to educational resources based on recent scientific advances or other current events, while still others might emphasize class-tested resources focusing broadly on science literacy. Proposals should include evidence that the proposed aggregation of resources will support the very best SMET education at all levels—education that is inquiry-driven, active, and engaging. Collection development may necessitate modification of materials to take maximum advantage of the library’s content. However, these collection development efforts are distinct from content development efforts supported by other NSF programs such as the Course, Curriculum, and Laboratory Improvement program, the Instructional Materials Development program, and other curriculum and materials development programs funded by NSF or other agencies.

Collection providers are expected to exploit the potential of information technologies and digital library research to create and support rich learning environments. Proposals should address criteria and mechanisms for acquiring and selecting high-quality content; for active archiving that maintains the usability of content as the underlying hardware, operating systems, and software evolve; and for maintaining currency. Linkages among different collections are particularly encouraged. Collection providers are also expected to participate in the development and adoption of minimal standards for interoperability, reusability, reliability, and stability of resources and services. In particular, basic metadata requirements are needed to support flexible browsing and targeted searches across distributed collections. In this regard, projects in this track are expected to establish and maintain close interaction with each other and with projects in the Core Integration System track.

Proposals should include a management plan that addresses long-term sustainability. Projects must have a tangible, long-term commitment from a stable institution. Cost recovery and for-profit models are welcome. The evaluation of the long-term management plans will be strongly informed by the goal of making the full library's resources available to potential users at a cost that will not limit their use. Partnerships among academic, business, government, and other organizations are strongly encouraged.

Because it is anticipated that projects developed in this track will be included in the alliance of resource collection providers comprising the ultimate digital library, the projects will need to cooperate closely, both among themselves and with the project(s) in the Core Integration System track. Nonetheless, they may pursue different strategies for collection selection and/or development, and their coverage may have different areas of strength. Collections not supported by the NSDL program are encouraged to partner with the Core Integration System track project(s) at any time, but the full integration of these collections into the library will primarily be emphasized during Year 3 of the program.

### ***Services Track***

Projects supported in this track are expected to develop services to increase the impact, reach, efficiency, and value of the digital library in its fully operational form. Although some examples are given below, many valuable services may be unanticipated. Proposals submitted to this track should also have a management plan that addresses long-term sustainability. Both cost recovery and for-profit models are welcome. Since there are natural synergies to exploit between digital library collections and services, projects are encouraged to collaborate with appropriate projects in the Collections track, if not at the proposal stage, then certainly during the course of funding.

Services supporting *users* might include:

- help services such as 800 numbers, frequently asked questions (FAQs), rapid response e-mail, etc.;
- targeted assistance to students and teachers at K-12 schools or colleges having limited computer capability and technical support;
- methods to increase the library's usability for special populations such as young children or other users having limited experience with computer technology;
- synchronous and asynchronous mechanisms for collaborative learning environments using shared resources;
- mechanisms for building personal annotated digital information spaces;
- mechanisms to help content developers combine resources by different authors and from different collections; and
- "push" or "pull" mechanisms for reaching users.

Services supporting *collection providers* might include:

- peer review mechanisms for quality assurance;
- reliability testing for Java applets or other software-based resources;
- certification that resources are interoperable across platforms;
- provision of cataloging tools;
- high-volume servers that can handle periods of peak demand;

- “middleware” to support acquisition and incorporation of content from different sources;
- mechanisms supporting searches across multiple attributes;
- audio, image, and video search capabilities;
- mechanisms for associating commentary and other annotations with resources; and
- mechanisms for determining usage patterns.

Services supporting the *Core Integration System* might include:

- maintenance of an editorial “help desk” presence on the network;
- content-based searching;
- metadata system translation;
- maintenance of personal user profile systems that respect privacy issues;
- provision of user reports and other commentary associated with content;
- community feedback mechanisms, both passive and active;
- citation analysis;
- classification and organization;
- latent semantic analysis; and
- digital library evaluation metrics.

### ***Targeted Research Track***

Projects supported in this track should have *immediate* applicability to one or more of the other three tracks. Examples include, but are not limited to:

- digital library usage studies;
- research on building and sustaining user communities;
- automated annotation of audio, image, or video resources;
- user interface implementation issues;
- identification and usage of principles of information architecture design;
- rendering expertise embedded in high-quality but static paper-based educational resources into interactive, digital formats;
- use of expert system principles to capture human librarian knowledge bases;
- applications of simulation or virtual world technology for virtual assistants; or
- research on uses of digital libraries to improve learning by students at all levels.

Proposals for basic or general-purpose digital library research or basic or general-purpose research in the use of technology in education may be supported by the multi-agency Digital Libraries Initiative or other programs.

## **ELIGIBILITY**

NSF’s standard eligibility criteria apply (see GPG, Section I.D). An individual may serve as the Principal Investigator (PI) on no more than one proposal submitted for this program deadline. (This restriction does not preclude the submission of a proposal in subsequent years.)

## **AWARD INFORMATION**

Depending on the quality of proposals received and the availability of funds, the NSDL program expects to make approximately 20 awards totaling approximately \$13 million in FY2000. The program also expects to make awards in FY2001 and FY2002; program solicitations for these years will be posted on the NSF Web site <<http://www.nsf.gov/>> several months in advance of the proposal deadlines. The anticipated award characteristics for each year are as follows:

**Year 1 (FY2000): Proposal deadline April 14, 2000**

<i>Core Integration System</i>	3 to 5 awards, up to \$1,000,000 each, with durations up to 24 months
<i>Collections</i>	3 to 5 awards, up to \$1,000,000 each, with durations up to 24 months
<i>Services</i>	6 to 8 awards, up to \$500,000 each, with durations up to 24 months
<i>Targeted Research</i>	4 to 6 awards, up to \$250,000 each, with durations up to 24 months

**Year 2 (FY2001): Proposal deadline TBA, anticipated in April 2001**

<i>Core Integration System</i>	1 award, up to \$4,000,000 per year for up to 5 years
<i>Collections</i>	several new awards, up to \$1,000,000 each, with durations up to 24 months
<i>Services</i>	several new awards, up to \$500,000 each, with durations up to 24 months
<i>Targeted Research</i>	several new awards, up to \$250,000 each, with durations up to 24 months

**Year 3 (FY2002): Proposal deadline TBA, anticipated in April 2002**

<i>Core Integration System</i>	no new awards
<i>Collections</i>	several new awards, up to \$1,000,000 each, with durations up to 24 months
<i>Services</i>	several new awards, up to \$500,000 each, with durations up to 24 months
<i>Targeted Research</i>	several new awards, up to \$250,000 each, with durations up to 24 months

## **PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS**

### **A. Letter of Intent**

A letter of intent to submit a proposal is requested (but not required) from all applicants, to assist NSF in plans for review. The letter of intent is not a preliminary proposal. It should be a brief statement and should be sent by electronic mail to <[due-nsdl-program@nsf.gov](mailto:due-nsdl-program@nsf.gov)> no later than March 13, 2000. Please use "Letter of Intent" for the e-mail's "subject" line.

### **B. Proposal Preparation Instructions**

Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide* (GPG), NSF 00-2, except as noted below. The complete text of the GPG (including electronic forms) is available electronically on the NSF Web site at <<http://www.nsf.gov/cgi-bin/getpub?gpg>>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722, or by e-mail from <[pubs@nsf.gov](mailto:pubs@nsf.gov)>.

Proposers are reminded to identify the program solicitation number (NSF 00-44) in the "Program Announcement/Solicitation No." block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

FastLane <<http://www.fastlane.nsf.gov/>>, NSF's system for conducting business over the Internet, must be used to prepare and submit NSDL proposals. PIs who have not used FastLane before are reminded to make sure that their institution is a registered FastLane institution (see the list at <[http://www.fastlane.nsf.gov/a0/fastlane\\_insts.htm](http://www.fastlane.nsf.gov/a0/fastlane_insts.htm)>) and to contact the institution's Sponsored Research Office to be added to the NSF PI database; all co-PIs listed in the proposal must also be in the NSF PI database. PIs who intend to use subawards in their proposal (see GPG, Section II.D.7.f.v) are reminded that the subcontract institution(s) must also have an NSF Institution ID Number (or be a registered FastLane institution) before FastLane can be used to prepare the subaward budget(s). *New FastLane users should acquaint themselves with the system as early as possible—well before the proposal deadline.* The signed Cover Sheet should be mailed to NSF in accordance with the instructions given in Section C ("Proposal Due Dates") below.

Proposers are reminded to indicate on the Cover Sheet the correct NSF organizational unit(s) to consider the proposal. Specifically, on the Cover Sheet in FastLane, under “NSF Unit Consideration,” select “National SMETE Digital Library” as the program to consider the proposal and “DIVISION OF UNDERGRADUATE EDUCATION” as the division to consider the proposal.

A Project Data Form (NSF Form 1295) must be submitted (via FastLane) as part of all proposals. The information on this form is used to direct proposals to appropriate reviewers and to determine the characteristics of projects supported by the Division of Undergraduate Education. In FastLane, this form will show up in the list of forms for your proposal only *after* you have (1) selected “National SMETE Digital Library” and “DIVISION OF UNDERGRADUATE EDUCATION” as the NSF organizational units on the Cover Sheet and (2) saved the Cover Sheet.

A Budget Justification of up to three pages must accompany the budget forms and provide details about budget line items.

If Special Information or Supplementary Documentation is included with the proposal (see GPG, Section II.D.10), this section should be submitted as a PDF file using FastLane’s “Supplementary Documents” function. (Paper documents should be electronically scanned and converted to PDF.) This optional section may include *only* the sorts of items listed in GPG, Section II.D.10.

Organizations intending to submit simultaneous Collaborative Proposals (as described in GPG, Section II.D.12.b) must alert a cognizant NSF program officer by e-mail <[due-nsdl-program@nsf.gov](mailto:due-nsdl-program@nsf.gov)> prior to the submission and must exactly follow the instructions for electronic submission specified in GPG, Section II.D.12.b. The project titles of the related proposals must be identical and must begin with the words “Collaborative Project,” and the *combined* budgets of the related proposals should conform to the anticipated individual award sizes specified for the various program tracks under “AWARD INFORMATION” above. These simultaneous Collaborative Proposals will be treated as a single proposal (with a single Project Summary, Project Description, and References Cited) during the review process.

### **C. Proposal Due Dates**

Proposals must be submitted electronically (via FastLane) to NSF by the Sponsored Research Office or equivalent by 5:00 p.m. (submitting institution’s local time) on April 14, 2000. The signed proposal Cover Sheet must be submitted in accordance with the instructions specified below.

The PI is responsible for the completeness and accuracy of the proposal as submitted. Unless requested by NSF, additional information may not be sent following proposal submission.

*Submission of Signed Cover Sheets:* The Cover Sheet (NSF Form 1207) with appropriate signatures must be post-marked within five working days following electronic submission of the proposal and sent to the following address:

NSDL Program Cover Sheet  
Division of Undergraduate Education  
National Science Foundation  
4201 Wilson Blvd., Suite 835  
Arlington, VA 22230

A proposal will not be processed until NSF has received the complete proposal (including the signed Cover Sheet).

### **D. FastLane Requirements**

Proposers must prepare and submit proposals electronically using the NSF FastLane system <<http://www.fastlane.nsf.gov/>>. Detailed instructions for proposal preparation and submission via FastLane are available at <<http://www.fastlane.nsf.gov/a1/newstan.htm>>. Before creating the PDF files that are required for a

FastLane proposal, proposers are encouraged to review the “FastLane PDF Creation Hints and Pointers” at <http://www.fastlane.nsf.gov/a1/pdfcreat.htm>.

*Submission of Signed Cover Sheets:* See the instructions in Section C (“Proposal Due Dates”) above.

## **PROPOSAL REVIEW INFORMATION**

### **A. Merit Review Criteria**

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

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

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

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of 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?

PIs should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give these factors careful consideration in making funding decisions.

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

## **B. Review Protocol and Associated Customer Service Standard**

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

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. A program officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. If the recommendation is to award funding, in most cases the program officer will contact the proposer after the recommendation has been approved by the program officer's supervisor. This informal notification is not a guarantee of an eventual award. NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals. The time interval begins on the proposal deadline or target date, or on the date of receipt if deadlines or target dates are not used by the program. The interval ends when the division director accepts the program officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a grants 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 an NSF program officer. A PI or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF grants officer does so at its own risk.

## **AWARD ADMINISTRATION INFORMATION**

### **A. Notification of the Award**

Notification of the award is made *to the submitting organization* by a grants officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the NSF office or division administering the program. Verbatim copies of reviews, not including the identity of the reviewers, will be provided automatically to the PI.

### **B. Grant Award Conditions**

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant 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 grant conditions, such as Grant General Conditions (NSF GC-1)\* or Federal Demonstration Partnership Phase III (FDP III) Terms and Conditions\*; and (5) any NSF brochure, program guide, announcement, or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

\* These documents may be accessed electronically on NSF's Web site <<http://www.nsf.gov/>>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722, or by e-mail from <[pubs@nsf.gov](mailto:pubs@nsf.gov)>.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) (NSF 95-26), which is available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office, Washington, DC 20402, telephone 202.512.1800. The GPM may be ordered through the GPO Web site <<http://www.gpo.gov/>>.

### **C. Reporting Requirements**

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

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

NSF has implemented a new electronic project reporting system, available through FastLane, which permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. Reports will continue to be required annually and after the expiration of the grant, but PIs will not need to re-enter information previously provided either with the proposal or in earlier updates using the electronic system.

PIs are required to use the new reporting system for submission of annual and final project reports.

### **D. New Awardee Information**

If the submitting organization has never received an NSF award, it is recommended that the organization's appropriate administrative officials become familiar with the policies and procedures in the NSF *Grant Policy Manual* which are applicable to most NSF awards. The *Prospective New Awardee Guide* (NSF 99-78) includes Administrative and Management Information, Accounting System Requirements and Auditing Information, and information on Payments to Organizations with NSF Awards. This information will assist an organization in preparing documents that NSF requires to conduct administrative and financial reviews of an organization. The guide also serves as a means of highlighting the accountability requirements associated with Federal awards. This document is available electronically on NSF's Web site at <<http://www.nsf.gov/cgi-bin/getpub?nsf9978>>.

## **CONTACTS FOR ADDITIONAL INFORMATION**

General inquiries about the NSDL program may be made by mail, phone, or e-mail as follows:

National Science, Mathematics, Engineering, and Technology Education Digital Library (NSDL) Program  
Dr. C. Dianne Martin or Dr. Lee L. Zia, Program Directors  
Division of Undergraduate Education  
National Science Foundation  
4201 Wilson Blvd., Suite 835  
Arlington, VA 22230  
Telephone: 703.306.1666  
E-mail: <[due-nsdl-program@nsf.gov](mailto:due-nsdl-program@nsf.gov)>

For questions related to the use of FastLane, contact NSF's FastLane Help Desk, telephone 703.306.1142, e-mail <[fastlane@nsf.gov](mailto:fastlane@nsf.gov)>; or Ms. Romona Truesdale, Division of Undergraduate Education, telephone 703.306.1670, e-mail <[duefl@nsf.gov](mailto:duefl@nsf.gov)>.

## **OTHER PROGRAMS OF INTEREST**

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

tional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG.

Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin* <<http://www.nsf.gov/home/ebulletin/>> and in individual program announcements. Subscribers can also sign up for NSF's Custom News Service <<http://www.nsf.gov/home/cns/>> to find out what funding opportunities are available.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement or contact the program coordinator at (703) 306-1636.

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 regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

We want all of our communications to be clear and understandable. If you have suggestions on how we can improve this document or other NSF publications, please e-mail us at [plainlanguage@nsf.gov](mailto:plainlanguage@nsf.gov).

## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Reports Clearance Officer; Information Dissemination Branch, DAS; National Science Foundation; Arlington, VA 22230.

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