National STEM Education Distributed Learning (NSDL)

PROGRAM SOLICITATION
NSF 10-545

REPLACES DOCUMENT(S):
NSF 09-531

National Science Foundation

Directorate for Education & Human Resources
Division of Undergraduate Education

Letter of Intent Due Date(s) ***(optional)*** (due by 5 p.m. submitter's local time):

April 24, 2010

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

May 26, 2010

IMPORTANT INFORMATION AND REVISION NOTES

In FY2010, the NSDL program will accept proposals in four tracks:

- *Pathways*,
- *Pathways - II*,
- *Services*, and
- *Targeted Research*.

The program will accept **proposals for large grants** in 1) the *Pathways* track, 2) the *Pathways- II* track, 3) specific sub-tracks of *Services,* and 4) within *Targeted Research* for projects that focus on the impact of networked digital resources on education and learning.

The program will also accept **proposals for small grants** that extend or enhance efforts supported by awards from all tracks within the NSDL program. Within this small grant opportunity the program particularly encourages proposals from institutions new to NSDL that seek to establish partnerships with existing Pathways project activities. See the full text of this solicitation for more details.

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPPG Guide Part I: *NSF Proposal & Award Policies & Procedures Guide* Chapter II for further information about the implementation of this new requirement).

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 17-1), which is effective for proposals submitted, or due, on or after January 30, 2017.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

National STEM Education Distributed Learning (NSDL)

Synopsis of Program:

This program aims to establish a national network of learning environments and resources for science, technology, engineering, and mathematics (STEM) education at all levels. The program has four tracks:

- *Pathways* projects are expected to provide stewardship for the content and services needed by major

communities of learners;
- Pathways II projects are expected to move beyond the major stewardship goals and use Stage II support to ensure the expansion and stability of an original Pathways effort;
- *Services* projects are expected to develop services that support users and resource collection providers by enhancing the impact, efficiency, and value of the NSDL network; and
- *Targeted Research* will focus on investigating the educational impact of networked digital resources.

The existing *NSDL Resource Center* will provide collaboration assistance across all projects; undertake strategic partnership development on behalf of projects particularly with respect to non-academic entities; coordinate and, in some cases, perform thematic research and evaluation studies related to the program; synthesize findings across the portfolio; and disseminate findings of the accomplishments of the NSDL program. The *NSDL Technical Network Services* project operates NSDL's infrastructure and NSDL.org; provides technical support for NSDL tools, services, and collections management; supports Pathways and other NSDL projects in contributing resources and collections to NSDL; and engages the NSDL community in identifying priorities for services developments.

In FY2010, the program will accept **proposals for large grants** in 1) the *Pathways* track, 2) *Pathways - II*, 3) specific sub-tracks of *Services, and 4) Targeted Research*. In all tracks, the program will also accept **proposals for small grants** that extend or enhance results from existing services, collections, or targeted research activity to enlarge the user audience for the NSDL network or improve capabilities for the user.

Technology-intensive projects that explore specific topics that have immediate applicability to collections, services, and other aspects of the development of the NSDL network should seek small grant support under the *Services* section of the program. In addition the program particularly encourages proposals for small grants from institutions and organizations new to NSDL that look to establish partnerships with existing Pathways project activities.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Lee L. Zia, Lead Program Director (Mathematics), 835 N, telephone: (703) 292-5140, email: lzia@nsf.gov

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

- 47.076 --- Education and Human Resources

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 24 to 37 (1 to 3 Pathways; 3 to 5 Pathways - II; 6 to 8 Services; 4 to 6 Targeted Research, focus on educational impact; 10 to 15 Small grants).

Anticipated Funding Amount: $10,750,000 (approximately) in FY2010, subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

An individual may serve as the Principal Investigator (PI) or co-Principal Investigator (co-PI) on no more than one proposal, including collaborative proposals, submitted in the FY2010 competition.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is optional. Please see the full text of this solicitation for further information.
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**

- Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
- 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: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

  Cost Sharing is not required under this solicitation.

- **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

- **Letter of Intent Due Date(s) *(optional)*** (due by 5 p.m. submitter's local time):

  April 24, 2010

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

  May 26, 2010

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

Innovative projects supported by NSF and many other organizations have developed numerous examples of rich, learner-centered educational materials and environments. Features include the use of sophisticated graphics tools for animation and visualization of scientific, engineering, and mathematical concepts; computational tools for modeling and simulation; remote access to scientific equipment; analysis of large, real-time or archived data sets; and network-supported collaboration. During this time the World Wide Web has shown great potential for enabling access to the very best of these new learning materials and environments. The highly linked, dynamic information architecture of the Web mirrors the interconnected nature of knowledge, enables the inclusion of new high-quality materials and practices, supports annotation and community commentary, promotes the integration of research and education, and encourages learners to become active participants in expanding their educational experience. In addition, advances in grid and mobile Internet technologies, the presence of powerful commercial search engines, and more recently the rise of social networking technologies and participatory culture sites are now challenging the traditional social constructs and contexts of learning. Finally, open source, open content licensing agreements (e.g. http://creativecommons.org/) and new kinds of open courseware resources are creating a fresh climate for educational innovation.

However, Web-based collections of resources can exhibit significant shortcomings as tools for teaching and learning. For example, it is often difficult to determine from a lengthy list of links how well an individual item suits a particular learner's needs. When resources are located, they can exhibit uneven reliability or stability particularly if they incorporate additional software elements for animations, audio, or video. In addition, the audience for these collections often lacks the support and expertise needed to select an appropriate resource, incorporate it into a coherent learning experience, and evaluate the impact of the new approach.

While the principles of interoperability and reusability of learning resources or "learning objects" are gaining visibility, their widespread application remains more promise than reality; and the construction of new learning objects with executable content from "building block" component pieces (e.g., Java applets or application software macros) demands additional planning, testing, and coordination to achieve an impact on learning. A great deal of new content requires a higher level of organization and aggregation than traditional learning objects. Sequences of tested activities in materials such as inquiry learning environments or video and audio of entire courses add value to individual components. These sequences and combinations need to be integrated with existing collections.

Through the NSDL program, NSF seeks to enable the discovery, collaborative selection, organization, and effective usage of quality learning and teaching resources appropriate for educators and learners at all levels. The NSDL network of learning environments and resources should readily provide reusable, shareable, and interoperable learning objects that enable teachers and learners at all levels to select, use, and evaluate materials suited to their needs, both within and across traditional STEM disciplinary boundaries. Such materials should include assessment and evaluation tools and results from user tests. They should harness new understandings about pedagogy, curriculum, and the processes of learning that are founded on a solid research base. The resource collections, services, and infrastructure of NSDL should facilitate the development and dissemination of new tested materials and methods, recommend systems that leverage the aggregated data from all users' experiences to recommend related resources, customize guidance systems that profile individual users, and support continual improvements in STEM education at all levels.

To realize this vision, the NSDL program began first by supporting projects focused on the development or enhancement of resource collections, implementation of digital library services, and a small set of targeted research investigations. In more recent years, the program introduced the concept of Pathways projects that take responsibility for stewardship for the educational content and services needed by a broad community of learners, e.g. in disciplines, such as mathematics or biology, or in educational sectors, like community colleges. While projects focused on collection development or stewardship are still appropriate, this solicitation especially invites projects to investigate the relationship between design of collections and their utilization by instructors and students. Projects that enable testing of the impact of collections and resources for instructors on teachers' activities, and that investigate the impact of the resources in the collections on student learning are especially welcome.

II. PROGRAM DESCRIPTION

The goal of the National STEM Education Distributed Learning (NSDL) program is to create and develop a network of digital environments and resources for STEM learning. The ultimate test of the utility of this network is whether its services demonstrably meet the needs of students and teachers at all levels -- pre-K to 12, undergraduate, graduate, and lifelong learning. It should serve individual teachers as well as groups of teachers who jointly want to improve their instruction. It should also serve both the individual learner seeking understanding, and groups of learners engaged in collaborative exploration of concepts; and should support formal and informal modes of learning. It should also function as a forum where resource users may become resource providers. It is vital that NSDL offer value-added resources and services that go beyond what is currently available in a highly competitive environment of rapid technological innovation for standard search services offered by both established commercial providers and newer arrivals.

In addition to retrieval of relevant information, NSDL projects may offer users access to virtual collaborative work areas, tools for analysis and visualization, remote instrumentation and observation platforms, large databases of real-time or archived data, simulated or virtual environments, and other new capabilities as they emerge. The NSDL network should enable the dynamic use of materials and

tools that are supplied by diverse providers of resource collections and services, ranging from large groups of cooperating vendors or publishers, to individual professors or teachers, and even student bloggers. The learning environments created should increase the usability and impact of all resources by giving learners and teachers at all levels – both individually and in collaborative groups – the tools and services: i) to search for and discover content relevant to their needs along with evidence of its effectiveness, ii) to assemble and test curricular and learning modules from component pieces in a flexible manner, and iii) to gather evidence of impact and communicate experiences to the community.

To maximize the utility of its resources, the NSDL program is also concerned with the development of a comprehensive cyberlearning infrastructure. Features should include practices and policies for community-based review, methods for combining new and existing resources into effective learning experiences, methods for logging and interpreting student and teacher actions, and other mechanisms that assure the quality and usability of resources. For example, teachers may consider recommendations of learning and teaching resources more relevant if teachers with experience profiles and learning contexts similar to their own recommend their use. Likewise, practices and policies are needed for collections management issues such as archiving, preservation, and deaccessioning. Other infrastructure concerns include: i) the articulation of standards that promote stability, interoperability, and reusability of a wide variety of learning objects, ii) effective ways to handle intellectual property issues that focus on maximizing the value of content, iii) login and authentication systems, iv) archiving services, and v) digital rights management systems.

Following from the basic mission of making digital objects fully useful in the support of STEM learning, NSDL is deeply concerned with developing and understanding mechanisms that facilitate utilization of its network of digital resources by students and teachers. These efforts should harness new understandings about pedagogy, curriculum, and the processes of learning, and they should investigate the impact that the digital tools and services of the NSDL network have on teacher practice and on student learning.

Finally, the long term impact of the network of learning resource collections and services assembled under the NSDL program will depend largely on how well funded projects can leverage related efforts and demonstrate value to significant audiences so as to achieve sustainability after the period of NSF funding.

NSDL projects should serve to multiply the impact on learning of digital resource collections and services. Similarly the NSDL program seeks synergy with efforts supported by NSF and sister government agencies, the private sector, professional societies, and others working to improve education in science, technology, engineering, and mathematics nationwide. New NSDL projects are expected to coordinate their work with those of current NSDL projects and other educational digital collection efforts, such as the Digital Library Federation, the Gateway to Educational Materials, projects supported by the Institute of Museum and Library Services, or projects funded under the joint NSF and Library of Congress sponsored National Digital Information Infrastructure and Preservation Program.

NSDL activities are distinct from original content development supported by other NSF programs such as the Transforming Undergraduate Education in STEM (TUES) [formerly called the Course, Curriculum, and Laboratory Improvement (CCLI) program], the materials development aspects of programs in the NSF Division of Research on Learning in Formal and Informal Settings (DRL), and similar curriculum and materials development programs funded by NSF or other agencies. NSDL projects start from the assumption that materials, resources, modules, and other digital learning objects are developed. Similarly, proposals that are primarily digitization or conversion projects are not appropriate for the NSDL program. Prospective proposers who have questions are encouraged to contact the NSDL program at due-nsdl-program@nsf.gov.

PROGRAM TRACKS

In FY2010, the NSDL program will accept proposals in four tracks: *Pathways*, *Pathways – II, Services*, and *Targeted Research*. The program will accept **proposals for large grants** in 1) the *Pathways* track, 2) the *Pathways – II* track, 3) specific subtracks of the *Services* track*,* and *4)* the *Targeted Research* track.

In all four tracks the program will also accept **proposals for small grants** to build on outcomes from prior projects either directly funded by NSDL or related to the goals of NSDL. Small grants are especially encouraged for projects that: exploit the Fedora-based architecture of NSDL or the current collaborative communication capabilities of NSDL to create value-added services for teachers or learners (e.g. annotation or rating functions); enhance utilization of collections of digital learning objects; provide for assessment of the impact on student learning; provide mechanisms to engage the collective intelligence of a user audience to advance the understanding, reliability, and effective use of digital learning materials; or increase the likelihood of sustainable activity.

Within this small grant opportunity the program particularly encourages institutions or organizations that are new to NSDL to submit proposals. An important area of emphasis will be on small grants that complement the efforts of a particular Pathways project and enable the proposing institution or organization to form appropriate partnerships with that Pathways activity. For example, projects could lay the groundwork for model foci within a Pathways project that targets either school districts or individual schools that lack resources for customizing materials to the needs of their students.

All proposal teams are strongly encouraged to have the project leadership include senior personnel having the appropriate balance of expertise relevant to the aims and methods of the project with roles/responsibilities clearly delineated. This is especially important in the educational and evaluation portions of the proposal where current research should be included. End usage by teachers and students is also a priority.

TRACKS	**Emphasis**	**Large grants**	**Small grants**
Pathways	Provide stewardship for the content and services needed by major communities of learners	**X**	**X**
Pathways - II	Ensure expansion and stability of an earlier *Pathways* effort or similar activity	**X**	**X**
Services	Develop tools and applications for users and resource collection providers that enhance the impact, efficiency, and value of the NSDL network	**see sub-tracks**	
-- Integrated services	Enhance overall capabilities of the NSDL network to meet the needs of its user and developer communities including the need to	**X**	**X**

	demonstrate impact of content and resources		
-- Selection services	Increase the amount of high-quality STEM educational content known to the NSDL network	**X**	**X**
-- Usage development workshops	Promote the use of the NSDL network and its resources by various learner communities	**X**	**X**
-- Technology Focus	Explore specific topics having applicability to collections, services, and other aspects of the development of the NSDL	**n/a**	**X**
Targeted Research (focus on educational impact)	Provide for the assessment of the impact of networked digital resources on education and learning	**X**	**X**

Proposals for *Pathways* and *Services* projects must describe prospects for continuing to make project capabilities available beyond the period of NSF funding. This description should include a long-term management plan, and proposed projects should have a tangible, long-term commitment from a stable organization. Open source and open content models are particularly encouraged. Sustainability is also often fostered through partnerships involving academic, business, government, and other organizations. Cost recovery and for profit models are welcome, although the evaluation of a project's long-term management plan 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. Cost models should be tested with users and shown to be sustainable over the life of the materials.

It is important that proposals provide evidence of familiarity with and understanding of the current state of development not only of NSDL, but also other leading providers of access to digital educational resources. A project's stewardship should contribute to the overall value of NSDL, as it serves to facilitate the development and dissemination of both new and tested materials and methods supporting continued improvements in STEM education. Websites that provide information about ongoing projects and activities are listed at the end of this solicitation.

***Pathways* Track**

The *Pathways* track supports projects that organize digital resources so as to serve the needs of an identifiable STEM education community. Proposers of a *Pathways* track should make evident how the resources to be organized within the pathway enable STEM education that is inquiry-driven, active, engaging, and effective. Moreover, these should be representative of larger realized or potential collections or holdings of resources, and they should offer special characteristics and strengths to the users of NSDL. *Pathways* should not only collect resources but look forward; they should anticipate and provide value-added services needed by the targeted learning community. Proposers should articulate how their work will make the resources more available and more useful not only to the primary audience, but where appropriate to an expanded audience.

A project supported in this track also accepts a stewardship role on behalf of NSDL for the educational content and/or the services needed by a broad community of learners, e.g. educators in disciplines, such as physics or chemistry, or K-12 teachers seeking authoritative rich media educational content. Responsibilities for stewardship include:

- maintaining criteria and mechanisms to identify, select, and annotate high-quality and relevant digital content as it continues to become available, and to generate appropriate metadata for such content;
- providing all item-level metadata to the central NSDL data repository (see the *NSDL metadata requirements* described below);
- documenting the ways students and teacher use resources and demonstrating that the NSDL adds value to learning and teaching using accepted research designs;
- sustaining the currency of the aggregated educational resources, either by acquiring/linking, or deaccessioning;
- archiving that preserves the usability of digital content as the underlying information technology systems evolve;
- partnering with small grant awardees to enhance NSDL diversity;
- in addition to collection building and maintenance, *Pathways* are expected to support their target audiences through the provision of tools, services, contextualization, and professional development, as appropriate.

Potential audiences include: the users of subjects and concepts within a broad STEM domain; the educational community associated with a grade band; or users and providers of professional expertise in areas such as assessment or evaluation. Proposals to address audiences formed by the intersection and/or combination of the preceding examples are also possible, as well as proposals that identify other broad audiences defined by a coherent set of content and user needs. In all cases projects should indicate clearly the attributes of the audience(s) being targeted and the most pressing needs and areas of stewardship to be addressed. In FY2010 priority will be given to projects that clearly serve the needs of audiences not currently met by the ongoing *Pathways* efforts. In order to gain a better understanding of the unique role of *Pathways* within NSDL, investigators considering a *Pathways* proposal submission are strongly encouraged to contact the NSDL Resource Center and/or Technical Network Services prior to preparing their proposal. (See References section below for more information on these ongoing projects.)

Pathways providers are expected to marry the potential of information technology advances and digital library research with the best practices of human expertise to fulfill their stewardship responsibilities. It is anticipated that projects will primarily use NSDL-supported tools and services or adapt and implement existing services and approaches, when appropriate and efficient, in order to avoid duplication of effort. Opportunities to leverage technologies across the *Pathways* projects will be particularly important to exploit. Evaluation of the effectiveness of the project in carrying out its stewardship role should be informed by the degree to which users can consistently find appropriate pathways or connections to the resources that meet their specific learning needs.

Pathways - II

Projects in this *Pathways* track will have accomplished the major stewardship goals set out above for an identifiable audience of learners, and would use Stage II support to ensure the expansion and stability of the original *Pathways* effort. In addition to existing NSDL *Pathways* projects entering the final year of their award, this sub-track is also open to projects and organizations that have developed mature digital collection enterprises without NSDL support, providing they fulfill functions comparable to what existing *Pathways* offer for their well-defined educational audiences.

Pathways - II proposals should clearly outline the accomplishments of the project to date and relate them to key *Pathways* priorities, including a detailed description of their ongoing stewardship activities. Applicants should also review the collections that the project

makes available, and chart the growth of usage of the materials and services provided by the project. Projects should show how use of the materials impacts teaching and learning, analyze the cost/benefit structure where feasible, and document how users customize the resources to their needs. Where appropriate, the proposal should describe how the project has worked successfully toward the shared goals of the NSDL, and how the project has acquired and maintained partners that have contributed to its success.

Projects in this track should provide a compelling plan for the use of funding, which must discuss the rationale and process for expanding the content and resource collections for which it provides stewardship and/or the services that the project will develop. *Pathways* and other collection builders are encouraged to create open collections. *Pathways - II* are permitted to use portions of their funds for limited development enabling them to adapt and integrate the use of NSDL tools and services with their systems. Prospective applicants in this track also need to provide market data or other evidence that these services and materials will satisfy a clear unmet demand of their target audience. To encourage a focus on the *Pathways*' users, projects are expected to conduct pedagogically sound workshops to support use and assessment of the impact of content and services. Projects should conduct workshops for teachers, educators, and developers, and should allocate not less than 25% of the proposed budget to such workshops and related outreach activities. Finally, a *Pathways - II* proposal must present a convincing sustainability plan. This section should review the sustainability activities accomplished in the first round of funding, and explain how additional support will bring the *Pathways* effort to a point where it will be able to recover operational and developmental costs from users or their sponsors after the NSDL support concludes. Proposers are strongly encouraged to develop their plans with a view towards coordinating efforts with other *Pathways* projects and NSDL as a whole.

***Services* Track**

This track supports projects to increase the impact, reach, efficiency, and value of the NSDL collected resources. Priority will be given to efforts that have the greatest potential for broad impact across an array of other NSDL projects and offer mechanisms to assess that impact and demonstrate success. Projects that propose to use a web services framework should expect to provide web service definitions (e.g. WSDL) and appropriate web service interfaces (e.g. SOAP or REST) to aid in service discovery and use. In developing services, projects are encouraged to build on new Web 2.0 ideas and tools rather than replicating them. As in the *Pathways* track, *Services* track projects are expected to cooperate closely, both among themselves and across NSDL. Building on a standard platform and connecting through a common infrastructure enables such distributed services to increase in value. Technology focus proposals previously submitted under the Targeted Research track should be submitted as small grants under the Services track. Included in this track is a focus on diversity.

In FY2010, the NSDL program will support two levels of funding within the *Services* track. Proposals for large grants may address any of three sub-tracks: **Integrated Services**, **Selection Services**, and **Usage Development Workshops**, or proposers may seek small grant support to define and describe activities that extend the impact of existing efforts in any of the first three of these sub-tracks. Integrated services projects could develop new services that can be incorporated directly into nsdl.org; selection services projects could plan to expand the content areas they are tagging and integrating into the NSDL data repository; workshop projects could target new communities of learners to enlarge the NSDL user base. Extensions to other types of services may also be proposed; however, subject to the availability of program funds, priority may be given to supporting projects that respond to these specific elements, or otherwise have wide applicability and strong potential to enhance the value of NSDL to users. Responsibilities of *Services* track grantees include:

- sharing their results with the broader NSDL community (including Resource Center or Technical Network Services as appropriate);
- integrating their work with existing services;
- improving accessibility of NSDL to users with disabilities, underserved/underrepresented groups, and international audiences.

Integrated Services

Integrated services projects enhance the overall capabilities of NSDL to meet the needs of its user and developer communities including the need to demonstrate impact of NSDL content and resources. Successful proposals must identify services that are not yet fully implemented by NSDL and provide compelling arguments that they would be highly valued by user or developer communities in NSDL. For example, projects could leverage new social networking tools and sites, tailor them to educational audiences, and integrate them into NSDL. All projects in this component also will fulfill three key conditions of integration: (1) They must be able to operate on digital collection resources available through the NSDL data repository (NDR); cross-repository services that can also operate on materials from other sites and repositories are highly encouraged. (2) They must be implemented in such a way that they could be included in nsdl.org, the central NSDL portal; portable services that could also be integrated into other sites or libraries are highly encouraged. (3) They must be shared with NSDL under a license that permits reuse by others.

The Strand Map Service is an existing NSDL tool that provides graphical representations of connections among concepts, and the NSDL Science Literacy Maps (http://strandmaps.nsdl.org/) is a specific implementation of this tool. Together they illustrate the features of an integrated service. First, it is valuable, since such a tool can help educators and students comprehend and use educational resources, serving in effect as a concept- and standards-correlated "lens" through which a body of educational resources may be explored. Second, the service can be applied to collections resident in NSDL's NDR. And third, a version of this service that was originally developed for the Digital Library for Earth System Science (DLESE; http://www.dlese.org) has been generalized for use in NSDL, and it can be customized and incorporated into Web pages using a Web 2.0 JavaScript API.

Examples of potential services that are either not yet part of NSDL or not yet fully integrated into NSDL, but for which need has been voiced, include:

- community feedback and/or collaborative filtering mechanisms for recommending resources to users;
- design, implementation, and validation of evaluation metrics;
- mechanisms to associate commentary, recommendations, and other annotations with resources;
- provision of technical capabilities and expertise for sharing, reusing, and repackaging NSDL resources with those of traditional and new media publishers;
- development of personal user profile systems that support personalization services and respect privacy issues; and
- implementation of methods to determine usage patterns to inform design and evaluation.

Selection Services

The aim of this type of services project is to increase the amount of high-quality STEM educational content known to NSDL. These

resources may vary from individual learning object items such as images or simulation applets to an entire set of digital content available as a web site. A project in this sub-track is expected to use existing criteria endorsed by the target audience such as learning design principles. Projects should use valid, user tested processes for identifying and selecting content within a particular domain. Similarly, projects that seek primarily to develop new software technology are not appropriate. While Selection services do not necessarily have to be associated with expanding existing NSDL projects, it would be important for proposals to demonstrate familiarity with these efforts and to articulate their particular value added aspects. Selection services providers would also be expected to coordinate their efforts with relevant projects in the *Pathways* track once the funding period commences. Selection services developers are encouraged to utilize the principles of open source development in planning, building, and disseminating their work.

The selection process assumes that materials, resources, modules, and other digital learning objects are already in existence. The task of the Selection services provider is to select and tag this content, and to deposit item-level metadata into the central NSDL data repository and into other repositories, as appropriate (see the description below of the *NSDL metadata requirements*). Building on these selection efforts, the project or other providers may then develop and offer more extensive and value-added annotation and review of the suitability of the digital resources for particular user audiences. Furthermore, support for personalization of finding aids and other discovery tools can be enabled. Similarly, tools may be developed to help content developers combine resources from different providers or collections and present this specialized content to users. Proposers are especially encouraged to include activities that can contribute to understanding and evaluating teachers' use of digital educational resources and the impact of using digital resources on student learning.

Usage Development Workshops

These projects will support workshop series that promote the use of NSDL and its resources by various communities of learners. Examples of possible workshop emphases include development of leadership teams of faculty and librarians seeking joint expertise in the use of digital libraries that would in turn be shared with a local institutional or organizational audience; or assistance for teachers and students at K-12 schools or colleges having limited computer capability and technical support; or experiences to increase the library's usability for special populations such as young children or other users having limited experience with computer technology; or engagement of users of digital resources within a specific STEM domain.

Simultaneous with the development of a user base for NSDL, the workshops will permit the study of user information-seeking behavior and user interaction with specific NSDL content, for example in existing *Pathways* or earlier collection efforts. Projects should report feedback from these observations that can guide further development of NSDL and make its overall resources more useful. Of particular interest is the opportunity to gain insights into faculties' and teachers' use of digital resources for their own professional development and the effect students' use of digital educational resources has on their learning. Workshops should seek to improve both the capacity of individual users and the capacity of the larger community of learners. Such capacity would inform both research on building and sustaining user communities within the context of managed digital resource networks, and research on uses of digital materials to improve learning by students at all levels. As with the Selection Services projects above, proposers are especially encouraged to include activities that can contribute to understanding and evaluating teachers' use of digital educational resources and the impact of using digital resources on student learning.

While it is expected that the majority of funds in Usage Development Workshop project budgets will be directed towards participant support costs, development of resources to be used by workshop participants may be requested. In all cases such materials should be made available via NSDL for use in subsequent workshops or by interested individuals or groups seeking to develop an understanding of the capabilities of NSDL. Furthermore, any materials and other resources developed by workshop participants should be suitably described with appropriate item-level metadata and contributed to NSDL (see the description below of the *NSDL metadata requirements*). Projects are expected to provide models for how their approaches can be applied to other learning communities sharing similar characteristics. Proposals must demonstrate plans for sharing data from workshops with the NSDL Resource Center and how they will work with the Resource Center to integrate their workshops with existing NSDL outreach and professional development efforts.

Technology Focus

Technology focus proposers should submit **proposals for small grants**, and are encouraged to define and describe activities that extend their project's direct applicability to one or both of the other tracks or to technical aspects of collection management. Additionally, they may explore other aspects of NSDL including its impact and development of new learning environments. Examples include, but are not limited to: automated annotation of audio, image, or video resources; user interface implementation issues; identification and usage of principles of information architecture design; use of expert system principles to capture human librarians' experience, knowledge, and practice; analysis of user practices and trends in social networking and participatory development environments and their application to NSDL; research on hybrid systems that marry human and automated expertise to provide user services; and applications of simulation or virtual world technology for virtual assistants. Proposals must demonstrate plans for how technology tools or products will integrate with existing efforts. Proposers are strongly encouraged to contact Technical Network Services and/or Resource Center prior to submitting a proposal (see References for additional contact information).

Other Services

Additional services supporting existing collection providers, *Pathways* projects, resource selection or workshop activity, or technical aspects of collection management might include:

- reliability and/or interoperability testing across different platforms for Java applets or other software-based resources;
- provision of user reports and other commentary associated with content;
- "middleware" to support acquisition and incorporation of content from different sources;
- specialized audio, image, and video search capabilities;
- specialized content-based searching;
- small grants seeking diversity of the digital resources may select a topic falling into this category, but still should make every effort to partner with a compatible pathway.

To determine whether or not a candidate service has already been integrated into NSDL, prospective applicants are encouraged to review the set of NSDL *Services* projects referenced in the list of web resources at the end of Section II.

***Targeted Research* Track**

In FY2010 this track will emphasize research on and evaluation of the impact of networked digital resources on education and learning. Many projects and organizations have contributed to a growing body of learner-centered educational materials, learning strategies, and distributed learning environments, and these activities provide a rich arena in which to study the use of technology in the learning process. Proposals should state questions to be addressed, describe study design and methodology, and draw on relevant literature. Proposals that address the following areas of interest on educational impact are encouraged:

- examination of different learning styles and the use of mixed media;
- examination of how interactive educational experiences can/do build on learners' perspectives;
- development of learning skills and social skills through collaboration among learners and with the community of learners/educators; or
- the impact of authentic tasks on learning in formal and informal settings.

All proposals must demonstrate plans for sharing data from their research with the NSDL Resource Center.

PROGRAM-WIDE SERVICES

Technical Network Services

In FY2008, the NSDL Program funded one project, the NSDL Technical Network Services (TNS), to assume responsibility for operating NSDL's infrastructure and NSDL.org; providing technical support for NSDL tools, services, and collections accessioning; supporting Pathways and other NSDL projects to contribute to NSDL; engaging the NSDL community in identifying priorities for services developments; and developing models for sustainability. Proposers are strongly encouraged to both use and contribute to the NSDL platform, including EduPak, a primary tool for creating and managing digital collections for cyberlearning applications (http://ncore.nsdl.org/).

This basic open source service platform includes the:

- NSDL Data Repository (NDR), which uses open source software for flexible, extensible views of the repository and its digital objects, via web services.
- NSDL Collection System (NCS), to create and manage collections of metadata within the NDR. The NCS is a flexible XML-driven tool that provides a full-featured metadata editor, collection workflow processes, and a role-based permission system in support of distributed and collaborative collections management. The NCS transparently writes metadata and collection-level information to the NDR using the NCore Application Programming Interface (API).
- Digital Discovery Service (DDS), which provides search and retrieval services for resources that reside in the NDR. The service is optimized to support the rapid construction of audience- specific portals and applications and can be flexibly configured to search over any XML schema structure. A range of information retrieval features is available from the service including textual and field- based searches such as audience, subject, resource type, or content standard. DDS also supports geospatial search and can be integrated with Web 2.0 applications such as Google Maps.

The TNS team collaborates closely with the NSDL Resource Center (see below) as well as *Pathways*, *Services*, and *Targeted Research* projects, and is responsible for engaging the NSDL community in using and contributing to the NSDL platform through a roadmap process. Roadmaps are rough guides to future development based on formal and informal developer feedback. Grantees are expected to participate in this roadmap process. Proposers should contact TNS for more information on working with TNS and NSDL infrastructure and services (see References for additional contact information).

NSDL Resource Center

In FY2008, the NSDL program funded one Resource Center. The Resource Center provides collaboration assistance across all projects in such areas as research and development methods, evaluation, implementation, and "webmetric" analysis procedures; engages in effective outreach and professional development regarding the use of digital learning resources; undertakes strategic partnership development on behalf of projects particularly with respect to non-academic entities; coordinates and, in some cases, performs thematic research and evaluation studies related to the program; synthesizes findings across the full range of NSDL projects; and promotes both national and international dissemination of the research and development contributions of the NSDL program. In addition to these activities, the Resource Center helps to build the NSDL community through: support for principal investigator meetings; promotion of sharing of outcomes and findings across projects; or other activities that address interests and concerns across the NSDL program.

EXPECTATIONS FOR SHARED DEVELOPMENT OF NSDL

The success of NSDL in making the full richness of its resources and services useful for STEM education depends not only on technical excellence, thoroughness in collection building, and creativity in interface design and construction, but also on the development of a sense of common cause by all the projects. New awardees are expected to collaborate with one another and with previously funded projects. To facilitate interaction among all projects, regular Principal Investigator (PI) meetings and workshops are held throughout the course of the NSDL program. Representatives of related projects not funded by the NSDL program are also invited to these meetings. New projects in particular are expected to attend the Annual Meeting.

To engage program PIs and other stakeholders in addressing essential infrastructure issues, and in assessing the impacts of its resources on learning, NSDL supports ad hoc Working Groups on specific topics as the need arises. These Working Groups are a valuable addition to the work of an active Community Advisory Board which provides consultation and guidance, based on community input, to both the NSDL Resource Center and Technical Network Services, as well as to the community at large. Principal investigators are strongly encouraged to provide leadership in this larger community building effort.

The Resource Center operates the NSDL Community Network (http://nsdlnetwork.org/), a social networking site and resource area for the NSDL community providing access to forums for discussion, news, trends reporting, working and interest groups, annual meetings, outreach, and other issues of interest to NSDL grantees, including guidelines for working with and contributing to NSDL. NSDL grantees are strongly encouraged to create a user account on the NSDL Community Network site and actively participate via use of this community resource.

NSDL METADATA REQUIREMENTS

All resources and collections that are contributed to the NSDL must meet the criteria of the NSDL Collection Development Policy (http://onramp.nsdl.org/eserv/onramp:42/NSDL_Collection_Development_Policy.pdf).

All new and continuing contributors are expected to supply item-level metadata records about resources they wish to make accessible in the NSDL. The NSDL architecture provides access to resources based on XML metadata information, the textual content of resources, and other information that provides context for resources. These metadata records can be supplied to the NSDL via:

1. the Open Archives Initiative (OAI) protocol (http://www.openarchives.org/OAI/openarchivesprotocol.html)
2. the NSDL Collection System (NCS) (http://wiki.nsdl.org/index.php/Community:NCS)
3. or directly through the NSDL Data Repository (NDR) API (https://wiki.nsdl.org/images/7/71/Api.pdf).

Proposers are encouraged to contact the NSDL Resource Center (http://nsdl.org/about/contact) for information on contributing resources and acceptable metadata formats. Proposers may also review the information found at http://nsdlnetwork.org/contribute for guidelines on contributing their materials to NSDL. Contributors are responsible for cataloging their resources with the appropriate metadata. The Technical Network Services team provides OAI, NCS and API training to facilitate the creation and management of metadata and collections. (See References for additional contact information).

RELATED FUNDING SOURCES

Although the purpose of the NSDL program is to support improvements in STEM education in the United States, the impact of the program has an increasingly important international dimension. Conversely, international digital library efforts may help achieve the goals of the NSDL program. Consequently, proposals to this program may be part of a larger effort that includes international elements funded by sources in this or other countries.

Proposals for basic research on the use of technology in education or other investigations relevant to NSDL's development may be supported by programs such as Advanced Learning Technologies (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12834) or Research and Evaluation on Education in Science and Engineering (REESE) (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13667). Emerging grant opportunities also exist within the Human and Social Dynamics priority area (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11678) or the Cyber-enabled Discovery and Innovation initiative (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503163&org=OCI&from=home). Prospective proposers are encouraged to contact the NSDL program at due-nsdl-program@nsf.gov if they have questions about the match between their interests and the goals of NSDL versus these related programs.

REFERENCES

The references that follow provide additional information to prospective proposers about advances in information technology relevant to the NSDL program as well as summary documents regarding the current state of development and progress of NSDL.

Anderson, C., (2004). *The Long Tail*. Available at: http://www.wired.com/wired/archive/12.10/tail.html.

Anderson, C., (2006). *The Long Tail: Why the Future of Business is Selling Less of More*. New York: Hyperion.

Boyd, D.M. and Ellison, N.B., (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13(1), article 11*. Available at: http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html.

Felfernig, A., Friedrich, G. and Schmidt-Thieme, L., (2007). Guest Editors' Introduction: Recommender Systems. *IEEE Intelligent Systems 22(3): 18-21*. Available at: http://csdl2.computer.org/comp/mags/ex/2007/03/x3018.pdf.

IEEE, (2007). *IEEE Intelligent Systems Special Issue on Recommender Systems, Volume 22(3)*. Los Alamitos, CA: IEEE Computer Society.

Shirky, C., (2005). *Ontology is Overrated: Categories, Links, and Tags*. Available at: http://www.shirky.com/writings/ontology_overrated.html.

Tapscott, D. and Williams, A.D., (2006). *Wikinomics: How Mass Collaboration Changes Everything*. New York: Penguin Group (USA).

The New Media Consortium and the EDUCAUSE Learning Initiative (2008). *The Horizon Report: 2008 Edition*. Austin, TX: New Media Consortium. Available at: http://www.nmc.org/pdf/2008-Horizon-Report.pdf.

The following references provide information regarding the current state of development and progress of NSDL.

A list of all projects funded by the NSDL program with links to abstracts is available at Abstracts of Recent Awards Made Through this Program. Each abstract also has contact information for the project's principal investigator(s).

For information about current Pathways projects, see http://nsdl.org/about/?pager=pathways

To participate in or follow the activities of the NSDL community and its ongoing online exploration of key issues, as well as current workgroups, meetings, and outreach activities, see the NSDL community website at http://nsdlnetwork.org/.

For guidelines and detailed technical information on contributing collections, see http://nsdlnetwork.org/contribute.

To discuss the development and/or integration of a candidate service, contact Technical Network Services http://nsdl.org/about/contactus/).

For detailed technical information on the NDR Application Programmer Interface (API) that guides the design and implementation of new NSDL integrated services, and on licensing options that will guide the choice of appropriate rights and permissions for integrated services, see http://nsdlnetwork.org/contribute, or contact Technical Network Services: http://nsdl.org/about/contactus/.

To follow the activities of the NSDL community and its ongoing online exploration of key issues, see the Community Pages at http://nsdl.org/resources_for/library_builders/index.php.

For information about the various workgroups that are addressing issues such as Accessibility and Diversity, Community Services, Content, Copyright, Educational Impact and Evaluation, K-12 Educational Standards and Alignment, Scientific Markup Languages, Sustainability, Technology, and Webmetrics, see http://nsdl.org/resources_for/library_builders/nsdlgroups.php.

III. AWARD INFORMATION

NSF anticipates that approximately $10.75 million will be available in FY2010 for awards made through this solicitation. The program expects to make approximately 24-37 awards, depending on the availability of funds and the quality of proposals received. The anticipated distribution of awards is as follows: • *Pathways*: 1 to 3 new awards, up to $2,550,00 each; • *Pathways - II*: 3 to 5 new awards, up to $725,000 each; • *Services*: 6 to 8 new awards, up to $600,000 each; • *Small Grants*: 10 to 15 new awards, up to $150,000 each. • *Targeted Research (Educational impact)*: 4 to 6 new awards, up to $500,000 each. Awards in the *Pathways* track may have a duration of up to 36 months and will be made as continuing grants. Awards in the *Pathways - II* track may have a duration of up to 24 months and will be made as either standard or continuing grants. Awards in the *Services* track may have a duration of up to 36 months and will be made either as standard or continuing grants. Awards in the *Small Grants* track may have a duration of up to 24 months and will be made as standard grants. Awards in the *Targeted Research (Educational Impact)* track may have a duration of 36 months and will be made either as standard or continuing grants. The estimated program budget, number of awards, and average award size and duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

An individual may serve as the Principal Investigator (PI) or co-Principal Investigator (co-PI) on no more than one proposal, including collaborative proposals, submitted in the FY2010 competition.

Additional Eligibility Info:

The categories of proposers identified in the *Proposal & Award Policies & Procedures Guide* (see Chapter I, Section E) are eligible to submit proposals under this program solicitation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent *(optional)*:

A letter of intent (LOI) is requested, but not required, by April 24, 2010. The LOI should be submitted using the FastLane Letter of Intent module. Please provide the name of the Principal Investigator and the submitting organization, and indicate clearly whether the prospective proposal will address the *Pathways* track; the *Pathways - II* track; the Integrated Services, Selection Services, Usage Development Workshops, *Targeted Research (focus on educational impact)* track or the Small Grants opportunity to enhance or extend an existing NSDL activity.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

Submission by an Authorized Organizational Representative (AOR) is not required when submitting Letters of Intent.

- A Minimum of 0 and Maximum of 4 Other Senior Project Personnel are permitted
- A Minimum of 0 and Maximum of 4 Other Participating Organizations are permitted
- Track for proposal (Pathways, Services, Small Grants, or NSDL Resource Center) is required when submitting Letters of Intent
- Submission of multiple Letters of Intent is not permitted

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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@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: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). 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 nsfpubs@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. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

For full information about the NSF Proposal Review process including a discussion of the two NSF merit review criteria, Intellectual Merit and Broader Impacts, see section VI of this solicitation. Proposers are reminded that they must address both merit review criteria in separate statements within the one-page Project Summary in accordance with PAPPG, Chapter II, Section C.2.b.

The following information supplements the standard PAPPG or NSF Grants.gov Application Guide proposal preparation guidelines:

The Project Description contains most of the information that determines whether or not a proposal is funded. Project Descriptions should include:

- **Statement of Need.** For *Pathways* projects: Describe clearly the stewardship needs for the educational resources and services of the community of learners being addressed. For *Pathways - II* projects: Describe clearly the successes of the original *Pathways* effort or its equivalent and how this next stage of support will enable it to add value and satisfy unmet needs of educators and learners. For Integrated Services projects: How will the service operate on digital collection resources available through the NSDL's NDR? Similarly, if appropriate, how will the service engage other high-quality digital collection resources that are not yet part of the NSDL network? How will the service be implemented so that it can be included in the central NSDL portal? How will the service be shared under a license that permits reuse by others? For Selection Services and Usage Development Workshops projects: What is the educator or learner demand that the project proposes to satisfy and what is the evidence that such a demand exists? For projects seeking Small Grant support to extend or amplify the impact of current activities: What content areas are being expanded or enhanced and why? What are the particular user needs of the anticipated participants and why are these critical to NSDL? For Small Grants focusing on Other Services or *Targeted Research (focus on educational impact)* projects, state clearly the demand for the enhanced service, or the additional problems or issues being researched. In all cases the proposal should demonstrate how the proposed work will build upon current results or capabilities of NSDL activities.
- **Target Audience.** Describe clearly the community or communities of learners whose needs will be addressed by the project. What aspect(s) of the user's experience with NSDL will be enhanced and/or extended by the project outcomes? What users will be affected and how, and what is the context of the anticipated usage. What is the setting of the project: for example, informal or formal education, life-long learning, and why is this vital to NSDL?
- **Project Goals.** State the overall goals and objectives for the project and how progress towards these goals and objectives will be assessed. What is the relationship of the project to the current state of development not only of NSDL, but also other leading providers of access to digital educational resources? How does the project enhance the value of the NSDL network by having a demonstrable impact on educators or learners?
- **Project Design.** Describe the overall approach and components of the project. How will the intended learners use the resources or services? How will the understanding gained from targeted research enhance the NSDL network's operation or its impact on learners? Where appropriate, applicants are strongly encouraged to provide links to examples or a prototype web site that illustrate any proposed functionality.
- **Key Staff.** Provide a description of the roles, responsibilities, and qualifications of key personnel, consultants, and/or advisors. These should be tied to major project goals and objectives.
- **Timeline.** Where appropriate, include a timeline for development indicating major points of progress that are expected.
- **Dissemination.** Describe, as appropriate, how the outcomes and lessons learned from the project will be communicated broadly.
- **Evaluation.** Describe, as appropriate, the plans for evaluation, including the name and qualifications of any evaluator(s). Information about the evaluation strategy, process, and methods should also be provided. What evidence will be sought to inform the progress towards project goals and why is this of value? As a component of NSDL, how will usage of the services offered by the project be ascertained? What evidence of impact on educators and/or learners will be gathered and why?
- **Sustainability.** For *Pathways,* and *Pathways - II,* describe the plans to promote and sustain the project beyond the grant period.

In preparing this narrative, proposers should ensure that both the intellectual merit and broader impacts of the project are addressed

equally.

A Project Data Form must be submitted 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. Note: In FastLane, this form will show up in the list of forms for your proposal only after you have (1) selected the correct Program Announcement/Solicitation No. on the Cover Sheet and (2) saved the Cover Sheet. Take special care to identify the proper track for your proposal in Item 1 of the form. Grants.gov users should refer to Section VI.5. of the NSF Grants.gov Application Guide for specific instructions on how to submit the DUE Project Data Form.

Organizations intending to submit simultaneous Collaborative Proposals (as described in PAPPG, Chapter II, Section D.4) must alert an NSDL program officer by e-mail (due-nsdl-program@nsf.gov) prior to the submission and must follow the instructions for electronic submission specified in PAPPG, Chapter II, Section D.4.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 projects in Section III ("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. **All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via FastLane.**

Instructions for Small Grant support:

Requests should provide: 1) an up-to-date description of the state of development or progress of the current NSDL activity being extended or enhanced; 2) a detailed description of the proposed extensions or enhancements to the ongoing work and activities; 3) a clear analysis of how the proposed work fits into the larger picture of development for NSDL, so as to integrate with other projects, to reach a larger audience, or to improve the functionality and capability of user services; 4) a cogent justification of the value-added features of the work and; 5) a description of the method(s) and evidence that will be used to evaluate and determine whether or not the proposed work is meeting its objectives.

Additional instructions for all proposals:

A Budget Justification of up to three pages must accompany the budget forms and provide details about budget line items. Proposals that involve subawards should include separate budget pages and a Budget Justification of up to three pages for each subawardee organization.

If Special Information or Supplementary Documentation is included with the proposal (see PAPPG, Chapter II, Section C.2.j), this section should be submitted as one or more PDF files using FastLane's "Supplementary Documents" function. (Paper documents should be electronically scanned and converted to PDF.) This optional section may also include letters of support in addition to the types of items listed in the PAPPG. For Grants.gov users, supplementary documents should be attached in Field 12 of the R&R Other Project Information Form.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required under this solicitation.

Other Budgetary Limitations:

Anticipated maximum award sizes are specified in Section III ("AWARD INFORMATION") of the program solicitation.

In FY2008, NSF initiated a community-based approach for supporting certain aspects of NSDL-wide technical infrastructure and logistical support that makes these costs explicit within each project. To support these program-wide infrastructure services, the budgets for all proposals except those for Small Grants, should include a subcontract line item equal to 15% of the project's total direct and indirect budget request. Details will be determined during budget negotiations with NSF pending a decision to recommend funding. For expected award amounts, duration, and anticipated numbers of awards see Section III ("AWARD INFORMATION") above.

C. Due Dates

- **Letter of Intent Due Date(s)** ***(optional)*** (due by 5 p.m. submitter's local time):

  April 24, 2010

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

  May 26, 2010

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions 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. 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.

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. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical 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. 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.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF 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 either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with 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 of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be

accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

Evaluation of NSDL proposals will also include consideration of:

- Impact. Is the need for the project convincingly argued? Does the project fill a definable gap for NSDL? Is the target audience clearly identified, and what is the potential for the project to make a significant impact on that audience? Does the potential exist for the project to model a particularly creative approach to the provision of services that enhance learning with digital educational resources or to the stewardship of a usable body of digital resources?
- Plan. Is there a sound implementation plan that links clear project goals and objectives to roles and responsibilities of project personnel? Does the project demonstrate an understanding of the current state of technical development of NSDL, e.g. metadata harvesting protocols, standards for interoperability, or authentication protocols? If appropriate, does the project make use of currently available NSDL tools and services and demonstrate an understanding of the current state of other innovative technical developments that can bring value to the NSDL network? Does the plan describe adequately how collaboration and integration with the ongoing activities of relevant grantees or other projects will be accomplished? Where applicable, what is the potential for project capabilities to remain available beyond NSF support?
- Personnel. Does the project team represent an appropriate mix of expertise and experience to accomplish the project goals? What is the evidence of the commitment and involvement of senior personnel in the project and its activities? Are the roles of various other personnel clear? If there are project partners, contributors, or other collaborators, what is the nature and strength of their commitment?

Outcomes. Does the project offer access to expanded or enhanced capabilities not previously available through NSDL? Or is the project enabling a new user audience to access NSDL? Can this serve as a model for other user audiences? Does the project have a reasonable plan to scale up this access? Where applicable, is the project providing an opportunity for a new sector of the educational community to take part in selecting or otherwise contributing to NSDL's collections or providing a service?

- Contribution. How will the project's activities complement and add value to the growing NSDL community of users and developers? Is there potential for the project to bring new perspectives and approaches to solutions related to shared issues of networked resources and services development, e.g. needs and requirements of learners, new technical specifications, intellectual property concerns, or plans for sustainability? What is the potential for the project to engage new participants in achieving the goals of NSDL, e.g. business or industry, or the non-profit private sector?
- Evaluation. Where appropriate, has the project presented a reasonable plan to assess progress towards its goals and to evaluate the impact of the project on the intended audience? Are there innovative approaches proposed for evaluating learners' usage of networked digital resources and their efficacy in improving learning? Do these have the potential to be applied in new settings, e.g. for resources in other disciplines, or for user audiences beyond that originally targeted by the project? If applicable, does the project offer an opportunity to understand the potential applicability to NSDL of new information technologies?

B. Review and Selection Process

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

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. 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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program 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

An NSF award consists of: (1) the award notice, 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 notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. 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 https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

C. Reporting Requirements

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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. 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 Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Lee L. Zia, Lead Program Director (Mathematics), 835 N, telephone: (703) 292-5140, email: lzia@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: 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.

IX. OTHER INFORMATION

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, "NSF Update" 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 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. "NSF Update" also is available on NSF's website.

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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 55,000 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 Arctic 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 (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 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 https://www.nsf.gov

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **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: nsfpubs@nsf.gov

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

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

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