

## **NSF/EHR Response to Observations, Comments, and Recommendations from the FY2005 NSDL Committee of Visitors Report**

### **Introduction**

On April 18-19, 2005, the National Science, Technology, Engineering, and Mathematics Education Digital Library (NSDL) Program held its second Committee of Visitors (COV) meeting to review the processes and outcomes to date of the program. The COV submitted a carefully prepared and thoughtful report in early May 2005. This document contains a set of responses from NSDL staff in NSF/EHR to particular observations, comments, and recommendations within the COV report. After a general statement that places the COV meeting and report within the context of the programmatic history and current stage of development of NSDL, the key recommendations and comments along with the NSDL response and proposed action item(s) appear and are keyed to relevant sections of the COV report, with relevant passages from the report displayed.

### **Context for the COV meeting**

The NSDL program is a relatively young program. Its genesis dates back to late 1995 with an initial concept paper in the Division of Undergraduate Education and a subsequent call for the idea in the 1996 report "*Shaping the Future.*" Following a series of workshops conducted both at the National Academy of Sciences and at NSF, a prototype funding effort was conducted under the Digital Libraries research initiative. The program gained its own official identity early in calendar year 2000 with the release of its first program solicitation and a deadline for proposals in late April 2000.

Because the annual deadline for NSDL proposals occurs late in the fiscal year (FY) the program's first COV only considered two sets of proposals from FY 2000 and FY 2001. This second NSDL COV considered the FY 2002-2004 program cycles. FY 2002 awards had start dates in mid- to late fall 2002. Many of these projects remain active, as is true for all of the FY 2003 and FY 2004 awards. Moreover, the most recent awards from FY 2004 had only been active for less than six months at the time of the COV meeting.

A Core Integration project provides the technical and organizational "glue" to bind distributed collections and services projects to distributed users. The initial release of a limited, operational version of *www.nsd.org* with rudimentary functionality and domain coverage occurred in December 2002. The program introduced a significant element in the FY 2004 cycle calling for "Pathways" projects to provide stewardship on behalf of NSDL for the educational content and the services needed by a broad community of learners. In addition, spring and summer 2005 have seen the implementation of a new, more flexible and robust data architecture for the core technical services at *www.nsd.org*. These developments signal the beginning of an early stage of maturation for the program.

NSDL staff welcomed the opportunity to open the program to examination through the COV process at this important stage. We found the commentary and dialogue throughout

the meeting to be very useful, and thank the COV members for their hard work and thoughtful observations, comments, and recommendations.

## **Responses**

NSDL staff appreciates the recommendations and concerns embedded by the COV in its observations and comments. Several themes present themselves and in the responses below we address these in aggregate where appropriate as well as providing cross-referencing among items. In addition, portions of the COV report comment on the *NSDL program*, while other portions comment on *NSDL, the emerging digital library entity*. We distinguish between these where it makes sense, but also recognize that there is a rich interplay between progress and conduct of the former as it informs the latter.

- 1. Communication of overall program context and coherence** The COV discussed this theme in several places (see section A.1: Question 1 – paragraph 1, Question 2, Question 3 – paragraph 1, and Question 8; and section A.4: Questions 13 and 14). For example, the COV urged that *“at every step in the process, people need to be able to articulate clearly what the Program is, how projects—individually and in the aggregate—contribute to the Program’s goals and objectives.”* While the COV recognized that the degree of “prescriptiveness” of the language of the program solicitation has increased in recent years, it recommended further specificity: *“The solicitation should require statements of how each project will meet the NSDL and NSF goals/priorities.”* In addition, *“NSDL should make certain that the reviewers/panel ask how does this project fit into the larger NSDL program and how it meets the mission/purpose of NSDL.”*

**Response:** NSDL program staff concurs with the importance of having a clear picture of NSDL to convey along the continuum from proposal development to NSF decision-making. We also recognize the challenge that cultivating this picture presents, given the dynamic nature of the digital environment and the emerging phenomenon of the digital library. While we believe the solicitation does describe a broad compelling vision for the program, we also recognize the value of having succinct statements of purpose for staff across NSF and other advocates of NSDL to use. The NSDL program solicitation (as all NSF solicitations) is subject to overall NSF guidelines and policy, leading to solicitation language that is by and large descriptive in nature. But we appreciate that the program solicitation should reinforce expectations about the relationship of individual projects to the larger NSDL.

**Action:** We will develop more focused descriptions of purpose and program progress that build on the program solicitation, for staff across NSF and other advocates of NSDL to use. We will revise and refine these in light of the progress that projects make.

**Action:** In revisions to the program solicitation we will consider the suggestions of the COV. Specifically, we will incorporate explicit requirements for proposal narratives to address how proposed projects fit into the larger state of development of NSDL. This in turn will inform our instructions and guidance to reviewers and program officers.

**Action:** With respect to the review process, we took the opportunity in our May 2005 panel review to follow the COV's urging and provide panelists with even more guidance than has been our standard practice regarding expectations for how they should approach their reading and review. This included a number of communications prior to the panel describing the current projects, including a discussion of the cohering role for NSDL that the initial set of Pathways projects play. Feedback from reviewers (albeit anecdotal) is that this additional context setting was useful; and as we have engaged in our decision-making about these proposals, our consideration of individual and panel review commentary indicates that panelists read and rated proposals against this larger backdrop. We will continue this practice and update our descriptions as current projects progress. It is worth noting that NSF program directors, as well as NSDL panelists, have taken considerable care to assess how well new Pathways projects' activities align with the goals and needs of the NSDL, and to shape their work plans to improve this congruence.

**2. Merit review procedures** The COV made several recommendations concerning improvements to the NSDL review process.

**2.1** In section A.1: Question 1 – paragraph 2 the COV suggested that “*NSDL develop an online tutorial for reviewers/panelists. MERLOT has a proposal for training that might be transferable. This training should be specific to the program, and include components such as a glossary of terms specific to digital libraries.*” The utility of such a tutorial as part of an orientation for new reviewers was also noted, including the possibility of incorporating past reviews (see section A.3: Question 5 – paragraphs 1 and 4).

**Response:** The idea of developing a tutorial process for reviewers is an interesting one. To explore this possibility, we can take advantage of MERLOT's present involvement as an NSDL grantee organization. While we seek reviewers who already bring experience with digital libraries, or more generally involvement with applying learning technologies to education, the idea of providing a glossary is a good one, as it would serve at the very least to provide a mechanism for reviewers to calibrate their vocabulary. However, with respect to using past review commentary in any tutorial, there would be reviewer confidentiality issues to address before undertaking any specific implementation.

**Action:** We will create a glossary of NSDL terms for distribution to reviewers prior to the next panel meeting. We will also re-evaluate our reviewer instruction packet and panel meeting orientation session in light of the COV's concerns. This will incorporate a detailed description of the current overall state of development of NSDL and how existing projects fit into that larger picture. In addition, we will consider how to improve the effectiveness and timeliness of the communications with reviewers prior to the panel meeting. Our goal is a package of structured guidance that provides adequate information and support for all reviewers, particularly inexperienced ones.

**2.2** In section A.1: Question 4, the COV urged that “*NSDL create an opportunity through the individual and panel reviews, to indicate where each project fits into*

*the overall Program. We recommend that NSDL add this as an aspect of the review profile, forcing the reviewers – and staff to think about program integration at every step in the process.”* The COV made a similar recommendation regarding the panel summary (see section A.1: Question 5).

**Response:** NSF Program Officers have no direct control over the specific formatting template for FastLane reviews, as this electronic template must serve a variety of needs across the many diverse programs of NSF. Therefore, we cannot create customized components in the individual review forms nor the panel summary forms that specifically prompt reviewers to comment on how a project fits into the overall NSDL program.

**Action:** Although we cannot change the FastLane electronic templates, we will continue to provide instructions and guidance to panelists regarding expectations about items to address in their free text. Furthermore, we will ensure that NSDL program officers are consistent in their reinforcement of these expectations within individual panels. This guidance must of course be consistent with the language of the program solicitation. However, as noted earlier in item 1, we plan to include in future solicitations explicit requirements for proposal narratives to address how proposed projects fit into the larger state of development of NSDL.

**2.3** The COV recommended (see section A.1: Question 6) that *“NSDL provide panels information on how the grantees are notified of results, what information is provided to those who are not awarded grants, and what assistance is provided to those individuals and institutions who represent important constituencies whose proposals were reasonably well-ranked but were declined so they might develop more competitive proposals in the future.”*

**Response:** It is standard NSF practice to explain to reviewers what is done with their reviews and their important role in providing feedback to proposers.

In “high declination” cases where a proposal has obtained strong, but not consistently strong ratings from panelists, additional communication occurs between the cognizant program officer for the proposal and the Principal Investigator (PI). If encouragement is given to revise the proposal for resubmission e-mail communications between the program officer and the PI often ensue. This can lead to follow-up phone calls and not infrequently to visits to NSF by PIs for additional discussion.

**Action:** Since substantive reviewer comments enhance the value of the advice given to PIs in the above situation, we plan to include a description of this practice in the guidance we will provide for NSDL reviewers (see above, item 2.1).

**3. Communication and outreach** The COV expressed concern about communication and outreach both for the NSDL program and the NSDL entity (the digital library).

**3.1** In addressing section A.1: Question 1 the COV stated that it is *“difficult to get to the solicitation from the NSDL web page because it is on the NSF home page.”*

**Response:** NSF funding for the NSDL program is indicated on the main NSDL web page ([www.nsd.org](http://www.nsd.org)) and a link is provided to the NSF/NSDL Program page that is part of the NSF website. Furthermore, this link also appears at the bottom of all pages at the NSDL website ([www.nsd.org](http://www.nsd.org)) -- but we agree this is not obvious to casual users.

**Action:** The NSDL home page at [www.nsd.org](http://www.nsd.org) was redesigned in late Spring 2005. The links to the NSF/NSDL Program page have been made more explicit in the form of text, "Funded by NSF," that appears as a standard bar of links on each page. This NSF page has a link to the program solicitation that is kept current as new solicitations are published.

**3.2** The COV observed in section A.1: Question 3 that *"Making presentations to professional conferences, writing articles in professional journals, and posting listserv notices are insufficient means of marketing to communities like classroom teachers, parents, and lifelong learners. COV recommends development of a marketing and communication strategy and tactics—a communications program—that will get the word out to each of the key NSDL constituencies, present and prospective."* This observation was echoed in the comments solicited in section A.5: Question 2.

**Response:** NSDL program staff concurs that as NSDL matures as a digital library entity its outreach and marketing efforts must increase. With respect to the development of a marketing and communication strategy and tactics for the program, we believe we should continue to work jointly with the NSDL PIs on this effort. For example, the NSDL Core Integration team has maintained an active schedule of exhibitions at major professional organizations for practicing K-12 classroom teachers such as the National Science Teachers Association and the National Council of Teachers of Mathematics. The Pathways projects are also actively representing NSDL at the important conferences of their disciplines or educational sectors that draw the teaching faculty. An NSDL booth and presentations have also been at the national meetings of the American Library Association and the Consortium for School Networking. At these meetings the grant opportunities through the NSDL program are always presented in sessions targeting potential applicants, in addition to outreach sessions about NSDL itself as a digital library entity.

**Action:** NSDL program staff will continue to identify opportunities as the COV suggests and seek guidance from external sources about ways to reach new communities of potential patrons of NSDL and prospective proposal writers. For example, the involvement in NSDL both of WGBH, a Pathways awardee, and the Exploratorium offers the opportunity to connect with prominent informal science organizations and life-long learners.

**Action:** In addition to these external efforts program staff will also seek to strengthen its interactions with NSF's Office of Legislative and Public Affairs, building on the reliance of NSF on NSDL content for the "classroom resources" section of the NSF web site.

**4. Merit review implementation: broader impacts** In the context of the implementation of the NSF merit review criteria, the COV felt that panelists were better at addressing intellectual merit than broader impacts, and made several recommendations in section A.2 of its report.

**4.1** In section A.2: Questions 1 and 2, the COV charged NSF and reviewers to demand more attention to broader impact if NSDL is to be successful. “*Program officers need to take leadership in strengthening the broader impact statement in all aspects—both in the development of the proposal and in the panel evaluations.*” and “*Having a clear understanding of the desired broader impacts of the NDSL is critical to its success.*”

**Response:** NSDL staff concurs with the importance placed by the COV on increased attention to broader impacts. As noted above in item 1, NSDL staff took the opportunity during its May 2005 panel to increase the explicitness of its guidance to reviewers to address the broader impacts criteria in a substantial way. We note, however, that in cases where reviewers conclude first that the intellectual merit of a proposed project is weak, they also often conclude the project’s potential to have broad impact is significantly diminished. Ultimately, of course, the attention paid in a proposal to the potential broader impacts of a project depends heavily on the proposal writer. However, we recognize that improved articulation of program objectives within the solicitation, particularly with respect to NSDL’s broader impacts, signals to proposers how they may effectively address this criterion within their proposal narratives.

**Action:** The program will continue to monitor panelists to ensure that during the review process they address a project’s broader impacts, and we will refer them to the relevant parts of the NSDL solicitation that emphasize broader impacts as an important merit review criterion. However, this is standard text used in all NSF solicitations, and it cannot be changed.

**4.2** The COV also raised a question (see section A.2: Question 3) about the degree to which program officer review analyses address the broader impact criterion, noting that comments “*are very brief and in some cases there is no mention of the broader impact component at all.*”

**Response:** After the panel meeting NSDL program officers consider collectively the possible set of projects to recommend for funding with an eye towards balancing and aligning with current projects that comprise the larger set of extant awards. Review analyses serve as a record of the program officer’s decision either to recommend or not recommend a proposal for funding, and an important element of this record is consideration of the ratings a proposal receives, the individual comments of the panel members, and the summary of the panel discussion. However, the review analysis does not serve as an entirely separate and additional review of a proposal, and it is considered a companion document to the individual reviews and the panel summary. Given the volume of proposals handled by the NSDL program, a fully individualized review analysis is not typically prepared for non-competitive proposals.

**Action:** Program staff will work to improve the way that review analyses address not only the “findings” of the panel review process with respect to both NSF merit review criteria, but also the relationship of those findings to the program officer’s recommendation.

**4.3** In section A.2: Question 4, the COV urged NSDL to *“take leadership within NSF in creating a model for evaluating and promoting the importance of the broader impacts of STEM fields on society at all steps in the program process from solicitation, to implementation, to evaluation, to decisions on project proposals.”*

**Response:** NSDL staff appreciates the COV’s belief in the opportunity that NSDL has to provide leadership among NSF programs to improve how broader impacts are addressed from proposal preparation through staff decision-making. However, we also recognize the important role that improved communication regarding the overall NSDL program mission, goals, and progress (see item 1 above) plays in promoting the importance of the broader impacts of STEM fields on society. NSDL can serve as a portal to detailed information about and results of other NSF sponsored projects, particularly major NSF research centers conducting educational outreach. Cutting-edge research investigations often provide a natural way to engage learners at many different levels of STEM inquiry. For example, one of the new FY 2005 Pathways projects focuses on education in and about Materials Science and will aggregate educational material from the many NSF Materials Research Science and Engineering Centers.

**Action:** Program staff will actively seek similar linkages between NSDL and other major NSF projects to help promote the importance of the broader impact of STEM fields on society.

**Action:** As the NSDL matures, program staff will continue to seek more detailed information from projects concerning impacts they are having in classrooms and in other educational settings. This effort will be incorporated into a programmatic evaluation (see section 9 below). Within NSF, we will report on these impacts, how they were measured, and how other programs could learn from NSDL’s experiences to improve the impacts of their own projects.

**5. Diversity of reviewers** The COV raised several issues related to this theme (see section A.3: Questions 1 and 2, Question 3 – paragraph 1, and Question 5 – paragraph 2). For example, *“Our concern is not with the number of reviewers. It is with their diversity and the diversity of the institutions and end-user communities they represent.”* To the COV it appeared that *“K-12 teachers, free-choice learning educators, expertise in the private sector are all relatively under-represented on the panels.”* Furthermore, the COV observed that among the reviewers the *“distribution of male and female is good, but there is a predominance of Caucasians”* and they recommended *“greater diversity of panelists in ethnicity and in target audiences of the NSDL.”*

**Response:** The NSDL program staff agrees that the program’s multi-faceted and multi-disciplinary nature requires panelists with a range of expertise and experience. In fact many reviewers already wear multiple hats that are not apparent in the standard NSF database records that capture only the self-reported disciplines of panelists. For example, one two-time reviewer for NSDL is an academic information technology staff member at an institution of higher education who brings additional experience as a former secondary school mathematics teacher. Similarly, a disciplinary professional society staff member bears responsibility as the K-12 education outreach coordinator for the society; and a member of a university education department has primary duties within a pre-service teacher education program. With respect to gender, ethnic, and other personal diversity characteristics, these are self-reported since NSF policy does not permit the gathering and storing of personal data in the NSF reviewer database. The program recognizes however that accurate reviewer demographics are vital for ensuring a healthy mix of reviewers who can bring the perspectives of diverse user audiences to the reviewing process.

**Action:** NSDL staff will make additional experience factors of reviewers more visible within its reviewer listings for future COV meetings, and it will seek to improve the display of personal demographics of reviewers in so far as the result of self-reporting processes permits.

**Action:** Each review cycle the program begins with an initial reviewer pool that features a diverse distribution of characteristics along various lines, including gender, ethnicity, disciplinary expertise, and educational sector, setting, and level. However, in any cycle, acceptances to review may not occur in the same proportion as represented by the distribution of characteristics among the pool of initial invitees. The NSDL program will work to improve in this area for example, by staggering the issuance of invitations and readjusting the distribution of characteristics of panelists from stage to stage based on the “yield” from previous groups of invitations. In addition, we will seek to broaden the initial reviewer pool in particular areas that are underrepresented. The program will also provide this invitation “history” for future COV meetings.

**6. Reviewer recruitment** The COV offered several recommendations in this area (see section A.3: Question 3 – paragraphs 2 and 3, and Question 5 – paragraphs 1 and 3). For example, in acknowledging that release time for K-12 teachers is difficult, the COV observed that “*NSDL may have to (1) make adjustments to their panel review dates to get teachers after they are out of school, (2) increase the funds available to the panel so that schools could hire substitute teachers to replace the teachers on a panel, (3) or create other options to bring in this group of users.*” The COV also urged that “*all NSDL panels need to include new people and experienced reviewers. We would suggest that NSDL consider a rotational program with people being on a panel for perhaps a 3-year period, so that the panel would have a mix of new people and people knowledgeable about the Program.*”

**Response:** NSDL program staff previously considered an arrangement whereby a “core” of reviewers would be specifically identified and asked to serve staggered multi-year “terms.” (A suggestion like this was made by the FY 2002 COV.) However, since a



standard practice for NSF programs has always been to balance both new and experienced reviewers, as well as to include current PIs in the reviewer mix, the program felt it could achieve the objective of balancing new and experienced reviewers without formally identifying such “core” reviewer pools; and the program has in fact been able to maintain from the start a healthy number of reviewers in any one cycle who have participated in previous review cycles for NSDL. However, program staff acknowledge that this past reviewer experience was not well presented to the COV during its meeting.

**Action:** The program will include the reviewing history of panelists within its reviewer listings for future COV meetings, and it will also clearly identify whether reviewers have been or are current NSDL project PIs.

**Action:** The program will also explore options for providing incentives or other forms of support for teachers to enable them to review, including involvement as off-site ad hoc reviewers, perhaps with teleconference access during specific panel meeting times. However, we note our reviewer pool contains a growing number of individuals with prior school teaching experience, and we will continue to ask panelists to suggest colleagues whom they think might be able to contribute relevant expertise and perspective.

**Action:** In the Appendix below we describe the program’s current guiding principles and general mechanisms for recruiting, selecting, and assigning reviewers. However, we will continue to look to expand our reviewer pool and seek new and innovative ways to cultivate reviewers as the COV has urged us to do; and in turn modify our principles and mechanisms as appropriate.

**7. Overall quality and impact of projects** The COV recognized (see section A.4: Question 1) that final reports for NSF projects are not released to the public. However, it recommended that “*NSDL should look for options to make these proposals and reports, which are different from those of other NSF programs, public.*”

**Response:** Current NSF policy does not permit public access to Final Project Reports. However, the narratives of proposals that are funded are available to the public and it is not uncommon for program staff to receive inquiries for these documents. In such cases program officers advise inquirers to contact PIs directly rather than make an official request to NSF. Experience shows that PIs are usually more than willing to oblige. Since the NSDL program is housed in the Division of Undergraduate Education (DUE), the Project Information Reporting System for DUE does capture core material within annual and final project reports (see [http://www.ehr.nsf.gov/pirs\\_prs\\_web/search/default.asp](http://www.ehr.nsf.gov/pirs_prs_web/search/default.asp)). This system is available for public perusal.

**Action:** Should the policy on the availability of Final Project Reports come under examination in the future, NSDL staff would look forward to contributing to discussion of any internal NSF issues and the exploration of options to make such reports available. However, as noted several times by the COV, these reports would be most valuable if placed within the context of a larger picture of NSDL progress; thus, as noted earlier

under item 1, program staff will develop such a description of progress for use in various settings.

**8. Balance and degree of risk within the awards** The COV commented and made several recommendations on this theme.

**8.1** The COV noted that the success of NSDL depends on usage of its services by diverse communities of users (see section A.4: Question 3 – paragraph 1). The COV urged the program to take *“risks on individuals and institutions that do not have a strong record of grant getting, if NSDL is to reach the communities they represent.”* Furthermore, the COV recommended that NSDL *“cast a broader net by getting underrepresented individuals and institutions involved on review panels, by encouraging collaborations of existing grantees with new underrepresented institutions, by involving them in proposal- and program-development workshops, etc.”*

**Response:** NSDL staff agrees with the importance of continuing to bring in organizations and PIs who are “new” to NSDL, particularly where they represent important communities that are either generally underserved with respect to participation in STEM fields or large but not yet actively participating in NSDL activity. However, achieving an ideal mix of “established” NSDL grantees and “new performers” is a challenge, even as the need is vital (as expressed elsewhere in the COV report) to solidify and/or adopt strategic foci for NSDL’s development. Within the Targeted Research and Services track we believe there is an appropriate degree of risk and diversity of ideas that is informing NSDL’s development, and there has been a healthy influx in these tracks of new grantee institutions. NSDL also counts several small businesses among its grantees and this is unusual among NSF programs. New institutions are not confined to these tracks however. For example, one of the initial FY 2004 Pathways projects (“Computational Science Education Reference Desk,” institution: Shodor Foundation) had previously received no funding from NSDL. Through this project the grantee organization, a non-profit educational foundation, is reaching a large network of smaller institutions including a significant representation of HBCUs.

**Action:** All of the Pathways projects and other experienced grantee institutions are carrying out significant outreach efforts to diverse sets of user groups. The program will track the results of these efforts so as to better understand who are the current users of NSDL and what gaps exist.

**Action:** We will explore ways to better connect existing grantees with underrepresented institutions. For example, as a first step program staff will work with NSF colleagues in the Division of Human Resource development to identify a cohort of library staff and faculty from HBCUs to participate in the NSDL annual meetings.

**Action:** As noted earlier in items 5 and 6, the program will continue to use the review process as an important professional development opportunity for new reviewers (who could be potential new PIs) and as a way to stimulate proposal submissions from

underrepresented institutions. In addition, program staff will look into the feasibility of offering specific proposal development and writing workshops in conjunction with meetings where the NSDL projects are exhibiting.

**8.2** The COV recommended several approaches to help broaden the community of applicants (see section A.4: Questions 9 and 12), noting that *“MSIs and free-choice learning institutions are under-represented for the period reviewed.”* Potential strategies are to increase *“awareness of the NSDL program, through better and targeted marketing,”* and to target advice to *“individuals and institutions important to the success of NSDL.”* The COV went further to urge that *“NSDL should strongly consider a program- within-a-program for minority-serving institutions (e.g. the CREST program model), and find ways to include more free-choice learning institutions.”*

**Response:** The NSDL program staff agrees with the goal of trying to broaden the community of applicants.

**Action:** As described in item 3.2, we will continue to coordinate outreach and marketing efforts with the NSDL PIs. This includes promoting awareness of the grant opportunities available through NSDL.

**Action:** The “program-within-a-program” and planning grant activities are useful ideas and we will explore these possibilities, subject to our current budget constraints. As mentioned earlier in item 3.2, we are fortunate to have significant participation in NSDL by leading informal science organizations and we expect to leverage this opportunity to reach the significant audiences they represent.

**8.3** *Concerns about the degree of technological risk* The COV raised an issue about technological aspects of risk taking within the NSDL program (see section A.4: Question 3 – paragraph 2). In particular, it noted that *“With the shift toward usage and usability—i.e. toward the customers—NSDL will have to define high risk in relation to usage and usability.”*

**Response:** NSDL program staff appreciates the COV’s recognition of the dynamic nature of the underlying digital library and information technology foundation on which NSDL rests. Furthermore, we recognize that a balance must be struck between the “leading” and “bleeding” edges: too much technological innovation can interfere with usability of a tool, and NSDL will need to ensure that these remain close and mutually informative.

**Action:** At the program’s urging, the NSDL Core Integration team worked during summer 2005 to develop a series of workshop opportunities for the coming year that they will embark on in coordination with the new Pathways projects to further stimulate usage of NSDL. These will complement the currently funded usage development workshop projects. The workshops promise to provide important opportunities to gain direct feedback on usability that can affect design. The NSDL program will monitor results from all of these workshops.

**9. Program evaluation** The COV raised several issues regarding program evaluation (see section A.5: Question 1 – paragraph 3 and Question 4). *“One particular concern for us is the lingering issue of the lack of Program clarity, and its role in project evaluation. Specific projects need to clearly fit into the NSDL Program.”* and *“NSDL should commission a major evaluation of the program by an external evaluator.”* The COV comments go on to suggest several questions to guide the evaluation, such as: *“Do the projects meet the goals and objectives of NSDL? What are the criteria for inclusion of data and information in the NSDL portal? What type of quality assistance is provided to those developing proposals and is it effective?”*

**Response:** The COV observations and recommendations on this theme are similar to those addressed in items 1-3 above, particularly with respect to the issue of programmatic clarity. Several action items have already been identified in those sections.

The NSDL program staff recognizes the important role that evaluation plays, although to date its use has been primarily to inform individual projects. The field of digital library evaluation is itself an emerging one and there has been a need to help develop this field through support of individual projects. Furthermore the nature of NSDL projects (and hence their evaluation) varies across the different program tracks – Collections, Services, and Targeted Research, and the more recent tracks – Pathways, Selection services, and Usage development workshops. However, we also recognize the downside to reliance on a body of individual project evaluations, because its distributed nature challenges the portrayal of overall program coherence, as the COV has noted elsewhere. Lack of common reporting elements poses a further challenge.

In order to build capacity in the field of digital library evaluation, the program has supported the work of the NSDL Standing Committee on Educational Impact and Evaluation over the course of several years. This set of NSDL PIs has sought to establish both evaluation capacity across NSDL and common evaluation frameworks (see <http://eduimpact.comm.nsd.org/>). This standing committee has been the most active of several self-organized groups that have emerged from the larger community of NSDL PIs. The group has primarily conducted several workshops from which a number of useful products have come. These include a Webmetrics workshop in early August 2004 (joint with the NSDL Standing Committee on Technology) that has led to a signed agreement with a webmetrics provider to gather usage data and provide analysis across NSDL projects beginning first with the main portal and the Pathways projects. (See also the Webmetrics Bibliography at <http://webmetrics.comm.nsd.org/cgi-bin/wiki.pl>.) Another workshop on “Evaluating Educational Impact” has produced a general bibliography and a “User-Friendly Guide” to evaluating digital libraries (see <http://eduimpact.comm.nsd.org/evalworkshop/references.php>). In addition, there has been a workshop on “Controlled Vocabulary for Assessment of NSDL Collections and Items” and a Pilot Evaluation of the NSDL in late 2002 that laid the groundwork for the more recent Webmetrics effort. All of these activities address the evaluation of the NSDL as an emerging digital library entity.

**Action:** We will monitor the Webmetrics data gathering results closely and we will work with the NSDL Core Integration team to track usage of the “Evaluating Educational Impact” handbook and the Standing Committee’s wiki page.

**Action:** We concur with the COV that this is an opportune time to engage in a program level evaluation of NSDL: i) to consider a number of overarching issues and ii) to examine questions derived from those issues relevant to the state of development of NSDL and its future direction. We have already identified funds for this purpose and a draft statement of work has been developed. We anticipate letting a contract during FY2006. In moving ahead we will consider the example elements suggested by the COV and use them as appropriate. Additional evaluation issues for the program to consider were also suggested in section C of the COV report and we will also incorporate these into our planning. We also expect there will be opportunities to coordinate this work with an evaluation specialist who has recently joined the NSDL Core Integration team as part of its evaluation of NSDL from the perspective of operations and usage.

**10. Program planning and prioritization** The COV expressed concern in section A.5: Question 3 that there should be more evidence of *“a structured program planning and prioritization process that guided the development of the portfolio. This is particularly distressing in light of the specific recommendations of the April 2002 COV. We concur with their recommendations that NSDL should require all projects to track usage, undertake evaluations, and define the program by fitting the projects into the program.”*

**Response:** Issues in this section are similar to those noted and addressed above in items 1 and 9. The NSDL program implemented a major change in 2004 based on clear feedback received from various sources including several semi-annual meetings of the National Visiting Committee and direct interactions with the PI community. This change reflected both a need for NSDL as a digital library to focus on developing identifiable and cohesive domain coverage (conceptually, the “wings” of the library) so as to better represent its value, and a need to shift away from pure (and necessary) technology development to be responsive to usage and usability issues. Operationally, this major prioritization took the form of the introduction of the new Pathways track and the specific identification of two Services tracks: selection services and usage development workshops. We recognize however that this process could be portrayed better not only for future COV meetings, but also – and more importantly – for the broader educational enterprise that NSDL is intended to serve.

**Action:** As noted above in the introduction, the FY 2004 projects were less than six months old at the time of the COV meeting, but as they progress along with the new FY 2005 projects, we will monitor these carefully and feed usage and evaluation data from the projects into further refinement of the program.

**Action:** The new Webmetrics effort described above in item 9 will play a significant role in understanding usage of NSDL and we expect that it will be made available across all

projects after initial testing with the main portal and the Pathways projects. The program level evaluation of NSDL described above in item 9 will also inform this process.

**Action:** As stated above in items 1, 3.2, and 8 we intend to increase the program's outreach efforts in conjunction with the NSDL PIs. A key component will be an integrated picture of NSDL with the portrayal of anticipated directions for growth based on the evaluation efforts noted in item 9.

**11. Advice on additional questions posed by the program** The COV provided an extensive set of comments and suggestions in response to questions posed by NSDL program staff (see section C). Through these questions the program raised the general issue of how it might move towards an enterprise management approach, including the conceptualization and creation of a "managing entity" to provide core digital library services for NSDL and oversee its major project elements.

**Response:** The NSDL staff appreciates the very thoughtful and pointed set of comments and recommendations from the COV to the questions posed by program officers. These consolidate several of the important themes expressed elsewhere in the report. Overall, the program presents a challenging management opportunity, and NSDL staff concurs with the COV that while NSF remains an appropriate place for the NSDL program, NSF ultimately may not be the most appropriate long-term "home" for NSDL, the digital library. We appreciate the COV's recognition that the program is beginning to enter a transitional phase; and the themes aggregated in this section point to concrete steps that can be implemented to aid that transition. We have noted and responded to these in earlier items.

**Action:** We will share as appropriate the numerous suggestions offered by the COV more widely. Certainly, the spirit of the recommendations regarding further development of program clarity will inform how NSDL program staff communicates with current and prospective PIs, reviewers, and most importantly, the larger community of NSDL users.

**Action:** We have already engaged in initial discussions with the Core Integration project's National Visiting Committee to solicit its advice regarding the characteristics of a "managing entity" for NSDL and we will be continuing these. Discussions have also been initiated with the NSDL's Policy Committee comprising representatives of the larger PI community.

**Action:** We especially appreciate the COV's offer to suggest and recruit CEOs who might engage in a fruitful brainstorming session with respect to the creation and transition of new enterprises to a more mature state. We will take the COV up on this offer as we plan more formal discussions of the "managing entity," and we are grateful for the COV's advice to lay an appropriate foundation for these future discussions. We also plan to incorporate the development of "case studies" along the lines the COV suggests into the program level evaluation of NSDL described earlier in item 9. We concur that compelling "stories" of usage and impact can be very powerful in reinforcing the value of NSDL.

## Appendix: Reviewer Expertise, Recruitment, and Selection

**Expertise.** The multi-dimensional aspects of the NSDL program call for a diverse set of reviewers that represent disciplinary content experts, education and learning sciences experts, members of the “traditional” library and information science community, and the CS-based digital library research community. Moreover, attention must be paid to maintaining i) disciplinary balance, ii) representation from all levels of the formal educational enterprise – preK to 16, undergraduate, graduate, and life-long learning, iii) inclusion of perspectives from the museum and other informal science learning community, and iv) solicitation of advice and commentary from other governmental and private sector stakeholders. Finally, the program seeks to maintain a steady infusion of reviewers who are in underrepresented groups and/or new to the NSF process.

**Recruitment.** To meet these overarching goals the program maintains a candidate reviewer pool with names drawn from numerous sources, including:

- Attendees at professional meetings, e.g. Coalition for Networked Information, IMLS’ Web-Wise Conference, the Joint Conference on Digital Libraries, the International Conference on Asian Digital Libraries, the Joint Information Systems Committee (UK) workshops, and various EU and UNESCO sponsored workshops (In some cases NSDL program officers have been in attendance at these meetings, and in other cases program officers have been in e-mail contact with the organizers of these events.)
- Referrals from NSF professional staff: both EHR colleagues and colleagues on various NSF-wide cyberinfrastructure working groups comprised of representatives from each NSF Directorate
- Government agency colleagues, e.g. from the Smithsonian, NASA, Department of Agriculture, and the Institute for Museum and Library Services (IMLS)
- Principal investigators from IMLS, DLI-2, and NSDL projects (We have a good working relation with counterparts at IMLS and of course NSF colleagues involved with the original Digital Libraries Research Initiative.)
- Representatives of professional societies and non-profit organizations, e.g. the National Science Teachers Association, the American Library Association, the Consortium for School Networking, and the National School Boards Association
- Representatives from private or corporate foundations, e.g. the Mellon, Hewlett, Sloan, Pew, Kellogg, and Rockefeller Foundations
- Members of the publishing sector and online educational providers
- Visitors to NSF who seek information about NSDL or come to discuss proposal ideas
- Proposers to NSDL

**Selection.** Based on information gleaned from each cycle's letters of intent plus past programmatic experiences, the NSDL program staff estimates how many reviewers will be needed. A list of invitees is developed that deliberately "over samples" in order to allow for declinations of invitations to review.

Confirmed reviewers are then assigned to subpanels that consider proposals in one of the distinct tracks. A balance in each panel is sought that reflects the considerations described above in the discussion of reviewer expertise. Proposals are grouped to the extent possible by additional factors. For example, we have had cycles in which numerous proposals sought funding for projects dealing with personal annotation systems. Every effort is made to place similar proposals in the same panel.