Pathways Interviews – Report and Summary of Issues
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Overview

This report provides a summary of Pathways PI interviews conducted in July 2006. The focus of these interviews was to look ahead 3-5 years out and gather information about opportunities, threats, baggage and competitive advantage for each Pathway library and the NSDL overall. The summary breaks out the key patterns and information into sections on the Pathways' emphasis and key issues going forward, along with key challenges and opportunities going forward. Not all comments are represented.

Overall, the key strengths of NSDL include:
- Facilitating collaboration, partnerships, whether within disciplines, between research and education, or among developers. Being the common touch-point to maintain awareness of similar efforts and needs.
- Building a community (compared to other NSF programs) that is willing to collaborate and discuss important issues.
- Technology infrastructure, especially because the community is not wedded to one technology (like DSpace) and the core infrastructure provides basic services.

Pathways Participation and Plans

To understand what NSDL needs to retain moving forward, we discussed why each group chose to participate in NSDL. Beyond funding, several patterns emerged:
- Sharing technology, services, content and ideas/discussions in an active community
- Has helped them approach other groups, like societies, for partnerships
- Has helped to develop and operationalize a new disciplinary area
- Blends operations and research to answer the big questions
- Opportunity to explore issues that might not otherwise be explored within typical NSF programs and overall enthusiasm that NSF was funding education activities

As the Pathways move forward, most plan similar activities:
- Building out portfolios: finding and adding materials, workshops with developers/partners; searching NSDL for additional materials; providing services
- Building strategic alliances and defining their roles in the library (e.g. societies, government labs, research centers)
- Better defining audiences and their needs
- Although current user channels (web sites, RSS, etc) will continue to be important, they are watching and considering Web 2.0 technologies

Key issues for each library

Identifying and cataloging quality content continues to be the biggest challenge. There is a general sense that there might be a lot of content on the Web, but not enough quality content to meet the standards they have set for meeting their audience's educational

needs. All assume that a core value of NSDL is to contain quality content, and although they recognize the definition of quality does vary by audience, they think it should continue to be a key focus. For those who are primarily aggregators, they struggle with the issues of using content created and controlled by others, including ensuring its continued availability or vitality over the long term.

They are all looking to increase usage and get the word out about their libraries. Once users arrive, services and interesting content is important. Persistence of content will be critical including ensuring that assets continue to work, the content remains valid, and the content holder is sustainable (including the Pathways themselves).

Future technology changes are expected for both community engagement and educational delivery including use of virtual labs, providing MySpace-type functions, podcasting, and various flavors of user contribution such as blogs and user annotations.

Competitors include publishers, wikipedia, search engines, local content providers (e.g. institutional repositories), Discovery, and other private science education sites. Bottom line - many competitors could be collaborators, if the relationship is developed and well-managed.

Sustainability continues to be a concern, including sustaining basic operations and maintenance, and building/improving their collaborations and partnerships

Challenges for NSDL

Change is a key theme. Changes in education are slow to propagate, so most are focusing on first serving people where they are today. Even though the underlying technologies might change over time, the need for quality content and pedagogy remain the same. Also, any changes to underlying NSDL technology need to be carefully managed to minimize the ripple effect impacting maintenance budgets.

Boundaries of the NSDL work have been broadly defined, but recognized as almost impossible to do well. Big lists of various stuff are not viewed as helpful to educators. Several expressed that NSDL needs to have a stronger emphasis on educational resources. For example, research materials are okay, but only if provided within an education context. Meeting the need for quality, vetted materials that have a low barrier to access is key in differentiating NSDL from other sources.

Threats to NSDL and the Pathways themselves are many. There is a natural tension between funding for research and funding for STEM education. NSDL is cross-disciplinary, so the idea doesn't always match funding objectives of NSF or other groups. The bigger political debates loom large including the question of whether the government should be doing this, versus private development. These threats suggest the need to build data to prove that NSDL represents money well-spent and a focus on advocacy.

At times, NSDL appears to be research in the guise of development. A lot of NSDL components (both CI and other projects) are experimental and that makes it difficult for Pathways to depend on these components for daily operations.

The NSDL site is still trying to be all things to all people, so NSDL.org appears too big and too impersonal. The audience sections are a step forward, but they require additional tools to help educators and students find what they need. Overall, we all face broken links and lost content. Unfortunately, some NSDL–funded collections do not see themselves as operational and so they don't always work, but still have the NSDL logo on them. There are also rising user expectations when compared to other gaming and commercial sites. In addition, users expect "free" access of such a government-funded site, but there are many IP issues to using some materials or creating derivative works.

Baggage and Room for Improvement

Governance remains a mystery. What is the role of the Policy Committee (PC)? Some prior recommendations fell on deaf ears. Is it still valid considering the funding landscape of NSDL has changed (i.e. from funding many projects to only a few major projects)? Over time, there was too much emphasis on building community through the governance structure instead of solving real problems and discussing shared issues. In addition, there are still questions about who is in charge, and who has ultimate authority to make sure activities are completed in a timely manner.

Early on, CI pursued building a large catalog and an R&D focus in technology. This happened at the expense of providing library services focused on requirements of NSDL projects and participants, including helping projects to serve end users (e.g. helping projects to harden tools and services, or to improve usability). The goal of building a huge catalog seemed the only important metric, leading to an attitude of "here is the stuff, use it" as opposed to providing what users needed.

Within NSDL, there are too many half-finished NSDL-funded projects with promise. How do we capitalize on them? Along those lines, how do we stop reinventing the wheel? NSDL needs to identify leverage points for open source development. Another area for improvement lies in NSDL collaborative processes. No one is responsible for getting things done, and on a schedule. Groups need to be responsive to each other, especially as NSDL funding is reduced and the number of projects shrinks. The NSDL collaborative process also needs to address how Pathways deal with areas of competition (for funds or users) to ensure there is a consistent approach to pursuing opportunities.

Overall NSF has provided mixed messages. Every project is on its own for sustainability, which doesn't help set an expectation of cooperation, or motivation to fully participate. NSDL was positioned more as a digital library with its roots in DLI and computer science. That led to an early focus on services such as improving search and discovery on the web without understanding the different requirements of education digital libraries. So, for example, finding reusable resources became a core value, while not addressing the

reality that not all resources can be "reused" because of teaching needs, design, accessibility, system requirements.

<u>Moving Forward</u>

There is general consensus that NSDL must be positioned by what it can do for users, and what it can do for partners or others with STEM education missions. This includes providing tools and services, where the idea of cyberinfrastructure implies providing both Pathway and end-user services, such as support for education standards. These tools and services should include:

- Infrastructure for groups that don't have the resources, or where centralized service makes sense (such as the central repository). Some of these library operations could be provided by a Pathway for a group operating within their library's scope.
- Facilitating connections that allow for collaboration and cross-talk (and for CI, not just providing meeting space or ReadyTalk, but be involved in a hands-on way).
- Marketing and market development to help spur new development and interest
- Enabling and assisting with publisher interactions.
- Providing consulting and expertise, such as in technology and identifying trends that will impact all of us.
- Positioning NSDL as a place for quality materials that work, with valid content, and that meet educational needs. Establishes us as "trustworthy".

There are several opportunities that NSDL should keep in mind moving forward.

- Teacher needs such as NCLB and teacher recertification pressures; online professional development workshops for credit (through a college or professional society). Organizing knowledge about misconceptions.
- Teacher turnover as baby boomers retire. New teachers will be more tech savvy.
- Expanding content by providing cataloging and library services to groups wanting to do STEM education but not planning to create a digital library (e.g. some societies, local PBS stations).
- A trend towards open access for journals and licensing online material more broadly.
- Meeting the needs of state education groups.
- Working with NSF to build NSDL into all solicitations containing an education component as a way to sustain materials for long-term. For discipline specific directorates, the requirement would be to work with the appropriate Pathway.
- Creating a funding mechanism to answer some of the big, nagging issues, such as workshops for determining vocabularies, standards, best practices or for development in key digital library areas not currently covered, including evaluation of impact.
- Improvements to user experience
    - Improving searches by getting best content to bubble to the top of searches (for example, better weighting for materials reused in specific context such as a Pathways newsletter, or blogs, analyzing what people click on)
    - Helping users who are working outside of their domain expertise. This might happen through use of thesauri, linking to domain definitions or related materials)

- Cross-site personalization features, so people are better guided to materials no matter where they enter NSDL
- Helping NSDL.org users get what they need by directly using more Pathways tools and services
- Providing better support for content authors (e.g. accessibility, design, pedagogy)

Analyzing What It will Take to Move Forward

Overall NSDL needs to ensure that its efforts benefit the NSDL educational user. Evaluating the PI suggestions for improving NSDL's market position and various market opportunities can provide a starting point for where collaborative efforts might lead to sustainable and beneficial activities for NSDL participants. The threats and challenges can help provide criteria for deciding how NSDL proceeds.

In analyzing the various issues and their patterns, I have selected the following areas as suggested priorities to ensure that NSDL strategies and efforts are successful in the long term. Some of these require MOU items aimed at building agreements about NSDL process, and others are about specific development activities.

1) Outreach/communications/advocacy
- Focus on a combined campaign aimed at getting the message out about NSDL and what it can do for users and STEM education providers.
    - This requires hard data so this group needs to set the agenda for multi-year evaluation work by deciding what we need to know and be able to say about NSDL, along with creating a work group to execute that plan.
    - This could benefit from creating an inventory of services and tools to be bundled and provided to new partners or user communities. These could be Pathways-specific, or a general bundle related to overall NSDL content.
- Work with NSF to develop a clear vision of NSDL's role at NSF, and push for inclusion in solicitations. Also, advocate continued support for funding NSDL as a long-term archive for materials.
- Continue to work on overall sustainability plans for NSDL.
- Identify and develop plans for approaching publishers, major societies, and other potential partners to reduce the potential of confusing and conflicting messages and ensure successful engagement.

2) Shared development
- Identify a small number of key development projects for the new MOU, knowing that some development might be chosen to support longer term goals.
    - Given a theme to improve the user experience, these might focus on improving and testing: the NSDL search interface, the NDR API and its expression of relationships, education standards tools, cross-site personalization support, and usability/accessibility improvements.
    - To succeed, this requires better project management, so Pathways can depend on the delivery dates of services and tools.

- To ensure schedules can be met, determine "good enough" technological solutions if the ultimate solution is too far out to meet needs.
- Analyze development and operational activities for better leveraging of all resources, including possibly sharing positions (e.g. technical, marketing) or sharing systems administration, either primary or failover activities.
  - This might include making better use of the SDSC archive, or expanding the CI operations to include failover systems, but ultimately looks for ways to reduce "reinventing the wheel."

3) Operations, standards, best practices
- Improve monitoring of non-CI functions deemed to be core services, such as ASN, CAT and other work, so they can be depended on for operational use.
- Focus on hardening operations. R&D will always be needed but NSDL could focus more on setting an R&D agenda for digital libraries and related issues to be funded by other grants.
- Define the big, "burning" issues with cross-cutting ramifications.
  - Persistence should be on this list. Create a work group to address the issue, including defining what is ephemera and what is worth saving or perpetuating "forever". The corollary is a need to review the accessioning and deaccessioning guidelines for NSDL with an ultimate goal to improve the value of the NSDL imprimatur on materials. This also requires answering questions such as what is the minimum information required about resources, and how to retire materials past their useful lives.
  - Another looming issue is IP, reuse, and derivative works.

4) Organizational process
- Improve the collaborative process, e.g. how to work out: setting priorities; solving territorial disputes; cross-promotion; managing task dependencies. Each Pathway has its own agenda, so the key will be figuring out how to best serve the larger NSDL while still serving their community.
- Develop criteria for making decisions about how joint resources will be allocated. Criteria might include: how does it help the user, how does it maximize all of our resources, how does it impact usage, what is the net benefit to developers?
  - This requires honest discussion about concerns about return on resource investment and any fears about having to give up autonomy.
- Agree on the "who is in charge" question for making things happen and making tough decisions so there is accountability to the overall NSDL at the end of the day.

These challenges suggest that NSDL is faced with moving from a highly creative and somewhat disorganized group of projects to an organization that can act with clarity and confidence in delivering on the promise of impacting STEM education in a manner worthy of sustainability. In analyzing the future as the Pathway PIs see it developing, it is clear that NSDL, the organization, can position itself successfully to serve existing and anticipated needs. With improvements in the collaborative process, defining and resolving a few of the common "big" issues, and setting a handful of attainable development goals, the Pathways and CI can move the NSDL education agenda forward.