From NSDL 1.0 to NSDL 2.0: Towards a Comprehensive Cyberinfrastructure for Teaching and Learning

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Background and Overview

• EHR in NSF asked for new program ideas related to cyberlearning; for NSDL our response was to:
  – target several grand challenges in education
  – identify NSDL projects that are foundational
  – consider bridges from foundation to vision

• The challenges (research and practice):
  – matching educational needs to digital resources
  – providing cyber-teaching environments supporting customization
  – developing a cyber-workbench for educational interventions (*)
  – Integrating education research and practice

• A common theme:
  – NSDL as an cyberlearning platform for R&D...
  – as much as a repository for digital resources
Institution-Specific Sites

NSDL Cyberlearning Platform

- **Common Service Layer**
  - Basic cataloging, search, and collection tools
  - Open APIs, highly customizable
  - Web 2.0 tools: Expert Voices, wikis, and other basic and extended services

- **NDR + Fedora**
  - Research-based, NSF-supported
  - Open Source
  - Growing Fedora community
  - Lightweight, common middleware for integrating content and services

(revised and "repurposed" from: Sumner & Marlino, 9/07)
Curriculum Customization Service
(also revised and repurposed from Marlino & Sumner 9/07)

- Grand scale customization of learning and teaching
  - Customized to all middle- and high-school Earth science classes in Denver Public School (DPS) system (120 teacher 9000 students)
  - Customized to a diverse student body (20% white)
  - Adherence to state and national standards
  - Yet mass customized to teachers' and students' needs
  - Customized using NSDL and DPS content at the level of concepts and progressions not just broad coarse topics
  - Supported by augmented strand maps (linking to NSDL collections, education standards, online assessments and textbooks)
  - Using Interactive Teacher Guides for professional development

- Done on an exceptionally "lean" budget... HOW?
Institution-Specific Sites

NSDL Cyberlearning Platform

- Portals (e.g., NSDL.org, Pathways)
- Repositories (e.g., CARL)
- Learning Environments
- Strand Map Service
- Content Assignment Tool
- Media Wiki
- Discovery Service
- Collection Management System
- Extended Services

NDR-API

NDR

Fedora: Native Interface

Candidate platform component
New content or component
Reused content or component

Represented in NDR

- NSDL Collections
- Publisher-Provided Content
- User-Contributed Content
- DPS-Specific Content
- Learning Benchmarks & Concept Maps
- State & National Ed. Standards
Barriers to Effective NSDL Cyberlearning Platform Use

• NSDL's cyberlearning platform will always be "under construction"

• But the biggest barriers to platform use and reuse are social and policy-related -- not technical
  – Many researchers would rather (re)invent than reuse
  – NSF programs tend to reinforce such innovation in "intellectual merit" review criteria
  – It's often not easy to learn about the platform pieces and how to (re)use them
  – Transformational uses will bring together teams that rarely work together: technical developers, curriculum designers, ed standards experts, publishers, teachers...
Overcoming Barriers to Effective NSDL Cyberlearning Platform Use

- NSDL's APIs and documentation of the platform facilitate learning about components and reuse opportunities
- NSDL's solicitations have tried to enumerate opportunities – and requirements – for reuse and sharing
  - Pointers to community documents on committees
  - Statements of metadata requirements
  - Expectations of shared development
  - Guidance on platform use or barriers to entry
- The NSDL program has recently been reorganized to more explicitly support platform use and reuse:
  - Resource Center
  - Technical Network Services
NSDL Resource Center

• Will "provide cross-project collaboration assistance; undertake strategic partnership development; coordinate thematic research and evaluation studies; synthesize and disseminate program findings"

• "In addition to these activities, the Resource Center will help 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."
NSDL Technical Network Services

- Will have "responsibility for maintaining and upgrading the infrastructure underpinning NSDL and its primary website, nsdl.org"
- "Any new development work is expected to be accomplished cost-effectively by leveraging software tools and workflow practices that have been developed by both NSDL and other leading digital education consortia"
- All large NSDL projects will "allocate 15% of the total budget request for a subcontract to a technical network services provider"