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

Dave McArthur (GoH, formerly NSF) and Lee Zia (NSF)
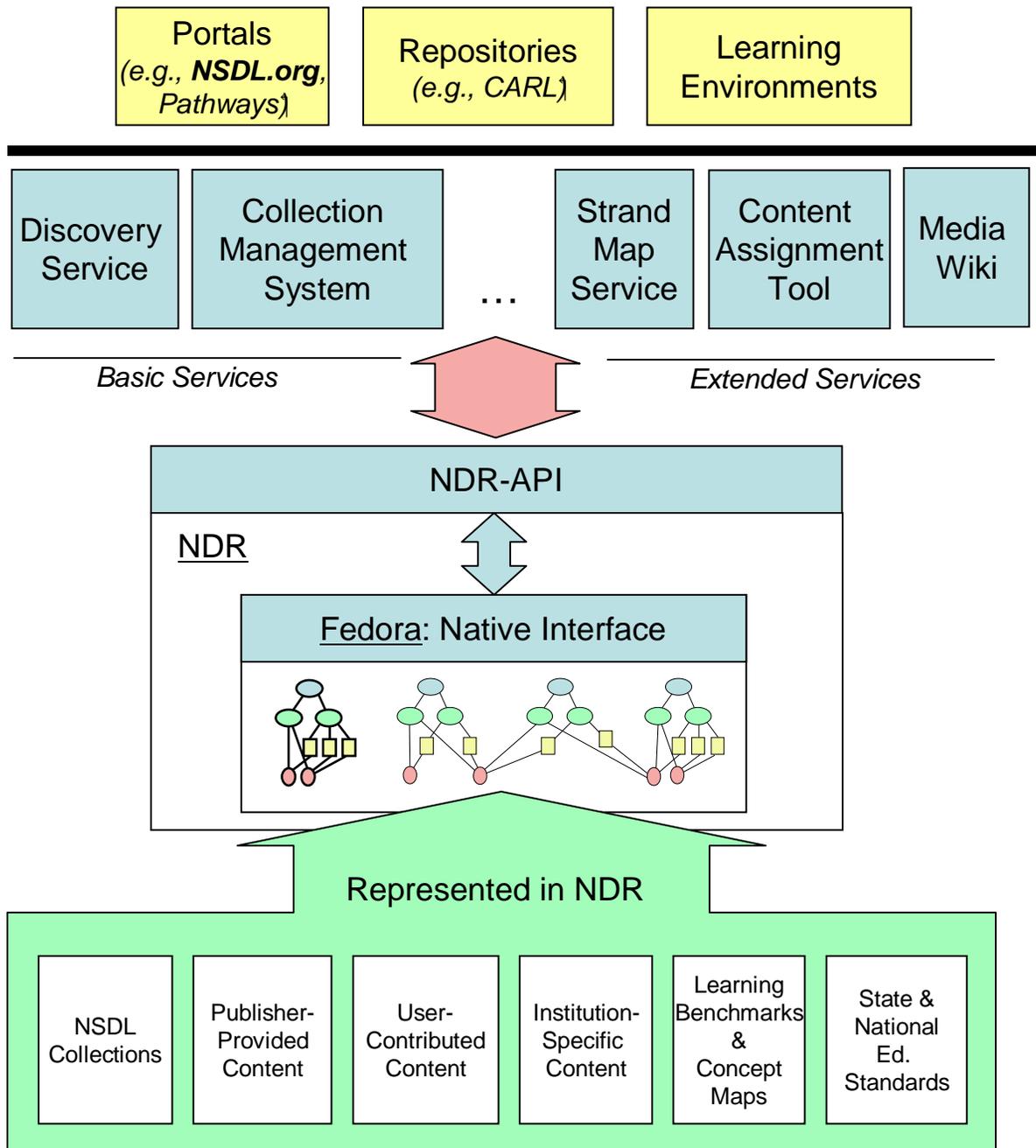
Background and Overview

- 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)

Portals *(e.g., **NSDL.org**, Pathways)*

Repositories *(e.g., CARL)*

Learning Environments

Discovery Service

Collection Management System

…

Strand Map Service

Content Assignment Tool

Media Wiki

Basic Services

Extended Services

NDR-API

NDR

Fedora: Native Interface

Represented in NDR

NSDL Collections

Publisher-Provided Content

User-Contributed Content

Institution-Specific Content

Learning Benchmarks & Concept Maps

State & National Ed. Standards

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

Portals *(e.g., **NSDL.org**, Pathways)* | Repositories *(e.g., CARL)* | Learning Environments | **DPS Portal** / **Curriculum Customization Service**

NSDL Cyberlearning Platform

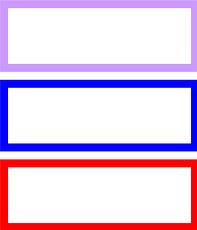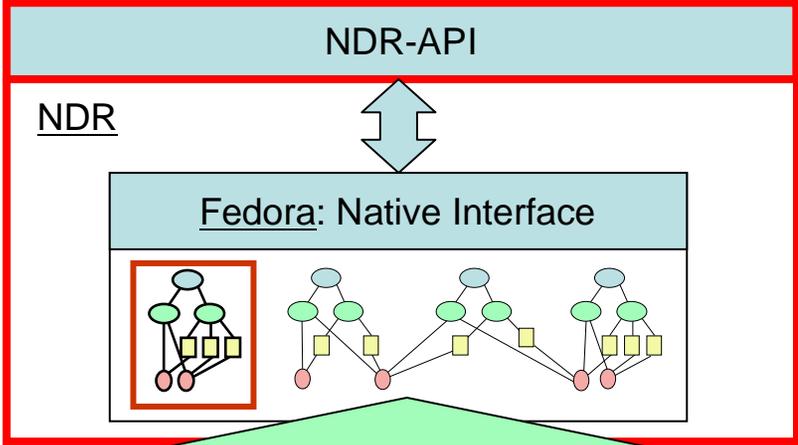Discovery Service | Collection Management System | … | Strand Map Service | Content Assignment Tool | Media Wiki
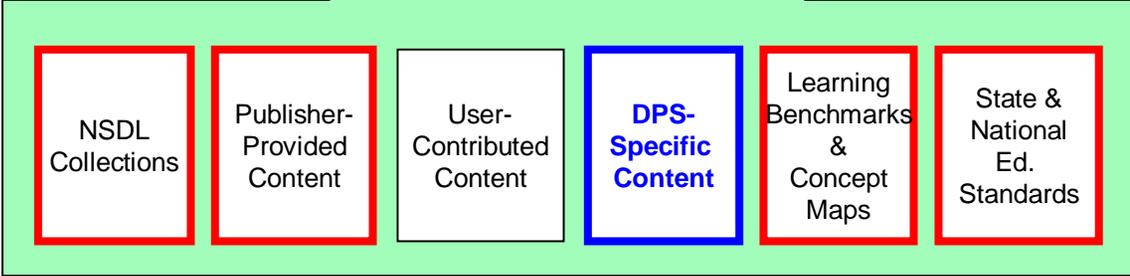
Basic Services — *Extended Services*

NDR-API

NDR

Fedora: Native Interface

Represented in NDR

NSDL Collections | Publisher-Provided Content | User-Contributed Content | **DPS-Specific Content** | Learning Benchmarks & Concept Maps | State & National Ed. Standards

Candidate platform component

New content or component

Reused content or component

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"