Development of National Digital Library of India

Towards Building a National Asset

NDL: VISION & MISSION

DR ZAKIR HUSAIN LIBRARY (CENTRAL LIBRARY)
JAMIA MILLIA ISLAMIA, NEW DELHI

Prof. PARTHA PRATIM DAS
ppd@cse.iitkgp.ernet.in
Joint PI, NDL Project, NME-ICT, MHRD
Indian Institute of Technology, Kharagpur

21-OCT-2016
BUILD UP
NATIONAL DIGITAL LIBRARY OF INDIA
AS A NATIONAL KNOWLEDGE ASSET –
THE KEY DRIVING FORCE FOR EDUCATION,
RESEARCH, INNOVATION, AND
KNOWLEDGE ECONOMY IN INDIA
TO CREATE A 24X7-ENABLED INTEGRATED NDL AS A UBIQUITOUS DIGITAL KNOWLEDGE SOURCE OF THE NATION – CATERING TO IMMERSIVE E-LEARNING FOR ALL LEARNERS AT ALL LEVELS IN ALL AREAS

TO INITIATE A MOVEMENT FOR INTEGRATED DIGITAL LEARNING ACROSS INDIA
NDL Motto

INCLUSIVE & OPEN
Libraries are more important to the education system than the institutions such as schools, colleges and universities

– Rabindranath Tagore
National Digital Library: Issues

User-side
- Wide geographic expanse & Large population
- Huge number of students
- Large number of institutions
- Varied linguistic diversity
- Severe lack of Teachers

Provider-side
- Wealth of digital content
  - Books and Articles
  - ETD
  - Question Papers and Solutions
  - Video Lectures - MOOCs
  - Simulations & Animations
  - NMEICT Projects
  - Data
  - ...
- No single-window search
- Google search uses keyword – no metadata search
- Widely varied DL technology
- Lack of Interactivity, Vernacular support
- Low integration between content and learning system
- Weak ecosystem between learners and teachers
National Digital Library: Service Architecture

National Digital Library

Digital Repository

- Authoring Services
- Acquisition Services
- Dissemination Services

Digital Library

- Learning Services
- Personalization Services
- Localization Services
- Open Services ...

Content Creation
Content Search
Learning Content
Experience-based Learning
Multi-Lingual Content
Mobile Apps

Content Borrowing
Content Access
Multi-faceted Interface
APIs

Learning Content Experience-based Learning Multi-Lingual Content Mobile Apps
Use Models

Physically Challenged
Researchers
Learners
Professionals

Content Access

Institutional Digital Repositories
Web Content

Web Content Harvesting

Content Contribution

Contributing Institutions

NDL Repository

Learning Management System

Educators

IIT, Kharagpur
21/10/2016
Prof. P P Das, CSE, IIT, Kharagpur
Presentation Model

- Not a new library – an umbrella
- Collects and ingests metadata only
- Presents full-text from source view
- Provides:
  - Search
  - Browse
Objective and Scope

TARGETS

CONTENTS, STAKEHOLDERS, CONTRIBUTORS, USERS, ARCHITECTURE, AND THE BIG PICTURE

• Books are for use
• Every reader his [or her] book
• Every book its reader
• Save the time of the reader
• The library is a growing organism

S R Ranganathan Laws
Objectives

- Create a 24X7-enabled Infrastructure for NDL with single window search facility – To include h/w systems, networks, s/w tools, applications and interoperability standards
- Harvest IDR\(s\) (Institutional Digital Repository) across institutions of the nation to provide integrated access
- Facilitate select institutes to disseminate existing content and create new digital content
- Provide support for immersive E-learning environments at multiple levels spanning across
  - All academic levels – school to college to university to life-long learning
  - All disciplines – Science, Arts, Humanities, Engineering, Medical, Law, and
  - All languages (vernacular) used as medium of instruction.
- Support interfaces in vernacular & for differently abled users

IIT, Kharagpur 21/10/2016 Prof. P P Das, CSE, IIT, Kharagpur
Digital Contents

Digital, Surrogate
Digital, Metadata
Digital, etc.

Content at NDL
- Born-digital object
- Digital surrogate of a physical object
- Digital metadata of physical object

Metadata at NDL
- NDL does not store contents
- NDL only ingests metadata for Search & Browse
- Content (Full-text) is delivered from Source

A content is included (metadata ingested) in NDL if it is expected to have educational value
Range of Contents

Institutional Digital Repository of Contributing Institutes

- Research and Professional Institutions, Central/State University
- Institutions of School & Higher Education, Boards
- Institutional and Open Contributions. Multi-modal, Multi-faceted

Faculty Publications, ETD (Electronic Thesis & Dissertation): DSc-PhD-Masters-Undergrad, Research Projects

Books & Periodicals, Open Access Journals, E-Books & Subscribed E-Resource

Annual Reports, Project Reports, Convocation, Working Papers, Others

Encyclopaedia Dictionaries Directories Others

Lecture Slides, Videos, Class Notes, Courseware

Term Papers, Assignments, Solutions

Lab Experiments, Manuals, Case Studies

Question Banks (JEE / GATE / NET / CAT), Model Answers

Datasets, Benchmarks, Models, Maps, Software

Manuscripts, Painting, Sculpture, Music, Dance, Drama

Audio & Video Content
## Stakeholders

### Roles and Responsibilities

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Roles and Responsibility</th>
</tr>
</thead>
</table>
| **Government**  | 1. Sponsor and facilitator  
|                 | 2. Content Contributor  
|                 |   • Ministries / Departments  
|                 |   • R & D Labs  |
| **Institutions**| 1. Host Institution – IIT Kharagpur  
|                  | 2. Contributing Institution – Supporting IDRss  
|                  | 3. Participating Institution – Providing Users & Feedback  |
| **Public**      | 1. Use and Feedback  
|                  | 2. Metadata by Crowd Sourcing  
|                  | 3. Content by Crowd Sourcing  |
| **Industry**    | 1. Technology Providers  |
| **Publishers**  | 1. Metadata Provider  
|                 | 2. Content Provider (under various licensing schemes) |
Contributors

CFTI, State and Central Universities, R & D Labs, Govt. Depts, Free Portals, Publishers, etc.
Users & Access

Registration is Open to all

Registration by invitation:

- **Individual**
  - Members of Institutions – by Institution
  - Holding an email in official domain – .gov.in, .ac.in, .ernet.in, ...

- **Institutional**
  - By request from Institution
  - Managed by authenticated Nodal Person
Architecture

- **Index Management**
  - Ingestion of Metadata
  - Indexing of Metadata for Search

- **Content Management**
  - Dissemination of local contents

- **Learning Management**
  - Creation of Content
  - Handling learning interactions
System Architecture

Content Management

Index Management

Learning Management

Content Management

LMS Cluster

Dispace Cluster

Content Harvest Cluster

Solr Cloud

Front-End Server Cluster

Internet

24-port Gigabit Ethernet Switch (2 nos)

10 GB Ports

40 TB NAS Central Storage with dual controller

Backup NAS

Gigabit Ethernet Switch

Content contributor/consumer
Where the mind is without fear and the head is held high
Where knowledge is free
Where the world has not been broken up into fragments
By narrow domestic walls
Where words come out from the depth of truth
Where tireless striving stretches its arms towards perfection
Where the clear stream of reason has not lost its way
Into the dreary desert sand of dead habit
Where the mind is led forward by thee
Into ever-widening thought and action
Into that heaven of freedom, my Father, let my country awake.

– Rabindranath Tagore
The Big Picture

NDL:
Content Repository

LMS:
Content Delivery for Learning

VUC:
Certification & Credit Transfer

National Digital Library of India

MOOCs LMS

Virtual University and Certification
Institutional Roles and Responsibilities

Terms of Reference to Contribute to NDL

The worth of a librarian should be gauged by his power of attracting and looking after such circles by acting as the intermediary of an intimacy of relationship between reader and the library. – Rabindranath Tagore
# Roles and Responsibilities

<table>
<thead>
<tr>
<th>Host Institution</th>
<th>Contributing or Participating Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>IDR</strong></td>
<td>• <strong>IDR (CI only)</strong></td>
</tr>
<tr>
<td>o Support for Setting up IDR</td>
<td>o Setup IDR in Institutional LAN</td>
</tr>
<tr>
<td>o Installation CD</td>
<td>o Register with OPENDOAR / ROADMAP</td>
</tr>
<tr>
<td>o Manual</td>
<td>o OAI-PMH compliance for harvesting</td>
</tr>
<tr>
<td>o Training</td>
<td>o OAI-ORE compliance for full-text access</td>
</tr>
<tr>
<td>o IDR Service, if needed</td>
<td>o Allow external access &amp; Update regularly</td>
</tr>
<tr>
<td>• <strong>Metadata</strong></td>
<td>• <strong>Content (CI only)</strong></td>
</tr>
<tr>
<td>o NDL Metadata Standard</td>
<td>o Add Content</td>
</tr>
<tr>
<td>o Creation, Curation Workflow</td>
<td>o Encourage faculty, students, staff to contribute</td>
</tr>
<tr>
<td>• <strong>User</strong></td>
<td>o Create and Curate Metadata</td>
</tr>
<tr>
<td>o Institutional Registration for Nodal Person</td>
<td>• <strong>User</strong></td>
</tr>
<tr>
<td>o Bulk Addition of Users</td>
<td>o Register as an Institution</td>
</tr>
<tr>
<td>• <strong>Ongoing Support</strong></td>
<td>o Add users in bulk or send to NDL</td>
</tr>
<tr>
<td>o Over email, phone</td>
<td>• <strong>Promote</strong></td>
</tr>
<tr>
<td>o Hands-on at NDL, if needed</td>
<td>o Organize Workshop</td>
</tr>
<tr>
<td></td>
<td>o Identify and Integrate Source</td>
</tr>
</tbody>
</table>

IIT, Kharagpur 21/10/2016 Prof. P P Das, CSE, IIT, Kharagpur
Technology of NDL

METADATA ENGINEERING

USER INTERFACE & EXPERIENCE TRACKING
• Metadata Standard
• Metadata Acquisition
Metadata Standard

Source: http://courseweb.ischool.illinois.edu/~butler9/LIS501b/current.html
Metadata Standard

- **Metadata**
  - Is primarily textual information relating to Content
  - Includes information that enables users to identify, discover, search, browse, interpret, or manage Content
  - Includes hyperlinks that direct users to Content on the Source
  - May include an expressive description of the Content

- **Metadata Standard**
  - Defines common understanding of the semantics of the data
  - Ensures correct and proper use and interpretation of the data
  - Defined through a set of fields, vocabs (optional), and instructions for fill-up
• **Wide** category of resources
  ○ Generic metadata or domain specific?

• **Openness** of repository
  ○ Closed metadata standard may fail to describe a new resource

• **Scale** is enormous
  ○ Manual annotation is infeasible
  ○ Automatic annotation guided by crowd sourcing?
Metadata Requirements Specs

• To describe any digital resource
  ○ Generic content metadata
    ▷ Contributor, Description, Language, Format etc.

• To describe domain specific resources
  ○ Educational content metadata
    ▷ Educational level, ToC, Type of learning material etc.
  ○ Thesis metadata
    ▷ Institution, advisor, degree, researcher
• NDL Metadata Standard v 1.0 is an **Open Virtual Standard**
• Schema is categorized into three profiles:
  - **Generic Metadata:**
    - Describes general attributes of the contents
    - Adopted from Dublin Core Metadata Standard
  - **Educational Metadata:**
    - Describes the educational attributes of the resources and helps in enumerating properties of the contents relevant to teaching-learning process
    - Adopted from Learning Resource Metadata Initiative (LRMI)
  - **Thesis Metadata:**
    - Describes dissertation or thesis related metadata fields
    - Adopted from Shodhganga Thesis Metadata Standard
  - More profiles may be added in future
• Uses the **namespace of Dublin Core (dc.)**
Metadata Envelop

- Dublin Core (generic)
  - subject
  - title
  - type
  - description
  - date
  - author

- LRMI (educational)
  - board
  - difficultyLevel
  - typicalLT
  - prerequisiteTopic
  - typeofLM
  - pedagogicObjective
  - educationLevel

- NDL Metadata
  - researcher
  - keyword
  - advisor
  - place

- Shodhganga (thesis)
  - department
  - institution
  - awarded
  - degree
Thesis Metadata
Metadata Acquisition
## Acquisition Scenarios

<table>
<thead>
<tr>
<th>Locate Content</th>
<th>Acquire Metadata</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Harvest Institutional IDRs</td>
<td></td>
</tr>
<tr>
<td>• Crawl Websites</td>
<td></td>
</tr>
<tr>
<td>• In Bulk – from Publishers</td>
<td></td>
</tr>
<tr>
<td>• Donated by Source</td>
<td></td>
</tr>
<tr>
<td>• Source-supported API</td>
<td></td>
</tr>
<tr>
<td>• ...</td>
<td></td>
</tr>
<tr>
<td>• Creation</td>
<td></td>
</tr>
<tr>
<td>● Manual</td>
<td></td>
</tr>
<tr>
<td>● Automated</td>
<td></td>
</tr>
<tr>
<td>• Translation</td>
<td></td>
</tr>
<tr>
<td>● Format</td>
<td></td>
</tr>
<tr>
<td>● Standard / Schema</td>
<td></td>
</tr>
<tr>
<td>• Curation</td>
<td></td>
</tr>
<tr>
<td>● Manual</td>
<td></td>
</tr>
<tr>
<td>● Assisted</td>
<td></td>
</tr>
<tr>
<td>• Ingestion</td>
<td></td>
</tr>
</tbody>
</table>
Challenges in Metadata Acquisition

- **Different sources follow different norm in annotation**
  - Automation of curation

- **Errors in sourced data**
  - Error listing
  - Manual curation

- **Errors in manual annotation**
  - Review step before actual submission in database
  - Manual curation

- **Set up norm/guideline**
  - Controlled vocabulary
Specifying Metadata Values

How do we ingest contents?

Metadata Translation

Institute 1

Institute N

IDR Harvesting

Manual Submission

Automatic Crawling

Metadata Extraction

Portal 1

Portal N

Metadata Annotation

Prof. P P Das, CSE, IIT, Kharagpur

IIT, Kharagpur 21/10/2016

Prof. P P Das, CSE, IIT, Kharagpur
Multi-format Translator

Creation
- Manual
- Automated

Translation
- Format
  - Standard / Schema

Curation
- Manual
- Assisted

Ingestion

Reader

CSV

MARC

JSON

XML

Metadata Translator

CMS Compliant Format
IDR Harvesting

Creation
  - Manual
  - Automated

Translation
  - Format
  - Standard / Schema

Curation
  - Manual
  - Assisted

Ingestion

Harvester

Metadata Translator
Web Crawling

**Creation**
- Manual
- Automated

**Translation**
- Format
- Standard / Schema

**Curation**
- Manual
- Assisted

**Ingestion**

- Portal 1
- Portal 2
- Portal n

**Crawling Engine**

**Metadata Generator**

**CMS Compliant Format**
Translation Issues

- **Variation in Subject classification standards**
  - Dewey Decimal Classification (DDC)
  - Library of Congress Classification (LCC)
  - Library of Congress Subject Headings (LCSH)

- **Mapping terminology for different languages**
  - *Translate* when equivalent terminology is present
  - *Transliterate* otherwise
Automated Metadata Extraction

**Creation**
- Manual
- Automated

**Translation**
- Format
- Standard / Schema

**Curation**
- Manual
- Assisted

**Ingestion**

Extractor and aggregator

Metadata Generator

CMS Compliant Format
• Automated metadata extraction workflow
• Syntactic metadata extractor
  ○ Author name, ISBN, Publisher, dates etc.
• Table of content extractor
• Wikification for keyword extraction
• Learning resource metadata
• Toolchain for metadata extraction

Once completed and tested, the toolkit will be released to public and open-sourced
• Experience Tracking
  o To offer customized search results
• Multi-lingual Support
  o Reduce cognitive load for native use
• Personalization
  o Customized UI to suit user grade

Experience API (xAPI) / Tin Can API

- Connects learning content and learning systems to record and track all types of learning experiences

Learning Record Store (LRS)

- Stores learning experiences

Infer:

Partha learnt – tiger is the national animal (of India)

... possibly

Source: https://tincanapi.com/overview/
UI Technology: Experience Tracking

LMS

NDL Repository

LRS

LMS Tracker

Search Tracker

Search/Browsing

Visualization & Analytics

Tin Can API

21/10/2016
UI Technology: Web Interface

API End Points:
- RestFul API endpoint
- CMS API, Index API and LMS API
- Parameterized access to the index
- API Sandbox

- Web interface is an app using NDL API
- Extended Search Features
  - Facet based search result refinement
  - DDC Topic tree based content browsing
  - Tag, comment on a content
  - Target group specific interface
  - Bookshelf
  - Rating and sharing
- NDL-Specific Features
  - Multi-lingual enablement
    - Multi-lingual query interface powered by Google transliteration
    - Cross-lingual search
  - Personalization
Copyright & License

HOW DOES NDL COPE WITH COPYRIGHT AND LICENSING ISSUES
Copyright Act, 1957 (Amendment 2012)

Is metadata copyrighted?

Yes / No / May be

Copyright of Metadata is contested

Source: http://lj.libraryjournal.com/2013/02/opinion/peer-to-peer-review/metadata-and-copyright-peer-to-peer-review/  

• Copyright is a bundle of rights given by the law to
  ○ Creators of literary, dramatic, musical and artistic works and
  ○ Producers of cinematograph films and sound recordings

• Rights are:
  ○ reproduction of the work,
  ○ communication of the work to the public,
  ○ adaptation of the work and,
  ○ translation of the work

• Creator / Author is the first Owner

• Ownership (Title) can be transferred (assigned)
Copyright of Metadata

• NDL principles as follows:
  ○ Vast Majority of Metadata is Not Subject to Copyright Restrictions
  ○ NDL’s Partners Share the NDL’s Commitment
  ○ NDL Asserts No Rights Over its Database of Metadata and Dedicates its Contributions to the Public Domain
  ○ Free and Unencumbered Access to Metadata

License Mechanisms

- **Content Access Views in NDL**
  - **Metadata View**
    - This shows the metadata of the item – as maintained in NDL
  - **Full Text View**
    - This shows the view and provides access to full text – offered by the content source

*A license encapsulates the rights & privileges that a copyright holder grants to someone else vis-à-vis something they have created*
Transport, magnetic, and Sn-119 Mossbauer studies on magnetically ordered valence fluctuating compound SmRuSn3

Source: IIT Bombay
Content type: Text
Publisher: AMER INST PHYSICS
File Format: HTM / HTML
Language: English
Subject Other: cerusn3
Abstract: SmRuSn3 is a unique compound among the known Sm-based valence fluctuation (VF) systems. Its crystallographic structure has two inequivalent Sn sites and Sm ions at only one of them are in VF state while the Sm ions in the other site orders magnetically. Our (119)Mossbauer studies show a quadrupolar splitting at the Sn site, consistent with the nonticubic symmetry of the Sn site. A broadening of the Mossbauer spectrum is seen due to magnetic ordering of the material. The transferred hyperfine field at Sn site at 4.2 K is small. (C) 1996 American Institute of Physics.

Other Identifier:
- JOURNAL OF APPLIED PHYSICS, 79(8):6349-6351
- 0021-8979
- http://dx.doi.org/10.1063/1.361996
- http://hdl.handle.net/100/1441

Source Page is rendered within NDL showing free Metadata
Transport, magnetic, and Sn-119 Mossbauer studies on magnetically ordered valence fluctuating compound SmRuSn3

Title:
Transport, magnetic, and Sn-119 Mossbauer studies on magnetically ordered valence fluctuating compound SmRuSn3

Author:
MAZUMDAR, C; HOSSAIN, Z; NAGARAJAN, R; GODDART, C; DHAR, SK; GUPTA, LC; PADALIA, BD; VIJAYARAGHAVAN, R

Abstract:
SmRuSn3 is a unique compound among the known Sm-based valence fluctuation (VF) systems. Its crystallographic structure has two inequivalent Sn sites and Sm ions at only one of them are in VF state while the Sm ions in the other site orders magnetically. Our (119)Mossbauer studies show a quadrupolar splitting at the Sn site, consistent with the monoclinic symmetry of the Sm site. A broadening of the Mossbauer spectrum is seen due to magnetic ordering of the material. The transferred hyperfine field at Sn site at 4.2 K is small. (C) 1996 American Institute of Physics.

URL:
http://dx.doi.org/10.1063/1.361996
http://dspace.library.iith.ac.in/xmlui/handle/10054/14612
http://hdl.handle.net/100/1441

Date:
1996
Access Options

- NDL presents a content with following options:
  - Open and Free
    - User can access from anywhere without any payment
  - Selectively Subscribed
    - User can access from subscribed institutional network
  - Subscribed / Purchased
    - User needs to pay / subscribe to get the content
  - Source Registered
    - User needs to register with the Source institute
  - Author Consensual
    - User needs to approach the Author to get the content
National Licensing

• An initiative by eSS:
  - e-ShodhSindhu: Consortium for Higher Education Electronic Resources

• Licensing being negotiated with Publishers
  - Institutional License:
    - Accessible from within designated institutional network: IP filtered
  - NDL Supported License:
    - Accessible if requested from NDL: Concurrent use-basis
Project Status
Completed:
Events: 11
Institutes: 400
Individuals: 800

Scheduled:
Events: 2
Institutes: 80
Individuals: 150
NDL Events

- Workshop @ INDEST Meet @ Mohali, 29/30-Apr-15
- National (East -I) IDR WS @ IIT Kharagpur, 15/17-June-15
- Regional (North-East) IDR WS @ IIT Guwahati, 04/05-July-15
- National Seminar on “Emerging Trends in Academic Libraries” @ IIT Kharagpur, 21-Aug-15
- Regional (North-I) IDR WS @ IIT Roorkee, 24/25-Aug-15
- ETD 2015 India @ JNU New Delhi, 05/06-Nov-15
- 4th NKN Annual WS @ JNTU Hyderabad, 21/22-Jan-16
- Regional (West) IDR WS @ M S University, 28/29-Jan-16
- National VC Address over NKN, 03-Feb-16
- Regional (South-I) IDR WS @ IIT Madras, 25/26-Mar-16
- Regional (South-II) IDR WS @ IISc, Bangalore, 20/21-May-16
- National Workshop for Open-Source Software for Library Management (OSSLM 2016) @ IIT Kharagpur, 13/18-Jun-16
- Regional (South-III) IDR WS @ IIIT, Hyderabad, 01/02-Jul-16
- Regional (North-II) IDR WS @ JNU, New Delhi, 01/02-Sep-2016
- Regional (North-East-II) IDR WS @ NIT, Meghalaya, 23/24-Sep-2016
- National VC Address over NKN, 26-Sep-16
- Regional (West-II) IDR WS @ IISER, Pune, 05/06-Oct-2016
- Regional (North-III, Medical) IDR WS @ AIIMS, New Delhi, 20/21-Oct-2016
- Lecture @ Jamia Millia Islamia, New Delhi, 21-Oct-2016
- NDL WS, PLANNER 2016 @ NEHU, Shillong, 09-Nov-2016
- Regional (Central) IDR WS @ NIT, Raipur, 18/19-Nov-2016
- Regional (East-II, Legal) IDR WS @ NUJS, Kolkata, 02/03-Dec-2016
- NDL WS, ICDL 2016, New Delhi, 14/16-Dec-2016
- International Conference on Digital Library, May/Jun-17 (tentative)
NDL Live:
https://ndl.iitkgp.ac.in/

NDL on Facebook:
https://web.facebook.com/NDLIndia/

NDL on YouTube:
https://www.youtube.com/watch?v=LEwAyHGKeLw
https://www.youtube.com/watch?v=qIZB-G9ywFo

NDL Project:
http://www.ndlproject.iitkgp.ac.in/ndl/
Publications


Status …

- Items: 15 lakh+
- Metadata: Version 1.0 of Standard Published
- Sources: 106 (IDRs: 70+)
- Registered Users: 2.5 lakh+
- Nature of contents
  - Subject domain: Most of the major educational areas (except medical and law)
  - Language: 10+
  - Learning Resource type: 15+
  - Educational Level: School Level (Class-I to XII) UG and PG
- Nature of Sources: 106 (IDRs: 70+)
  - Featured: 7 (DLI, Shodhganga, Shodhgangotri, Spoken Tutorial, SNLTR, OECD, Satyajit Ray Archives, JEE / GATE Questions & Solutions, South Asia Archives)
  - Crawled Repositories: 5 (NPTEL, Khan Academy, PhET, Project-OSCAR, LibriVox (audio books))
  - Manually-annotated sources: 6 (NCERT, CBSE, Boards of WB, Tripura, AP, Karnataka)
  - Through API: 1 (INFLIBNET N-LIST)
Status ...

- **Upcoming**
  - Integration Underway
    - IEEE
    - World eBook
    - PubMed
  - Advanced Stage of Negotiation
    - Various publishers under eSS
  - Exploration
    - UNESCO
    - Gandhi Heritage Portal
    - Digital Herbarium (BSI)
Summary

The only thing that you absolutely have to know (may use Google, though), is the URL of NDL:

ndl.iitkgp.ac.in

Rest you find in NDL

Why are you waiting?

- An umbrella over all IRs of India
- User-Centric Design
  - Multi-lingual Indic Interface
  - Multi-faceted Search
  - Multi-modal Filters
  - User Experience Tracking for Personalization
- Rich Set of Contents
  - National Licensing
  - Domain / Usage-focused Verticals
- Metadata Engineering
  - Metadata Standard
  - Open Source Toolkit
- NDL Services
  - Open APIs for 3rd party development
- Platform for Educational Ecosystem where all stakeholders participate, contribute and benefit
- Spearheads NDL Movement

'Ve only thing that you absolutely have to know, is the location of the library.'

Albert Einstein
Jai Hind!

Join

NDL Movement
to

Make-in-India

21/10/2016

IIT, Kharagpur

Prof. P P Das, CSE, IIT, Kharagpur
IDR Service

What is IDR Service?
- NDL will provide hosting for IDR, if needed
- Details on NDL Project Page
- Hosting service is based
  - Virtual servers loaded with 64-bit Ubuntu 14.04
  - DSpace (V5.2) Content Management System (Default interface)
  - PostgreSQL database engine and default DSpace User Interface.
  - Metadata registry as per NDL metadata schema
  - OAI-PMH (V2) is enabled to support harvesting of metadata
  - External connectivity is rendered through NKN

Scope
- Available for limited number of small institutions
- Limited to 5 GB space to upload e-contents and metadata
- No Shell access or customizable UI (logo & header allowed)
- Available for 2 years only
IDR Service

- Institutional Eligibility
  - Is affiliated with or accredited by a Central or State education body
  - Has at least 500 learning e-contents with metadata
  - Agrees to populate metadata as per NDL metadata schema
  - Permits access of its IDR to NDL for harvesting metadata
  - Extends archiving rights to NDL (harvested metadata & contents)
  - Allows searching, browsing & downloading for educational purpose
  - Maintains backup of all metadata and contents

- How to Apply?
  - Download form from NDL Project
  - Head of the Institute to identify and assign anodal officer to coordinate with the Team NDL
  - Agreement to be signed by the Institute with NDL
Use Case: Content Access
Use Case: Content Contribution
Use Case: Web Content Harvesting
Use Case: LMS

1. Front-end Server
2. Video Streaming
3. Central Content Storage
4. Index Database
5. Search and Navigation
6. LMS
7. LMS Database
8. Non-video content
9. Video content
10. Student
11. Course developer

IIT, Kharagpur 21/10/2016 Prof. P P Das, CSE, IIT, Kharagpur
Manual Annotation Workflow

1. Login to NDL
   - Choose Content Reference from ‘content-distribution.xlsx’ File

2. Browse Community Structure to find the collection
   - Click on submit new item link
   - Populate Generic Metadata

3. Select Content
   - Find Directory Structure from ‘content-distribution.xlsx’ File
   - Browse Directory Structure
   - Select Content

4. Self Review or Edit
   - Upload Content File
   - Populate Thesis Metadata
   - Populate Educational Metadata

5. Submit
   - Skip this step for external resources

IIT, Kharagpur
21/10/2016
**Automatic Crawling Workflow**

1. **Portal With Service Endpoints**
   - Response Object Parsing
   - Pattern Matching and Language Processing

2. **Portal W/O Service Endpoints**

3. **SIP Generation**
   - Community/Collection Hierarchy
   - Batch Submission
Metadata Translation Workflow

1. Harvest IDR in Harvesting Server
2. AIP Backup of Harvested Data
3. Metadata Translation (Automated)
4. IDR Specific Metadata Mapping
5. AIP Restore in Live System
Automatic Metadata Extraction Workflow

1. Upload Content Set
2. Extract Metadata
3. Curate Metadata
4. Ingest in Repository
5. Create Repository Format