National Digital Library: A Platform for Paradigm Shift in Education & Research in India

A Platform for Paradigm Shift in Education & Research in India

NDL PILOT PROJECT: 2015-18
VISION & MISSION

4th Annual NKN Workshop
NKN at the Core Cyber Space

NMEICT: National Mission on Education Through Information and Communication Technology

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Challenges faced by India in Education

- Wide geographic expanse & Large population
- Huge number of students – rapidly growing student base
  - Indian HE system is the largest in the world enrolling over 70 million students
- Large number of institutions
  - 1,24,500 secondary schools and over 11 Lakh elementary schools [Source: MHRD – NISG Report]
  - 659 Universities, 33,023 colleges and 11356 Stand Alone Institutions [Source: FICCI HE Summit 2012]
  - India needs to build 6 universities and 270 colleges every month in the next 20 years
- Varied linguistic diversity
- Severe lack of Teachers
- Lagging behind in digital initiatives
  - Lack of quality e-content in various digital forms and formats
  - Poor quality of connectivity due to lack of infrastructure
- ...

TEL with National Outreach
National Perspective

- Make-in-India knocking at the door
- Digital India, Smart Cities, ...
- Large volume of Content from several projects
- Big population of quality institutions
- Various nation-wide infrastructure
- ... YET ...

One cannot find what one needs
Overt memorization in coaching impairs learning
MOOCs is only toddling
Virtual University only in the virtual world
... HOWEVER ...
A National Digital Library can help
NDL Project – A 3-years Pilot

- Development of National Digital Library of India – Towards Building a National Asset
  - An NMEICT Project
  - Hosted and Coordinated by IIT Kharagpur
  - Pilot: April, 2015 – March, 2018
  - To Build a Model for Digital Library Integration in India

- We present the Vision and Mission, Challenges and Opportunities, and Objective and Design for NDL
BUILD UP NATIONAL DIGITAL LIBRARY (NDL) 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
Overview

- National Digital Library
  - will be a national asset that is a key driving force for its education, research, innovation and knowledge economy
  - will cover the gaps that exist in the wide range from literacy to advanced knowledge discovery and development of knowledge
  - will enable integrated knowledge gathering on diverse topics on core issues from economic, strategic and social sectors
  - will help personalized, self-paced, new-age multi-media education at all levels
  - will ...
  - Not a new Library, but an umbrella over existing ones
NMEICT Objectives

• “Catering to the learning needs of more than 50 crore Indians (working population) and of providing a one stop solution to all the requirements of the learning community”

• ...

• “Knowledge modules based on the personalized needs of the learner would need to be delivered to him / her at the right time with the right content interactively to take care of his / her aspirations”

Initiatives ...

- Generate Contents
- Create Repositories
- Develop Dissemination Channels
- Build Learning Platforms
  - MOOCs Model (Massive Open Online Courses)
- Set-up Infrastructure – NKN, Baadal
- Integrate Stakeholders
- ...

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Roadblocks in Delivery

In spite of so many initiatives, benefits are yet to reach the masses due to several reasons including:

- Repository Service Issues
- Integrated Learning Issues
Repository Issues

- Users have to visit individual websites to access e-resources. No single window search facility for accessing all available digital resources
- Users need to learn retrieval techniques / search techniques separately as different Digital Library (DL) follows different DL software
- User interfaces, often, are not interactive, collaborative and participative
- Few mechanisms are available for differently abled learners
- Absence of vernacular access & limited contents
- Knowledge Repository on most subjects are not yet available for scholars
Integrated Learning Issues

- Few e-Learning environments for the students and teachers that access information from all available sources
- Distance mode of learning in India is helping mainly to increase learner-base not the knowledge-base as effectively as needed
- Non-integration of learner-learner, teacher-teacher and teacher-learner communication tools within learning environment
- Learning resources are generally outside the integrated learning environment
National Digital Library

- Content Creation
- Content Search
- Learning Content
- Experience-based Learning
- Multi-Lingual Content
- Mobile Apps
- Authoring Services
- Acquisition Services
- Digital Repository
- Dissemination Services
- Learning Services
- Personalization Services
- Localization Services
- Open Services ...
- Learning Content Experience
- Multi-faceted Interface
- APIs
- National Digital Library

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Approach NDL ...

- ICT and e-contents @Schools, @Colleges, @Universities to help minimize knowledge gap
- Collaborative e-Learning Framework for all stakeholders to work together in the learning phase
- Facilitate & Empower Self-Based Learning Framework (SBLF) – the next most important learning phenomena
- Tablet & mobile devices to play a major role in SBLF
- New apps for accessing e-contents from NDL
- Entrepreneurs to participate to design and develop application software for providing value added services
Objectives & Scope

- 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
Design Goals

- Stakeholders
- Use-Cases
- IT Infrastructure – Architecture
- Metadata Standard
- Automation & Technology
- Copyright Protection
- Inclusiveness & Openness
- Awareness and Dissemination
- Sustainability
Design Goals

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## Design Goals

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**WEB**

**Manual submission**

**Harvest**

**Content Repository**

**Course Repository**

**Course Authoring (LMS)**

**Course Access (LMS)**

**Repository Search and Browse**

**NDL API**

**General User**

**Student**

**Course Developer**

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22/01/2016  
IIT, Kharagpur (4th Annual NKN Workshop)
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NOT REALLY!

OPEN VIRTUAL STANDARD

Source: “Standards” from XKCD by Randall Munroe http://xkcd.com/927/
Design Goals

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- Use-Cases
- IT Infrastructure – Architecture

**Metadata Standard**
- Automation & Technology
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**Metadata**
- Dublin Core (generic)
- LRMI (educational)
- NDL Metadata

**Shodhganga** (thesis)
- researcher
- keyword
- advisor
- place
- department
- institution
- awarded
- degree

**Board**
- difficultyLevel
- typicalLT
- prerequisiteTopic
- typeofLM
- pedagogicObjective
- educationLevel
Design Goals

- Automated Extraction / Curation of Metadata
  - Extraction from PDF, DOC, HTML
  - Indexing of Videos – Xerox
- Crawling of Web Repositories
  - Khan Academy
- Harvesting of IDR – Institutional
- Integration of Repositories
  - NCERT
  - DLI
  - Publishers – IEEE, Springer, CRC, ...
- Federated Search
  - INFLIBNET
- Interface for the Differently Abled
  - SPARSHA

- Integration of enabling Technologies
  - Video indexing by Xerox
  - Microsoft Academic
  - Google OCR / Translate
- Multi-lingual Support
  - Interface
  - Search
  - Content
- Disaster Recovery – Onsite and Offsite
- IDR Service
  - Enabling small institutions
- NDL API Layer
  - Creating an Open System

- Stakeholders
- Use-Cases
- IT Infrastructure – Architecture
- Metadata Standard

**Automation & Technology**
Design Goals

- NDL deals *only with metadata* (copyright free)
  - Freely available
  - Institutionally provided
  - Made available under MoU

- Full Text Access governed by Copyright Status
  - Free access
    - To Open documents
    - To Contributed contents
    - Based on bipartite understanding between user and provider
  - Paid access based on bipartite understanding between user and provider

- National License (arranged by NDL / Ministries)
  - ISRO
  - Satyajit Ray Archives
  - INFLIBNET / INDEST

- Stakeholders
- Use-Cases
- IT Infrastructure – Architecture
- Metadata Standard
- Automation & Technology

**Copyright Protection**
- Inclusiveness & Openness
- Awareness and Dissemination
- Sustainability
Design Goals

- Public Institutions
  - IIT, IISc, NIT, IIM, IISER, IIEST, ...
  - School Boards
- Private Institutions
  - Amity, BITS, Manipal, ...
- Publishers
  - IEEE, Elsevier, Springer, ...
- Service Providers
- Domains
  - Science and Engineering
  - Medical
  - Law
  - Culture and Heritage
  - Humanities and Arts

- User Segments
  - Learners
  - Educators
  - Government
  - Differently Abled
- Open Access
  - Information
  - Technology & Infrastructure
- Technology Partners
  - Google, Microsoft, Xerox, Flipkart, ...

- Stakeholders
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- Copyright Protection
- **Inclusiveness & Openness**
- Awareness and Dissemination
- Sustainability
Design Goals

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- Workshop @ INDEST Meet @ Mohali, 29/30-Apr-15
- National IDR WS @ IIT Kharagpur, 15/17-June-15
- Regional IDR WS @ IIT Guwahati, 04/05-July-15
- National Seminar on “Emerging Trends in Academic Libraries” @ IIT Kharagpur, 21-Aug-15
- Regional IDR WS @ IIT Roorkee, 24/25-Aug-15
- ETD 2015 India @ JNU New Delhi, 05/06-Nov-15
- 4th NKN Annual Workshop @ JNTU Hyderabad, 21/22-Jan-16
- Regional (West) IDR Workshop, 28/29-Jan-16
- Regional (South) IDR Workshop, Jan/Feb-16 (tentative)
- ...
- International Conference on Digital Library, Aug/Sep-16 (tentative)
Design Goals

- Creation of High Value Proposition
- Inculcation of Open Culture
- Self-Supporting Revenue Model
- National Licensing
- Clean Copyright Policies
- Effective Crowd-Sourcing Mechanism

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- **Sustainability**
Status ...

- **Items:** 11 lakh+
- **Metadata**
  - Version 1.0 of Standard Published
- **Sources:** 58 (IDRs: 40+)
  - Crawled Repositories: 4 (NPTEL, Khan Academy, PhET, Project-OSCAR)
  - Manually-annotated sources: 4 (NCERT, CBSE, West Bengal Board, Tripura Board)
  - Through API: 1 (INFLIBNET N-LIST)
  - Direct: 6 (DLI, Shodhganga, Shodhgangotri, Spoken Tutorial, SNLTR)
- **Nature of contents**
  - Subject domain: Most of the major educational areas (except medical and law)
  - Language: 10+
  - Educational Level: School Level (Class-I to XII) UG and PG
Events ...
NDL Live:
http://ndl.iitkgp.ac.in/

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

Join NDL Movement to Make-in-India