Indian Agricultural Libraries in Digital Era : Content Management System

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ABSTRACT

The paper discusses how agricultural libraries have transformed in digital era. The changing trends in building collection, levels of automation, digitations, visibility of libraries on university web page,access to e-resources, information literacy and digital content. The agricultural libraries have gone through a considerable change in their operations and services, most libraries have the basic ICT tools and infrastructure in terms of both hardware's systems and application software's. Grants from ICAR has encouraged libraries to take up digitization projects like KrishiPrabha and resources sharing activities for example e-Cranth, IDEAL, CeRA and also improved their services by bringing libraries and users community into closer proximity virtually by removing boundaries.

Key words   *Digital content management, KrishiPrabha, E-granth, IDEAL,CeRA.*

The advent of information and communication technology has shown remarkable changes in the flow, contents and formats in which the information is presented. Keeping pace with these technological developments, the libraries are now moving towards the era of digitalization and collaboration to provide efficient retrieval system and access to information round the clock. The agricultural libraries have been integral part educational process and have been playing a significant role in shaping the future of education, research and extension activities in the country. The information professionals of agricultural universities have gone a long way in molding the future of the libraries and adapting it to the latest technological developments from time to time.

Scope limitation and Method

The scope of the paper is limited to the university libraries and learning resources of agricultural universities library and agricultural research centre. Details about transformation of agricultural libraries in digital era in terms of services and major changes in operations for delivering knowledge, the efforts made by the libraries from automation to building e-resources/institutional repositories, digital content management, and consortiums, etc. are discussed. Terms like libraries information centers and learning resource centers are used simultaneously. Websites of library home pages linked to agricultural universities were studied to find examples of services implemented using various ict tools.

Digitation of Agricultural Libraries in India

The agricultural libraries in the country have strengthened their efforts to reorganize their resources as per the need of the digital era and to bring libraries and users in close proximity and also further develop these resources in order to deliver library services in new and interesting ways. The launch of World Bank aided National Agricultural Technology Project (NATP) in 1998 and National Agriculture Innovative Project (NAIP) in 2006 had marked new

Chapter in agricultural research, these projects broadly aims to make agricultural research knowledge based, and IT oriented so that it can cater to the market and meet the fast changing consumer demands. ICAR which is implementing the projects is reaching out centers like agricultural universities, science and technology institutes, private bodies, etc. for innovative ideas and research. Agricultural libraries consortium CeRA (the Consortium for e-Resources in Agriculture) and are providing access to more than 3000 e-journal of national and international repute, besides, strengthening of digital infrastructure in terms of computers systems, application softwares, Local Area Network and VSAT or leased line Internet facility

All those libraries are provided with CD-ROM databases searches by subscribing to *CAB Abstracts*, *AGRIS*, *AGRICOLA*, *VET-CD*, etc. Some libraries are also subscribing to *EBSCO*, *PROQUEST,* and e-journals, etc. Moreover, it is encouraging to note that the collaboration between agricultural specialists and information specialists are increasing. In order to revitalize the agricultural information environment in India, ICAR has taken major steps to develop an AGRIS. During eighth five year plan, ICAR has embarked upon a project called AGRIS to bring the power of information technology to the NARS.

E-Granth Project

Strengthening of Digital Library and Information Management under NARS (e-GRANTH)' is a subproject under component of National Agricultural Innovation Project (NAIP), Indian Council of Agricultural Research (ICAR). National Agricultural Research System (NARS) in India comprises of Agricultural Research Institutions

An Agricultural University, It provides digital access to library resources of 16 different research institutes and agricultural universities which include OPAC, important institutional repositories, rare books and old journals and makes them publically accessible over internet under NARS with Online Computer Library Center (OCLC) partnership.

Ideal

IDEAL is a ready platform for Agricultural Libraries of Indian National Agricultural Research & Education System (NARES) which enables them to adopt Integrated Library Management System for their day to day operations of all their library functionality. It is a software platform built on 'Software as a Service' (SaaS) concept to provide hassle free, ready to use, international standards based platform for sharing library holdings through an union cataloge (AgriCat). An integrated digital library delivered at the desk of researchers, faculty and students of NARES can definitely boost the quality of research output and save time. Libraries can reduce cost incurred in procuring books & other library resources by sharing through this digital system. At present 38 libraries of NARES as a part of eGranth project supported by National Agriculture Innovation Project (NAIP) of Indian Council of Agricultural Research (ICAR) have endeavor to establish IDEAL platform which is easily extendible to more libraries covering whole NARES. Integrated catalog of whole NARES (AgriCat) provides access to holdings of other libraries of NARES.

Consortium of E –Resources In Agriculture

ICAR is having network connectivity across institutes and state agricultural universities, select journals could be made available over the network for the use of scientific community. Accordingly, the Consortium for e-Resources in Agriculture (CeRA) was established in November 2007 for facilitating accessibility of scientific journals to all researchers / teachers in the National Agricultural Research System by providing access to information specially access to journals online which is crucial for having excellence in research and teaching.

Krishi Prabha

Indian agricultural Doctroal dissertation repositories (KrishiPrabha) are a full-text electronic database of Indian Agricultural Doctoral Dissertations submitted by research scholars to the 45 State/Deemed Agricultural Universities during the period 2000 to 2014. This database, listing about 7900 Doctoral Dissertations with a full text of about 6250 Dissertations has been created by Nehru Library, Ch. Charan Singh Haryana Agricultural University, Hisar with financial support from Indian Council of Agricultural Research, New Delhi under its National Agricultural Innovation Project.

Development of Instructional Repositories

ICRISAT is a first Open Access Repository in agricultural sciences in India to be established in May 2009. The ICRISAT had taken lead in the movement and organized Consultation on Enhancing Open Access in Indian Agriculture duringSeptemember 2009 at Hyderabad. The outcome of the consultation is the Eprints@IARI, the Open Access Institutional Repository of the Indian Agricultural Research Institute which was established in the same year (2009) during November and OpenAgri, Open Access Agriculture Research Repository under the Agropedia of

National Agricultural Innovation Project (NAIP) in February 2010. These developments made Central Marine Fisheries Research Institute to establish its Open Access Institutional Repository, Eprints@CMFRI; Dspice@IISR by Indian Institute of Spices Research in June 2010; E-Repository@IIHR by Indian Institute of Horticultural Research in January 2011.

A part from thematic repositories like Agropedia and OpenAgri under NAIP, establishment of thesis repository for agricultural sciences in India was initiated in March 2008 under the name 'Krishiprabha'. It houses all the doctoral dissertations submitted to various agricultural universities. It is now housing, about 6000 dissertations and is hosted by Chandhary Charan Singh Haryana Agriculture University, Hissar. Unfortunately its of closed access and is only open to the consortium partners and other constituents of the National Agricultural Research System in India. However, the ETD@UASD, thesis repository established by University of Agricultural Sciences, Dharwad is freely available for download and use

AGRIS project

IARI Library was declared an input centre for national agricultural research database (NARD) under AGRIS Project. The Library was assigned the job of scanning articles from 10 most important Indian journals. The input was done in ISO format using AGRIN methodology. During the period under report, 392 articles were scanned, processed and sent to DIPA, ICAR for inclusion in AGRIS Index.

NARS

Indian National Agricultural Research System (NARS) has a very large collection of institutional repositories in agriculture and allied sciences, spread over the country in different libraries of ICAR Institutes and State Agricultural Universities (SAUs). Digitization of these valuable archives would allow online access to researchers, teachers and students to which they would not otherwise have an easy access. Duplication of record creation can be avoided by pooling the efforts through common electronic protocols.

DIGITATION OF AGRICULTURAL INFORMATION

Digital technologies and online information resources have brought fundamental changes in how the research is done. The most important component of digital library, however, is its digital collection. The information content of a digital resource includes virtually any kind of electronic media licensed database of journals, articles, and abstracts. Before developing a digitised system, it is pertinent on the part of the information specialist to determine the users group in agricultural sectors and their needs. Agricultural information users are agricultural scientists, faculty, researchers, students, extension workers, farmers, policy makers, administrators, and industrialists. Another important aspect is the users' competency of using digitised

information. The information specialist has to fully ensure that those users coming under ambit must be aware of such digitised information use so as to help develop a successful digital library. Digitisation is the answer to high cost involvement in the duplication of resources in all the libraries. It facilitates live and interactive access to wide variety of content online. It is an ideal solution for budget constraints, staff crunch, and space limitation for growth. Valuable archives owned by libraries are required to digitize so as to allow online access to researchers, teachers and students to which they would not otherwise have easy access.

Digital Content Creation

Content creation may seem like a important function for libraries, but it's nothing new. If you think back to the traditional library of yesteryear, you will notice plenty of examples of content being created. Digital content creation will be an integral part of the library's future. Digital content directly supports the teaching and research objectives of the University's faculty, staff, and students.

Selection and creation of digital content on a large scale will eventually necessitate fundamental structural changes in library access services. Comparing our permanent, dedicated digital library staff to peer institutions we not only lack a sufficient number of programmers dedicated to Digital Library development, but several key positions, including a metadata librarian, project specialists, and production supervisors do not currently exist. As the IT assessment report points out, the Systems Office spends much of its supporting the technical infrastructure and production systems that are critical to the Library's daily operations. Furthermore, the incumbent head of Digital Services and Development will begin his/her tenure with a skeleton crew. With isolated exceptions, library faculty has not pursued large-scale grants to digitize collections. Finally, the use of appropriate standards to create and manage on-line content has been spotty at best.

These challenges should not be minimized. On the other hand, many factors show that universities well placed to undertake large-scale digital content creation. The library's collections include large caches of unique materials worthy of large-scale digitization. Many of these items are in the public domain. Faculty and staff have developed expertise in working with XML, OAI, and database technologies that undergird digital libraries.

Stages of Content Creation

The usual five stages in digital content management are:

1. Creation
2. Editing
3. Publishing
4. Oversight, including managing updates and version control.
5. Removal.

Types

The content creation authority needs to know what types of contents are to be created. Before determining the types of contents here, it is necessary to ascertain the process of content creation which is basically divided into two types: (1) Dynamic content and (2) Static content. Dynamic contents are those multimedia components that are primarily treated as moveable in nature. Such contents are audio, video, both audio-visual video conferencing, songs, movie clips, etc. But the static contents are presented in the form of texts, pictures, graphs. However, the type of digital contents for creation can be categorized as graphics, texts, multimedia, databases, and file from websites.

Infrastructure

Digital Content infrastructure elements of systems that manage large quantities of digital materials that one would think of as a digital library, whether created through mass digitization efforts or through large-scale digital projects. An examination of the infrastructures of a few make it possible to understand the diverse approaches each has taken to manage digital content. Although there are many smaller, specialized digital libraries, creating libraries through mass digitization and large-scale efforts poses particular challenges that come with scale and breadth of materials. The following points related to the digital infrastructures used for managing content:

1. Storage and Content delivery
2. Metadata Approaches and Harvesting
3. Search and Discovery
4. Services and Application
5. System Sustainability.

Software

Digital content creation (DCC) software market for applications running on PC based computer platforms or UNIX workstations. Digital content creation software enables the creation or modification of digital content, such as animation, graphics, images or video, as part of the production process before presentation in its final medium. Software for scanning, optical character recognition (OCR), word processing, spell-checking, image management. Video and audio capture is required to manage the conversion process. Software tools— Photoshop 6.0, Omni Page Pro 11.0, Acrobat 6.0 and Drupal, Vignette, Red Hat, FrontPage 2000 are useful programs for content creation.

Metadata approaches and harvesting

Metadata format

Many large digital libraries use the Dublin Core metadata standard, although most add elements to support the services they provide. Large digital collections that use a common repository platform, such as many of the large U.S. state digital libraries, do less customization. Aggregators who harvest metadata from content providers usually publish metadata requirements, and the providers

are often responsible for ensuring that their metadata meet the specifications. Large digital libraries with sufficient staff support may take the metadata from the providers, along with a mapping, and they get the metadata into the needed format for the repository. As the quantity of digital objects grows to hundreds of thousands of items, organizations sometimes find that they need a new approach to their digital library data model. NINES (Nine Nines Support) initially planned to manage all content centrally, with protocols for submission; it was assumed that content would be marked up in TEI XML and that a METS wrapper would be used to describe and link the resources. After a few years, however, it became clear that the collections in NINES could grow much more significantly using a federated approach and adopting a more widely used metadata standard that would capture content stored in scholarly repositories. NINES now require content providers to submit their metadata in a DC "flavor" of RDF. Although the burden is on the provider to conform to the metadata requirements, providers

Management of Metadata with Content

Metadata can be either loosely or tightly coupled with its corresponding digital content objects. Proponents of loose coupling argue that separating the metadata from the objects supports better scalability for the digital library and better performance for searching and browsing. Since metadata is generally structured and comparatively very small, it can be searched rapidly and efficiently. By contrast, the objects being described by the metadata can be extremely large, especially when they are multimedia objects. Keeping the objects and metadata loosely coupled allows additional storage to be added and objects migrated across that new storage without affecting the metadata, except for noting where the object resides on the disc so it can be retrieved when requested. Searching, therefore, remains robust, delivering better overall performance for end users. Platforms such as DSpace support this type of architecture for metadata.

Content Management Organisation

To make the digital library system viable, some organisations have cropped up to take the responsibilities of content creation and management. The libraries may use the services of BLU Ecloud suite (BCS), Sirsi Corporation, Dynix corporation, Innovative Interfaces Inc, Bibiliotech Review, Library Technology Guides, Innovative Internet Application in Libraries, Auto Graphics Inc., Sagerbrush Corporation and OCLC Web Express Service Centre, etc. These are some of the leading organisations working for digital content creation and management for the libraries and information centres.

Case Study

Web-based Information Services for Agricultural Research for Development (WISARD) is a platform for providing access to projects, experts, organisations, and other outputs including documents, articles, and web pages.

WISARD is a database of organisations, experts and projects in agricultural research, natural resource management and content development. Organisations and individuals upload their contact details and research expertise to WISARD and can also deposit research outputs such as publications, conference proceedings and project reports. It can be used to search such literature or as a social networking tool. The database includes biotechnological applications in agriculture and crop improvement from around the world.

It is also used as a platform for creating customized portals by other organisations such as FARA, the CGIAR Project Portfolio archive, the InterSard Good Practices database, and the FAO Global IPPM archive. The FAO CARIS projects database is currently integrated with the WISARD platform which now contains over 55,000records5. Developers of WISARD products, based in the Netherlands, are actively engaged with GFAR, FAO, DFID, CTA, and CGIAR in 'coherence' initiatives. The new web 2.0and 3.0 tools and approaches also are being developed for FARA and a global horticulture portal including an open source discussion application and open source virtual learning environment. The organisation is engaged in content creation and management in agricultural subjects for a wider dissemination of web-based information to the worldwide.

Embedding Metadata Object Description Schema (MODS) and Metadata Encoding and Transmission Standard (METS) in metadata has also been successful. As Tim Cole has noted, the challenge with TEI is that there is not a canonical XSD for it. The modularity of TEI allows providers to define an XSD for a given module. There does exist a "tei-all.xsd" to use as a default, but it does not represent the breadth of TEI usage. TEI headers are generally the key elements for exchanging metadata files in collections marked up with TEI, and providers will create their own XSD for the headers. A similar challenge exists with RDF. As with TEI, there is no canonical XSD to support RDF; indeed, there is resistance within the RDF community to the development of an XSD, because it would be almost impossible to capture all of the nuances in the RDF data model (Tim Cole, personal communication). The IMLS DCC/ Opening History team has, however, found some workarounds to enable sharing of RDF metadata.

CONCLUSION

Agricultural libraries have embraced technology and are using a number of practical ways to disseminate information to their users' community. Digitization and resources sharing of information sources is fast Government financial support and good policy making from time to time are required for sustainable development of digital information resources management in agricultural libraries and information centers.

The modern library systems and services have developed the mechanism of content creation and

management in digital formats, which would be available in the networked environment. Agricultural libraries are no exception to it. Under the ambit of ICAR, initiatives have already been taken to digitize the agricultural book collection through e-Grantha, conversion of PhD theses of agricultural universities and research institutes into digital format through the project *KrishiPrabha*. A consortium of e-resources in agricultural (CeRA) has already been working successfully.

Open access publishing has already entered into the agricultural publishing industries in India. All those initiatives became possible in converting the print resources into digital. It is because digital content creation has become the necessity of this modern day information dissemination process. Libraries have to develop the necessary infrastructure for content creation and management, develop metadata harvesting and adopt content managements operations. Thereafter, it would be possible for them to disseminate the information in a web based networked environment for a wider use.

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