

UNIT- 7

E-REPOSITORIES AND USEFUL E-RESOURCES

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7.1 INTRODUCTION

The advent of Internet has considerably changed the scenario of people and every domain of the world. If we are talking about the libraries and its functions, it has led to incredible change in the way libraries function and offer services to their users. In today's scenario, the libraries actively obtain, organize, display and issue e-forms of books, journals, newspapers, theses and dissertations.

This is also due to revolutionize in information seeking behavior of users. The modern era of users prefers online resources as they want all information at the click of a mouse. The e resources have certain inherent characteristic features that offer convenience to the users. This lesson discusses the concept and importance of e-resources. It deals with different types of e-resources, their advantages and disadvantages. We will also discuss electronic resources such as E-Books, E-Journals, E-Databases, etc., their maintenance problem and solutions.

7.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Know about e-repositories and e-resources.
- Define types of e-resources.
- Explore the various e-repositories/ platforms.
- Managing e-resources.

7.3 E-REPOSITORIES: AN OVERVIEW

The meaning of the term ‘digital repository’ or e-repository is widely debated. Contemporary understanding has broadened from an initial focus on software systems to a wider and overall commitment to the stewardship of digital materials; this requires not just software and hardware, but also policies, processes, services and people, as well as content and metadata.

Repositories must be sustainable, trusted, well supported and well managed in order to function properly (Abbott, 2006). The first joint initiative of the National Science Foundation (NSF), Department of Defense Advanced Research Projects Agency (ARPA) and the National Aeronautics and Space Administration (NASA) in 1994, funded six digital library and e-repositories development projects for a period of four years, among six academic institutions.

Definitions of Institutional Repositories- There are many definitions described by different experts, some of them are mentioned below-

[1] According to Crow 2002, “an Institutional repositories are a digital collection for capturing and preserving the intellectual output of a single or multi-university community” (Crow, 2002).

[2] An Institutional Repository is a digital collection of a university’s scholarly/ creative output. IRs are collected, preserve, and make accessible the knowledge generated by academic institutions. IRs also forms part of a larger global system of repositories, which are indexed in a standardized way and searchable using one interface, providing the foundation for a new model of scholarly publishing Drake, 2004).

[3] An institutional repository is a web-based database of scholarly material which is institutionally defined (as opposed to a subject based repository), cumulative and perpetual (a collection of record), open and interoperable (i.e., Using OAI compliant software) and thus collects, store and disseminates (is a part of the process of the scholarly communication) (Ware, 2004).

Types of Institutional Repositories-

Institutional repositories generally can be classified into the following three categories.

[1] Institutional Repository: An institutional repository target to host and provide access to the resources related to or produced by a specific department or Organization. Institution specific repositories can handle all the outputs and resources owned by and related to the institution itself.

[2] Discipline Institutional Repository: An Institutional repository that hosts the resources deals with a subject or a specific type of resource. Such types of Institutional Repositories are confined to specific subject field of interest.

[3] Aggregator: A repository that collects the resources from other institutional repositories.

Some examples of Institutional Repositories in Indian context are-

a) Shodhganga: Shodhganga is a joint venture of UGC and INFLIBNET. INFLIBNET takes an active role in making it mandatory to submit the electronic copy of a thesis whenever the research scholars submit their thesis to the respective university or institutions for the PhD degree in India.

b) INFLIBNET's Institutional Repository: INFLIBNET Centre develops INFLIBNET's Institutional Repository by using DSpace software. It hosts Press and Media related documents, Annual Reports, Convention Proceedings, Special Seminar, newsletters, etc. related with INFLIBNET.

c) EPrints@IISc: EPrints@IISc repository collects, preserves and disseminates in digital format the research output created by the IISc research community.

d) EPrints@CMFRI: is the Open Access Institutional Repository of Central Marine Fisheries Research Institute.

Activities of e-repositories:

- Any digital content may be deposited, whether by the content creator, owner or third party.
- The repository architecture can manages content as well as metadata.
- The repository offers a minimum set of basic services e.g., put, get, search, access control
- An academic repository allows students, teachers, researchers and academic staff to easily keep their digital documents. In this way, stored content becomes available to people who want to read it, either inside or outside the university.

What type of contents digital academic repositories store?

Digital repositories may store the following types of content:

- Derived or raw research data.
- Full-text preprint scholarly research papers.

- Full-text peer-reviewed final drafts of journal and conference proceedings papers, such as- Electronic journals/ articles, e-Books and e-book chapters, Theses, dissertations, etc.
- Full-text original publications (institutional or departmental technical reports).
- Other learning objects, such as-Audio / video / multimedia materials, Photographs / images, Convocation addresses, Programs / software's, Annual reports / manuscripts / maps, Newspaper clippings / articles, etc.
- Corporate records (staff and student records, licenses, etc.).
- Bibliographies, Unpublished reports, Data sets resulting from research projects.

Benefits of using digital repositories-

- Digital repositories need not have any physical margin, it is available throughout the world due to internet connection only.
- Enables both metadata and the intellectual object to be stored in the same place, in a persistent manner.
- Preservation and conservation are the most important aspect of the digital repositories.
- The Digital Library brings the library to the user.
- Digital library improved access such as searching and browsing.
- Information can be shared more easily in digital library.
- In digital library it is easier to update information quickly.
- Information is always available 24x7.
- Allow collaboration and exchange of ideas.

Limitations of Digital Repositories-

The computer viruses, lack of standardization of digitized information, quick degrading properties of digitized material, different display standard of digital product and its associated problem, etc. makes digital repositories at times handicap.

- Digitization violates the copyright law easily.
- Speed of access decreases due to a number of connections are increasing.
- The infrastructure cost of digital repositories is very high.
- Digital repositories need high band for transfer of multimedia resources.
- Finding the authenticate material is very difficult.

7.4 PLANNING AND IMPLEMENTATION OF INSTITUTIONAL REPOSITORY

Institutional Repositories (IR) are developed primarily for collecting, preserving and disseminating the intellectual output of an institution. For the successful set up of an Institutional Repository, strategic planning is required with a predetermined goal and scope as well. Institutional Repositories (IR) are developed primarily for collecting, preserving and disseminating the intellectual output of an institution. The basic objective of the segment of

this unit is to discuss the steps to provide a roadmap for setting up an institutional repository in an academic institution.

[1] A strategic plan for setting up an Institutional Repository: To achieve success in any project perfect planning is a must. A planned scheduling is required before developing the digital institutional repository for any institution. The major factors focused are the financial background of the institution and the library as well, manpower, infrastructural requirements of the project, policy decisions to be considered, management team of the project, preparing an activity chart for the project and monitoring the implementation etc.

[2] Deciding the Objectives: Before scheduling with the project, the broad objectives of forming an Institutional repository have to be decided. The objectives decided for MES's IMCC Digital Institutional Repository are:

- To acquire and preserve the teaching and learning material in digital format, generated by the faculty members and make it accessible to the users.
- To capture and save the research projects and related contents in digital form, and make it available on Intranet to the students and faculty members on the Institutional campus.
- To serve as mediator between the digital research content and the users through the Intranet Institutional Repository.
- To develop manpower of library for providing better digital library services.

[3] Framing the Polices: The most important factors are determined before actually starting the project work. The factors such as management of the repository, the system support, customization and services provided through the repository system must be correctly framed. Further the strategic decision regarding the workflow of submission process has to be decided.

[4] Initial approach: Preliminary study is likely to reveal a series of following questions:

- What is the target content of the repository?
- Are all content types to be managed in a single repository, or more than one?
- What other systems and services might the repository be required to share information with?
- Does the budget support the requirement?

A key factor in cost considerations is not which software, but how it is delivered and support. There may be various types of IR software like D-Space, EPrints, Fedora are OSS (Open-Source Software). However, some of the software may be Commercial/Proprietary Software like- CONTENTdm, SirsiDynix Portfolio™. In Preliminary phase, it is significant to choose the IR Platform. It may be that numerous vendors can choose the open-source software. Because, these are free to download, install and use, but there is an ongoing cost to implement and maintain the repository, depending on the complexity and facility to configure

it for use. Some technical consideration may also require like platform needs, server operating system, Content Organization & Control, Interoperability, Accessibility, programming requirements and administration to manage or control of software etc.

Further, the end user reaction is taken through the discussion. A relative study of the various software's should be conducted with the help of the technical expert. The decision of selecting software, taken after the long committee discussions based on the conducted study.

[5] Installation of the software: People often think that installing software on a computer is one of the easiest things you can do. They are partly right. It is easy, but not as easy as pressing next-next to install. Many people choose to ignore precautions before installing software. Some precautions that should consider at the installation of the software are:

- Do you have enough disk space or resources to run this software?
- Is there any conflicting software on your computer?
- Always create a System Restore Point.
- Always select Custom installation.
- Install to the default directory.
- Update System Configuration Files.

[6] Collection Building of the IR

The collection building and development of IR is a crucial element and it requires careful selection of the documents. This includes selecting the sources for digitization. It is necessary to see that the documents which are selected for the digitization are free from copyright issues as well as if the material is in-house it must be permitted for digitization. The collection policy scope of the collections, selection criteria and responsibilities, editorial rights, and are some issues in collection development of IR.

[7] Repository Policies

Approval as well as support of the organization is required for building up and maintaining the Institutional repository collection. It requires long-term dedication for the sustainability in a continuous manner.

7.5 GENERAL STRUCTURE OF AN E- REPOSITORY SYSTEM

An electronic repository is a focused collection of digital objects includes text, visual, material, stored as electronic media formats. Here this segment of unit highlights technological architectural components, how the e-repositories software works, flow, and handle with various tools to carry out the e-repositories in a defined purpose and highlights the technological understanding and issues involving in creating e-repositories. Digital repositories are a very complex system. It is an integrated system that allows gathering,

storing, preserving, protecting and retrieving information at the right time to the right user. Digital repositories provide a user document with a systematic way to focus collection of digital objects that can include text, video, numbers stored as electronic media formats, along with means for organizing, storing, retrieving the file and the other media content in the e-repositories collection.

Digital Library Components:

With the advancement of information retrieval, the systems to retrieve of any document require advanced level tools. E-repositories furnish information to the user, but it's not in a simple way. The workflows of E-repositories are conducted with mainly four steps. The components of workflows are- User Interface, Repository, Handling system, and Search System.

[1] User Interface

The user interface is the design of computers, appliances, devices and software application focus on the user communication. A well user interface is an interface that connects between the user and the machine, which provide valuable information. An E-repository must give a single point of access like a portal to a huge quantity of digitized information that is available to a diversity of kind patrons with a different psychological, academic, social backgrounds and information needs over the Internet. In educational e-repository system, three possible users may exist and these act as information sources or final recipients of data and information. They interact with the system with various roles, namely, administrator: a person assigned system administration roles to control and monitor users and content submitted into the repository; authors: include faculty, students, and researchers who interact with the system when they submit their scholarly materials into the repository; and viewers: all persons who visit the repository for reading the contents. The end-users and even a user from remote area will be able to access the same user interface of the E-repositories and its collection and another user interface for the administrators who manage and build the collection. In general, the user interface is written in Java and made available to the user through the use of an Apache/Tomcat server.

User interface design principles: The principles of user interface to designed to improve the quality of user interface. All the user of the E-repositories is not equal psychology to access the information from the interface. By considering the various patron requirement, the designers have to follow the designing principle that is discussed below-

- **Simple-** The digital library user interface should be simple and straightforward. A well-organized simple user interface can easily provide the information that a user wants.

- **Access-** The E-repositories, the user interface can access the material easily and minimal keystroke.
- **Prevent Errors-** The user interface should be design in such a way that patrons cannot make errors. The interface should provide a technique to detect the error and give simple instruction that user could understand.
- **Multimedia Support-**In the present day, E-repositories are not only offers the textual information but also multimedia information. Therefore, the user interface should support the multimedia information.

[2] Repository

In general, repository refers to a storage location and often for preservation. In E-repositories, repository stores digital contents and its metadata. The interface to repository called the Repository Access Protocol (RAP). In the E-repository, the information's are stored in a database as a digital form. The database is at the heart of a digital repository, the repository also needs to include software to retrieve information from the database, format it and present it to the user in an easy-to-understand way. Most repositories are run on a relational database such as Oracle, Microsoft SQL, PostgresSQL, or MySQL. In the relationship database data is organized into tables, which have relationships linking them together.

[3] Handling System

E-Repository is a service to gather, supervise, protect and make accessible the information of the intellectual output of the research faculty. The intellectual output includes articles, monographs, audio/visual presentations, working papers, Journal articles, conference papers, poster, theses etc. There are many techniques to locating anything in the earth, such as by name or any attributes of the things. The same technique follows by libraries to locate and retrieve any document. The library allocates a call number and an accession number to each document so that the document can be easily located and retrieved when needed. In this way, digital resources should have unique locator or an identifier to retrieve from the web environment. It is the same way as ISBN for books and ISSN for journals, to search the item in the library.

[4] Search System

The 'Search' is a systematic examination of information in a database, aiming in view to identify the items or objects, which satisfy particular preset criteria. In other way, searching means the operation of locating a specific object in a given sequence of 'n' objects. Here the amount of time required to locate a specific object called 'search-time'. It is also needed to say that each item contains within itself a piece of information is termed as 'key' and a given key in a search is referred to as 'search-key'. In retrieval process, one can search to match for

a given key using a particular retrieval algorithm. There are dozens of algorithms, algorithmic techniques and approaches, which provides an ideal framework for the application to information retrieval, such as- Soundex Algorithm, Metaphone Algorithm, Phonex Algorithm, Stemming Algorithm, etc.

However, each algorithm has some issues of limitations. To cope with those issues, digital e-Repository should investigate the efficient search algorithms for providing an effortless way to perform most effective search results from digital repositories.

7.6 TYPES OF INSTITUTIONAL REPOSITORIES (IR)

In recent decades various platforms used in IRs with more updated features. The repository administrator has to play key role in identifying and selecting the IR platforms. There are various software packages available for IR, e.g., commercial, open source. Here we will discuss the various types of IR and its features which enabling the repository manager to understand which features of which platform will best suit his requirement and facilitate the success of the IR.

Classification of IR Software:

Open-Source Software (OSS): OSS is free, expandable and downloadable. But It usually requires some level of proficiency to implement and maintain. DSpace, EPrints, Fedora, Greenstone are some of the widely known OSS.

DSpace:

DSpace is the free software chosen by the academic, non-profit and commercial institutions for developing open digital repositories. DSpace was developed collaboratively by the MIT library and HP. The installation of DSpace is very easy and complete customization can be done according to the needs of any organization. DSpace preserves and easily manage all types of digital content, including text, images, video, audio and data sets, etc. Table 1 is showing the specifications of the DSpace software.

Table-1 Specification of DSpace	
Package Type	Digital Repository
Starting Year	November, 2002
Developed By	MIT and HP Labs
Web Site	http://dspace.org/
Operating System	Linux, Mac, Windows
Technologies Used	Tomcat
Programming Language	Java
Database	MySQL

EPrints:

As maintained to the its official website, it is one of the first IR software packages. This digital repository software was initially developed by the university of Southampton. The unique characteristics of the software are that is given a link to the SHERPA/RoMEO database. SHERPA's most notable service is RoMEO, is a database aggregating publisher archiving policy which allow researchers quick access to copyright and self-archiving policies.

Package Type	Digital Library
Initial Year	2000
Developer	University of Southampton
License	GPLv3
Development Status	3.3.11 / 31 January 2013
Operating System	Linux, Mac
Technologies Used	Apache
Programming Language	Perl
Database	MySQL

Fedora:

Researchers at Cornell University mutually with University of Virginia Library, originally developed Flexible Extensible Digital Object and Repository Architecture (FEDORA). Fedora provides web-based repository services with well-defined APIs. Beside this, Fedora provides a number of supporting features and technologies, including search, OAI-PMH, messaging, administrative clients, and more to publish, share and preserve digital contents.

Package Type	Digital Repository
Initial Year	May 16, 2003
Developer	Dura space (http://dspace.org/)
License	Apache 2.0
Platform	Linux, Mac, Windows
Technologies Used	OAI, Tomcat
Programming Language	Java
Database	MySQL, Oracle, PostgreSQL

Commercial/Proprietary IR Software

The proprietary software demands payment for the software, any additional subscription, consultation and for the software up-gradation. Clients can assure full support and annual

maintenance support from the software vendor. Some commercially developed software are mentioned below:

CONTENTdm

CONTENTdm was acquired by OCLC in 2006 which was originally developed by the Center for Information Systems Optimization (CISCO), at the University of Washington in 1999. The software contains provision for acquiring or creating, storing and managing the collection and provision for display, publish and retrieval of the contents.

Package Type	Digital Collection Management Software
Year of Starting	1999
Developers	CISO, University of Washington
Hosted by	OCLC
Platform	Window
Technologies Used	Unicode, Z39.50, Qualified Dublin Core, VRA, XML

Digi Tool

It is a developed by Ex Libris Group in the 1986 for the management of digital contents in academic environments.

Package Type	Digital Asset Management Software
Initial Year	1986
Developer	Ex Libris Group
Operating System	Window
Technologies Used	MARC, Dublin Core, Metadata Object Description Schema (MODS) Transmission Standard (METS)

VITAL:

VTLS Company invented VITAL Digital Asset Management System in 2004. VTLS give various facilities such as metadata conversion, digitization of content, and customization of Web interfaces etc.

Package Type	Digital Asset Management Software
Initial Year	2004
Developer	VTLS
Technologies Used	OAI-PMH, Dublin Core, MARCXML

7.7 E- REPOSITORY PROTOCOLS AND STANDARDS

Protocols and Standards are the key features of a digital library. There are different protocols and standards like Communication protocols, bibliographic standards, record structure

standards, encoding standards, information retrieval standards and digital preservation standards. All these protocols play a key role in making an e-repository efficiently. These relevant standards make by following institutions and organizations-

- The Digital Library Federation (DLF), (<http://www.diglib.org>).
- Council on Library and Information Resources (<http://www.clir.org>).
- The Library of Congress (<http://www.loc.gov>).
- The International Federation of Library Associations and Institutions (IFLA) Communication Protocols.

Transmission Control protocol / Internet protocol (TCP / IP), Hypertext Transfer Protocol (http) and file Transfer protocol (FTP) are some major protocols used by the internet for linked a communication between clients and servers in an e-repository and digital library. Http is the most significant protocol used on the World Wide Web (www). The file Transfer protocol (FTP) is a protocol that is worked for transferring files from one computer to another over LAN, MAN, WAN or internet.

Bibliographic Standards

Machine Readable Catalogue (MARC), Dublin core, BIB-1, TEXT Encoding Initiative (TEI), Electronic Archival Description (EAD), Metadata Encoding and transmission Standard (METS) Metadata Object Description Schema (MDDS) are some of the protocols used for bibliographic description. Bibliographic standards are related with the description of contents as well as the physical attributes of documents and non-documents in a repository.

Information Retrieval Standards

Such protocols allow a client machine to search databases on a server machine and get back records that identified as output of search. Following are some examples of information retrieval standards- Z39.50 or ISO23950 Search / Retrieve Web Service (SRW) and Search / Retrieve via URL (SRU), Open Archives Initiatives, Metadata Harvesting Protocol (OAI-PMH) etc.

Record Structure

Record Structure of a database means the physical and logical arrangement of the record, which contains the data. ISO2709 ISO 2709 is an ISO standard for bibliographic descriptions, titled Information and documentation.

Formats and Media

Text based contents of an Organizational repository can be stored and display as ASCII (American Standard code for Information Interchange), SGML or HTML or XML, PDF format whereas image format can be as .TIFF, .PDF, .JPEG, etc. format.

Preservation Standards

Preservation Metadata implementation Strategies and open Archival Systems are the preservation Standards.

7.8 CHALLENGES FOR E-REPOSITORIES

Presently, all institutional libraries are equipped with electronic resources such as E-Books, E-Journals, E-Databases, etc. Preservation of electronic resources in libraries safely is becoming a challenging task for librarians. So, we stored it in a central location in which data is stored and managed, that is called repositories. Because it is an electronic medium so it is called e-repositories. So, an e-repository is a repository where digital content such as computer files, Electronic journals/ articles and Book and Its chapters can be stored. It can also understand as it is an information system that ingest, store, manage, preserve, and provide access to digital content. Copyright and the other legal and regulatory aspects of maintaining a repository service will be a big issue of future in e-repository. Copyright and the other legal and regulatory aspects of maintaining a repository service may be a big issue of future in e-repository guaranteeing quality of service means that the service needs to be responsive to researcher needs is also a major challenge for the future e-repository. Poor cyber metrics of the online platform, low response rate of uploaded input, difficulty to get copyrights for older studies, lack of repository manager are some other challenges and obstacles for the digital repository, that should be resolve in future.

7.9 POINTS TO REMEMBER

7.10 GLOSSARY

- Archiving- Preserves the scholarly record over time.
- Copyright Statement - Depositors are all required to agree to the copyright statement
- Deposit- A deposit represents a bundle of submitted information. Typically, a deposit consists of descriptive metadata, access conditions and copyright information, and any relevant uploaded files. This entire set of saved information is the deposit record.
- Depositor- A depositor is the creator of a deposit record, who submits digital items and associated data for review, approval and upload to the repository.
- Digital Preservation- The process of ensuring that a digital object is accessible over the long term.
- Digital Repository- An online, searchable, web-accessible database containing works of research deposited by scholars, professional staff, Ph.D's and students
- Institutional Repository- A type of digital repository that is designed to collect the work of a particular institution
- Open Access- The scholarly communication reform movement that aims to make scholarly literature freely available on the public web.

- Persistent ID- A unique identifier for an object
- URL- Universal resource locator.

7.11 CHECK YOUR PROGRESS

Descriptive type questions-

- What is e-repository? What are the benefits of e-repository?
- What are the steps to be followed to build a new Institutional Repository?
- Define the digital library protocols and standards.
- Define the general structure of a e- repository system.
- Explain the various Institutional e-repository software systems.

Objective type questions-

[1] What is Dspace?

- | | |
|-----------------------------|---------------------------|
| (a) An Open-source software | (b) A System Software |
| (c) An Automation software | (d) A Commercial software |

[2] Who built DSpace?

- | | | | |
|---------|---------------|-----------------------------|--------|
| (a) IBM | (b) Microsoft | (c) MIT and Hewlett-Packard | (d) HP |
|---------|---------------|-----------------------------|--------|

[3] Identify the following Institutional Repositories available as free Project

- | | | | |
|-------------|---------------|------------------|------------------------|
| (a) e-print | (b) Open DOAR | (c) Both A and B | (d) None of the above. |
|-------------|---------------|------------------|------------------------|

[4] LOCKOSS (Software) is an international community initiative by:

- | | |
|---------------------------|-------------------------------|
| (a) MIT Libraries | (b) Stanford University |
| (c) University of Waikato | (d) University of Southampton |

[5] Resource sharing is a part of

- | | |
|-------------------------|----------------------------|
| (a) Library cooperation | (b) Library administration |
| (c) Library management | (d) Library cataloguing |

[6] Which one is a full text e-Resource?

- | | | | |
|----------|----------|----------------------------|---------|
| (a) JCCC | (b) ISID | (c) Science finder scholar | (d) ACS |
|----------|----------|----------------------------|---------|

Answer (Objective Type Question)-

[1] a [2] c [3] c [4] b [5] a [6] d

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