COURSE GUIDE

LIS 416
INTRODUCTION TO DIGITAL INFORMATION SYSTEM AND SERVICE

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CONTENT **PAGE**

LIBS 416 INTRODUCTION TO DIGITAL INFORMATION SYSTEM AND SERVICE

INTRODUCTION

This course **LIS416 (Introduction to Digital Information Systems and Services)** is a 2 credit unit course. The course is compulsory to all undergraduate students of the Department. It is designed to provide students with an understanding of the theoretical and practical principles of digital information systems and services. The course will focus on critical issues surrounding the development of digital information systems and services, and their contents in digital environments. Topics that will be covered in the course include digital information resources and services, digitization of non-digital materials, library automation, open source software, electronic resource management, management of information overload, search strategies, digital preservation, technological skills and training requirement for the digital work environment among others.

COURSE AIM

The aim of this course is to introduce students to various types of digital systems and services in libraries and in the World Wide Web. It also examines how digital systems have changed the nature of publishing and the challenges posed by their preservation and security. Additionally, it looks at the challenges and opportunities of digital systems for libraries in some of these areas: collection developments, reference, circulation service, serials management, information resource processing, electronic information resources and services.

COURSE OBJECTIVES

Upon completion of this course, you will be able to:

i. Understand the multiplicity of digital information resources and services.

ii. Understand the foundation and knowledge for current and anticipatory trend in digital working environment.

iii. Participate in the planning and management of digital information systems and services.

iv. Exhibit the theoretical and practical skills in digital information resources collection development and management.

v. Possess theoretical and practical skills in virtual library, digital library development, management, use, and preservation.

vi. Demonstrate sound knowledge and skills in setting up digitization project, institutional repository and digital preservation techniques.

vii. Understand open source software and its application in library system.

viii. Get acquainted with search strategies in digital environment.

ix. Comprehend technological skills and training requirement for digital work environment.

x. Identify challenges and opportunities for the digital information system and services.

WORKING THROUGH THIS COURSE

The overall success of completing the course depends on active participation by all members of the class. The students are expected to participate in both theoretical and practical exercise which would form a sizable portion of the grade. Students are required to read through the study units and are expected to participate in the class discussion and raise questions reflecting their reading and opinions. Most importantly, the students are required to read the course unit prior to the class, this is because the class sessions will be based on discussions about the readings. Also, students are required to read the recommended text books provided and other materials. In each of the study units there is an introduction, objective set to be achieved at the end of the study, conclusion and summary of what you have learnt in the study units. Also, reading list and references are provided. To evaluate the students' overall performance on their expected learning outcome, there is a Tutor-Marked assignment to evaluate what students have learnt.

The assessment of the students will be divided into two– the formative and the summative. The formative assessment will assist the students to evaluate and monitor their learning outcome based on the in-built question that comes at the end of every study unit, discussion forums and self-assessment exercise. The summative mode of assessment will comprise 3 continuous assessments constituting 30%. While the exams will constitute 70%, and you are required to participate in all the computer based test (CBT) and the final examination.

COURSE MATERIALS

Major components of the course are:

1. Course guide
2. 4 modules of content of 5 units each
3. Recommended textbooks
4. Assignment file

STUDY UNITS

There are 15 study units in this course divided into five modules. The modules and units are presented as follows:

Module 1 The Digital Age and the library

Unit 1	Digital Information System
Unit 2	Differences between Digital Information Resources and Print
Unit 3	Reference Services in Digital System
Unit 4	Digital Information System Services

Module 2 Digitization and Digital Information Resources and Services

Unit 1	Digitization and Information System
Unit 2	Digital Repository and Digital Preservation Techniques

Module 3 Library Automation and Integrated Library System

Unit 1	Library Automation
Unit 2	Application of Open Source and Proprietary Library Automation Software
Unit 3	Information Overload: Causes and Management Strategies

Module 4 Digital Information Resource Management, Digital Publishing and Digital Security

Unit 1	Electronic Resource Management
Unit 2	Open Access Information Resource
Unit 3	Information Search, Techniques and Strategies
Unit 4	Collection Development in Digital System
Unit 5	Digital Publishing
Unit 6	Digital Security

TEXTBOOKS AND REFERENCES

Clayton, M. (1992). *Managing Library Automation* 2nd Ed., Routledge

Dillon A., Breure, L. Oostendom, H. (2005) *Creation, Use and Deployment of Digital Information* 1st Ed. Routledge

Law, J. A. (2017) *Digital Libraries: Policy, Planning and Practice* 1st Ed. Routledge

Lee S. H. (2007). *Digital Information and Knowledge Management New Opportunities for Research Libraries*1st Ed. Routledge

Nielit, S. G., & S., T. (2016). E-Discovery Components of E-Teaching And M-Learning: An Overview. In E. de Smet, & S. Dhamdhere (Eds.), *E-Discovery Tools and Application in Modern Libraries* (pp. 240-248). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0474-0.ch013

Thanuskodi, S. (2013). Students' Attitudes towards Library Facilities and Information Resources of University Libraries in Tamil Nadu: A Survey. In S. Thanuskodi

(Ed.), *Challenges of Academic Library Management in Developing Countries* (pp. 1-15). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-4070-2.ch001

Thanuskodi, S., &Meena, M. (2013). Use of E-Journals by the Faculty Members, Researchers, and Students in the Faculty of Engineering and Technology, Annamalai University: A Survey. In S. Thanuskodi (Ed.), *Challenges of Academic Library*

Management in Developing Countries (pp. 218-225). Hershey, PA: IGI Global.

doi:10.4018/978-1-4666-4070-2.ch016

ASSIGNMENT FILE

All the specifics of the assignments you must send to your tutor for scoring can be included in this file. You ought to participate in these assignments for you to pass this course. Additional details can be found in the assignment file itself and the evaluation portion of this course guide.

There will be 10 assignments in this course which will cover the following areas:

1. Digital Information System (Module 1, Unit 1)
2. Differences between Digital Information Resources and Print (Module 2, Unit)
3. Digital Information System (Module 2, Unit 1)
4. Digital Repository and Digital Preservation Techniques (Module 2, Unit 2)
5. Library Automation (Module 3, Unit 1)
6. Application of open source and proprietary library automation software (Module 3, Unit 2)
7. Causes of Information Overload and Management Strategies (Module 3, Unit 3)
8. Electronic Resource Management (Module 4, Unit 1)
9. Open Access Information Resource (Module 4, Unit 2)

TUTOR-MARKED ASSIGNMENT

This course is made up of eight tutor-marked assignments. The four highest-scoring assignments will be recorded for you. In other words, you are not required to submit all of the assignments, but you are strongly encouraged to do so. Each assignment contributes 10 percent to your overall course grade.

All of the assignment questions for all of the units can be found in the Assignment file. To have a better understanding of the course, not rely solely on information obtained from the units to answer the questions. To learn more about the course, you need to go to the library and do extensive reading and research. Send each completed assignment to your tutor. Make every effort to get each assignment to your tutor on or before the deadline. However, if you are unable to complete any of the assignments on time, please notify your tutor before the due date. You may be granted an extension after careful consideration.

FINAL EXAMINATION AND GRADING

Revise all the topics covered in the course to prepare for this examination. Revision of all exercises and tutor-marked assignments before the examination will also be beneficial. After you have finished studying the last unit, you should begin revising. This final examination will last three hours. It is worth 60 per cent of the total course grade.

PRESENTATION SCHEDULE

The presentation schedule provides you with the essential dates for the accomplishment of your computer-based tests (CBT), participating in the discussion forum and at facilitation. Note that all your assignments must be submitted within the scheduled time-frame. Also, delay in submitting assignment and written test (CBT) are highly discouraged. Likewise, plagiarism is highly prohibited and considered as criminal offence in academics which could lead to heavy sanctions and punishment. Therefore, student are highly encouraged to seek for proper guidance on such practices.

COURSE OVERVIEW

Unit of the Work	**Duration (Weeks)**	**Assessment (End of Unit)**
Course Guide		
1. Digital Information System	2	Assignment 1
2.Differences between Digital Information Resources and Print	2	Assignment 2
3.Reference Services in Digital System	2	
4. Digital Information System Services	1	
5. Digital Information System	2	Assignment 3
6. Digital Repository and Digital Preservation Techniques	2	Assignment 4
7. Library Automation	2	Assignment 5
8.Application of open source and proprietary library automation software	2	Assignment 6
9. Causes of Information Overload and	1	

Management Strategies		
10.Electronic Resource Management	2	Assignment 7
11.Open Access Information Resource	2	Assignment 8
12. Information Search, Techniques and Strategies	1	Assignment 9
13. Collection Development in Digital System	1	Assignment 10
Unit 14: Digital Publishing	1	
Unit 15: Digital Security		
Total	**23**	**9**

HOW TO GET THE MOST FROM THIS COURSE

To get the most from this course, you need a functional Laptop and access to Internet connectivity. This will make your learning easy and convenient because you can access your course material 24/7 anywhere, anytime. Also in each study unit, carefully study the objective at the beginning. While at the completion of the study unit, ensure that the expected learning outcome is achieved through self-evaluation by attempting the tutor marked assignment.

It is important to diligently participate in the online real-time facilitation classes as scheduled. In a situation where you missed the real-time classes, always refer to the recordings of the facilitation to compensate at your convenient. Where you run into problem, do not hesitate to contact the facilitator or the E-librarian for further clarification.

In addition, you need to strictly adhere to the following to get most from the course:

- Always read the summaries provided at each of the study units;
- You need to participate in the discussion forum;
- Do the assigned reading, and perform all the exercises given;
- Strictly adhere to the study schedule;
- Take note of important ideas and points while reading;
- Go through the introduction of the study unit, the objectives and learning outcome;
- Perform self-exercise and conduct self-evaluation at the end of every study unit; and

- Obey instructions and observe rules and regulations throughout the period of your study.

FACILITATORS/TUTORS AND TUTORIALS

You will receive online facilitation. The online facilitation is based on learner-centered approach where student is an active agent in the learning process. The method of facilitation will be both asynchronous and synchronous. In the asynchronous mode, the facilitator will:

- Present topic for the week;
- Moderate and summarize forum discussion;
- Organize and manage activities in the discussion platform;
- Assess and grade students performance where necessary;
- Upload students' scores into the University endorsed platform;
- Send videos, audios, lectures and podcast to you via your email addresses;
- Provide learning support to you where you need such;
- There will series of real time contacts which will be via video conference on the Learning Management System;
- At the beginning of the course the facilitator will present real-time video facilitation time table;
- At the end of each real-time session a recorded video will be sent to you;
- The facilitator will give emphasis on the main themes and sub-themes based on the topic of discourse; and
- At the beginning of the course the facilitator will give you brief introduction to serve as a guide to lead you through the course;

Do not hesitate to ask questions where you find it difficult in any aspect of the course.

SUMMARY

This course LIS 416 intends to introduce digital information systems and services in line with the dynamics of digital environment. Upon completion of this course, you would have been introduced to the general knowledge both in theory and in practice concerning digital information resources, services and the ability to manage milieu of digital information systems.

MAIN COURSE

CONTENT **PAGE**

MODULE 1 THE DIGITAL AGE AND THE LIBRARY

UNIT 1 DIGITAL INFORMATION SYSTEM

CONTENTS

1.0 INTRODUCTION

This unit would introduce you to general overview of digital information system and services. It will also provide you with full knowledge about digital library/ electronic library as well as virtual library. Lastly, the unit will provide you with idea on how to build a digital library.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- discuss issues relating to digital information system
- define digital library
- define virtual library
- build a digital library and its collections
- to identify the types of services that could be rendered in the digital library.

3.0 MAIN CONTENT

3.1 Overview of Digital Information System

Digital information system and services provide new opportunities to both manager and user of information. Given the nature of digital information system it allow user to accessed information resources beyond the four walls of the library. While, printed information resources are basically designed for the use of one reader at a time and in one place, digital information resources and services can be accessed simultaneously, regardless of locations, time and space. In the past information professionals have always acted as custodian/intermediaries of print information that are localized within the four walls of the library. Today Internet has transformed the ways in which services are provided by the information professional, providing wider access and minimizing physical contacts between user and providers of information. Information is increasingly being created, accessed, disseminated, stored and preserved in digital format resulting in the emergence of digital libraries.

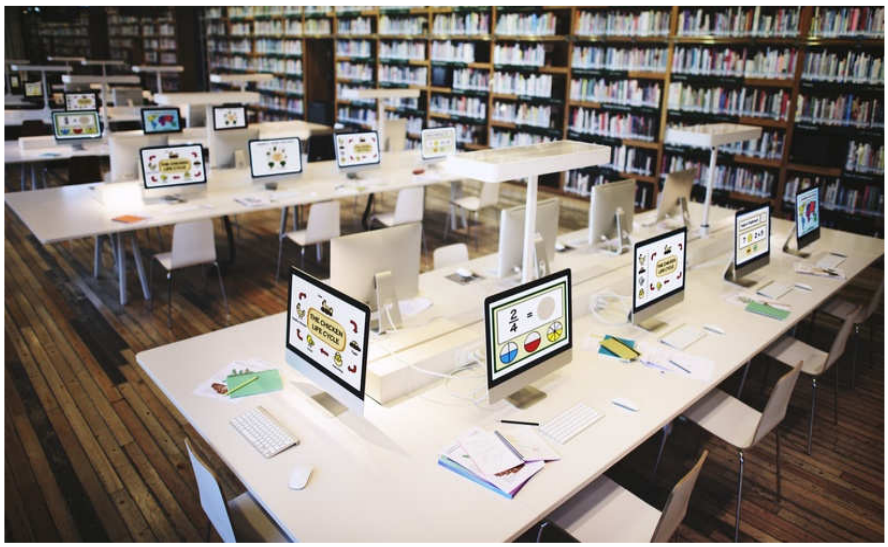


Fig. 1: Digital Information System

Source: Ron Leunissen (2021) **the New Role of A School Library in A Digital Age, Supporting Students As Producers**

3.1.1 Definition of Digital Library

A digital library is a set of digital collections or digital repository hosting diverse body of organised information resources and services that are in digital format and concentrated for the creation and preservation of such resources. A digital library may consist either online databases or offline CD-ROM (Compact Disk Read only Memory) or the combination of both that could be found in textual, image, graphics, Audio, video etc. that could be accessed using computer technology; such desktop, laptop and mobile devices. According to American Digital Library (ADL) a digital library is an organisation of resources including the staff, to select, organise, offer intellectual access to, share, preserve the integrity of and ensure persistence over time of collection of digital works so that they are readily and economically available for use by a defined user community or set of community. When a digital library is linked to the Internet, it becomes a virtual library. In library organisation and management, the virtual library overcomes the prevalent views of the locality.

3.1.2 Definition of Virtual Library

Virtual Libraries provide new ways of providing access to information resources and services to new generation of users. According to Usman (2019) a virtual library is a collection of resources available on one or more computer systems, where a single interface or entry point to the collections is provided and the resources can accessed remotely. A virtual library also provides user assistance services such as reference, interlibrary loan, technical assistance, etc. According to Gapen (1993) and Kato, Kisangiri, and Kaijage (2021) one of the central aspect of the concept of virtual library is the “remote access to the contents and services of libraries and other information resources, combining an onsite collection of current and heavily used materials in electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources”. The time, speedy, and wider access anytime, anywhere makes virtual libraries a global symbol of information access paradigm.

Fig. 2: Virtual
Source: Grimsby Public Library (2021)

3.1.3 Building Digital Library

Building a digital library consists of several processes and activities as follows;

1- Acquisition of original digital contents created by the authors or the copyright owners. This could be articles, books, monographs, conference proceedings, pictures etc. This involves acquiring permission from the authors to make their works publicly accessible to avoid copyright violations.
2- Converting non-digital born documents into digital format. This involves conversion of print documents into digital using Optical Character Recognition (OCR) and uploading such converted document into Institutional Digital Repository (IDR) or library website for access.
3- Subscribing digital content or using open access or free base information resources and create a link that will serve as a pointer to these external sources.
4- Handling issues relating to right management, which may include keeping track of copyright issues of the digital contents as well as authenticating users and their access to the digital information resources.

3.3 Digital Library services

Digital Libraries offer a variety of opportunities in services delivery

which help the staff of any type of library to organise collections of information resources and make them more widely accessible. According to Kato, Kisangiri, and Kaijage (2021) the term digital library resources define "the information processed and digitally driven using hardware and software that offer information that can be accessed by electronic users through remote information provider networks or mounted locally by digital library (DL) managers". Gladney, et. al. (1994) and Karaimelazhagu & Natarajan (2020) pointed out that "A digital library service is an assemblage of digital computing, storage, and communications machinery together with the software needed to reproduce, emulate, and extend the services provided by conventional libraries based on paper and other material means of collecting, storing, cataloguing, finding, and disseminating information." The following services can be rendered in the digital libraries:

- Access to online full-text databases (subscribed/ open-access databases): this provides the library with an opportunity to provide remote access to their online databases. Depending on the mode of access, users can remotely access library resources such as books, journal articles, conference proceedings, etc. using user names and password or it could be free access where user name and password are not needed.
- Access to offline CD-ROM Databases: Access to offline databases is one of the emerging means of information service delivery. Today, a lot of publishers do provide access to offline databases that are in CD-ROM, DVD etc. which form an essential part of modern libraries. One important advantage of offline CD-ROM databases especially in developing countries where Internet connectivity is a great challenge is that content could be access without Internet connectivity, once you are within the physical building you can have accessed the content using computer terminals or a Laptop.
- Access to Online Public Access Catalogue (OPAC): Today, most libraries have an Online Public Access Catalogue (OPAC) to indicate availability of information resources in the library. Unlike in the past where users of the library can only get access to the bibliographic information of the library collection via card catalogue, book or shelf catalogue. Currently, library user using computer terminals can use an Online Public Access Catalogue (OPAC) to navigate through the collection database to see whether the library has a specific work on a specific topic and to be aware of the location of such works. The Library catalogue is the most critical method for finding materials in the Library. The ability of a computer to store and process vast volumes of information and output in a variety of formats, makes

it possible for users of the library to access bibliographic records of the library holdings, from any location. OPAC allows users to search the catalogue using a computer terminal. OPAC enables easy and fast online browsing of the entire catalogue using one or more specific keywords. You may, for instance, search by author, title, keywords, call number, or any combination of all these.

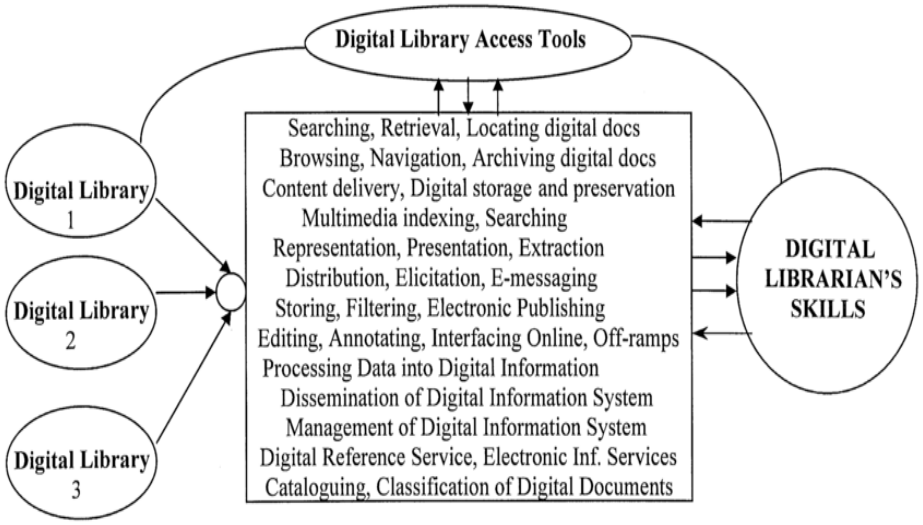
- Online reference and information services: Lankes describes online reference service as a form of interaction that involves asking and answering user's questions using Internet-technologies by way of linking users with persons who are experts in a particular subject area or skills. Also, an online reference service can be seen as a network of competence, intermediation, and tools placed at the disposal of a user seeking answers in an online/networked environment. Asynchronous technologies like e-mail, topic gateways, FAQs, as well as interactive tools like discussion forums, online reference desks, and ask a librarian, have largely replaced traditional methods of reference inquiry such as post, phone, or even personal contacts.
- Access to other Internet Information sources: Internet today is one of the largest repositories of information worldwide. Nowadays, the internet has become the major source of publishing and dissemination of digital contents. With a vast number of information resources such as books and journals being distributed mostly via the web. Nevertheless, in developing countries like Nigeria, underdeveloped Internet infrastructure, high cost of internet bandwidth, poor electricity supply etc. presents a significant challenge to the growth of ICT-enabled services. Large portions of the user population encounter a lot of challenges in accessing online information resources and services. As a result, libraries provide internet-based services and provide free Internet and e-mail access. Users may be assigned time slots to use the Internet facility based on availability.
- Access to e-theses and Dissertations: Digital technologies have provided room to most libraries to digitize and upload their contents. As a result of this advancement many libraries give their clienteles access to e-theses and dissertations created at universities, which are valuable sources of information and knowledge for further study. Many higher institutions have converted their theses and dissertations and other local contents into digital format and made accessible via Institutional Digital Repository.
- Electronic Document Delivery Service: Over the years, libraries and information centres have been searching for ways to speed

up the distribution of information. Electronic document delivery is one of the new technologies used in the digital era. Depending on the context, the word electronic document delivery (EDD) may have a variety of meanings. According to Chatterjee (2017) DDS "refers to the physical or electronic delivery of a document from a library collection to the residence or place of business of a library user, upon request." Cornish (1990) for instance, defines it "supplying a text in electronic form that is requested by a reader but is not in the library being used by the reader at the time". The International Encyclopedia of Information and Library Science defines EDD as the electronic transfer of information from a publisher or library to a user through electronic mail, an online platform, or a CDROM. Therefore, the term EDD refers to the automated request and delivery of documents (journal article, conference proceedings, some part of the book, or monograph, etc.) using electronic platforms especially the Internet between demanding and supplying libraries.

- Essential storage facilities for hosting digital collections and indexes: Digital Libraries provide information and educational content in digital formats that are compliant with current technologies, tools, and services.
- Audio and Video Communication: The modern multimedia technology makes it possible to access diverse formats of audio-visual materials audio including CD, Video CD (VCD), and Digital Video Disks (DVD) which provide more storage space, random access to content, and a longer lifespan than audio and videotapes and cassettes. Today, lots of libraries make available these facilities to their members for borrowing. Multimedia files can now be viewed and played on regular PCs, whether standalone or networked. With the advancement in digital storage media technologies and compression, it is equally possible to allowed vast amounts of multimedia information resources to be stored on the hard disk and distributed via the Internet. One can also play and view these files in a browser, software such as Quick Time Player, Microsoft Media Player, and others are now freely accessible.

- Access to online indexes and abstracts: compilation of bibliographic information in form of indexes and abstracts is one of the most tedious information services in the libraries and information centers. In the past all these services are done manually which makes the task repetitive and that does not often yield current results. The availability of bibliographic databases in digital format on CD-ROM or via Internet platforms allows access and retrieval of information resources easier and reliable.

Online bibliographic databases often provide unique and advanced search options (keyword, topic, author, title, source, class mark, publication date, Language etc.), as well as diverse display formats and styles.



S**Fig. 3: Digital Library services S**ource: Vayyavuru Sreenivasulu Digital librarian's interface functions, skills, roles in the management of DIS

4.0 CONCLUSION

In this unit you have learnt basic ideas about digital information system, definition of digital library, definition of virtual library and ways of building digital collections

5.0 SUMMARY

The summary of this unit is provided as follows:

- Today Internet has transformed the ways in which services are provided by the information professionals, providing wider access and minimizing physical contacts between user and providers of information.
- Digital information resources are can be accessed via Internet or locally (offline) using desktop computers, laptops or mobile devices.
- Digital information is not just words and numbers. Anything that can be viewed or heard can be digitized, so digital information resources can contain videos, audio, motion pictures, or images of artworks. For example, some databases contain a mixture of text, audio, video.
- A digital library is an organisation of resources including the staff, to select, organise, offer intellectual access to, interprete, share, preserve the integrity of and ensure persistence over time of collection of digital works so that they are readily and economically available for use by a defined user community or set of community.
- A virtual library is a form of library where digital content can be accessed remotely without necessarily being into the library physically.
- Building a digital library involves; acquiring original documents from the author, converting non-digital born information resources into digital, purchasing license from the publisher or access to free contents and digital right management.

SELF-ASSESSMENT EXERCISE

a) Define the term Digital Library

A digital library is an organised collection of digital information resources and associated tools for creating, archiving, sharing, searching and using information that can be accessed electronically.

b) Define the term virtual library

A virtual library is a form of library that provides access to digital information resources and services that can be accessed remotely without necessarily being into the library physically.

c) Differentiate between digital and virtual library

Digital library consists of digital information resources and services that can be accessed only when you visit the library in person while virtual library consists of information resources and services that can be accessed remotely anywhere anytime regardless of your location or time boundary.

d) Identify the steps involved in building a digital library

Building a digital library consists of several processes and activities as follows;

1- Acquisition of original digital contents created the authors or the copyright owners.

This could be article, books, monograph, conference proceedings, pictures, etc.

2- Converting non-digital document into digital
3- Subscribing or using open access or free based information resources by to their website or creating a link that will serve as a pointer to the external sources
4- Handling issues relating to right management, which may include keeping track of copyright issues of the digital contents as well as authenticating users and their access to the digital information resources.

e) List any 5 digital information services that can be rendered in any library of your choice

The following digital services can be provided in academic library:

Access to online full-text databases (subscribed/ open-access databases)
Access to offline CD-ROM Databases
Access to Online Public Access Catalogue (OPAC)

Online reference and information services
Access to other Internet Information sources
Access to e-theses and Dissertations

6.0 TUTOR-MARKED ASSIGNMENT

1. Define the term Digital Library.
2. Define the term virtual library.
3. Differentiate between digital and virtual library.
4. Identify the steps involved in building a digital library.
5. List any 5 digital information services that can be rendered in any library of your choice.

7.0 REFERENCES/FURTHER READING

Chatterjee, A. (2017). Document Delivery Service (DDS), In Elements of Information Organisation and Dissemination, *Chando Publishing*.

Cornish, Graham P. (1990). Inter/ending and Document Supply in Europe (UNESCO Document PGI-90/WS/13). Paris: UNESCO.

Karaimelazhagu, K., & Natarajan, D. (2020). Usage of the Digital Information Resources and services (DIRs) for the Educational Development of the users in the Library of Central University of Tamilnadu, Thiruvarur (CUTN): A study.

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Raveendran, R., & Francis, A. (2014). Digital information resources and services in Management Institute Libraries: A study with special reference to Kerala.

Usman, S. (2019). Information and Communications Technology and the use of online Resources in the Library A paper presented at the Biennial National Workshop for Judicial Librarians at the National Judicial Institute Abuja

UNIT 2 DIFFERENCES BETWEEN DIGITAL AND PRINT INFORMATION RESOURCES

CONTENTS

1.0 INTRODUCTION

This unit will discuss the differences between digital information resources over print format. It also discusses the challenges affecting librarians/information professionals in the digital age. Lastly, the unit would discuss the emerging role of information professionals in the digital age.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- differentiate the between digital information resources and print
- discusses the challenges affecting librarians and information professionals in the digital age
- identify the emerging roles of information professionals in the digital age.

3.0 MAIN CONTENT

3.1 Differences between Digital Information Resources and Print Format

Kato, Kisangiri, and Kaijage, (2021) identified the following as the major differences between electronic documents and paper document;

- Digital information resources and services can be accessed anywhere, anytime regardless of time and geographical barriers.
- Multiple users can access digital information simultaneously without any interference.
- Digital information resources occupy less space when compared with print and stored in compactible form with little difficulty.
- Digital information resources are very flexible; they can be easily edited, revised, rearranged, produced, reformatted or even combined with other information.
- Unlike print information resources such as books journals etc. digital information resources can easily be produced infinitely many times without reducing the quality or fidelity of the content.
- Digital information resources can be shared or distributed easily at a very minimum cost.

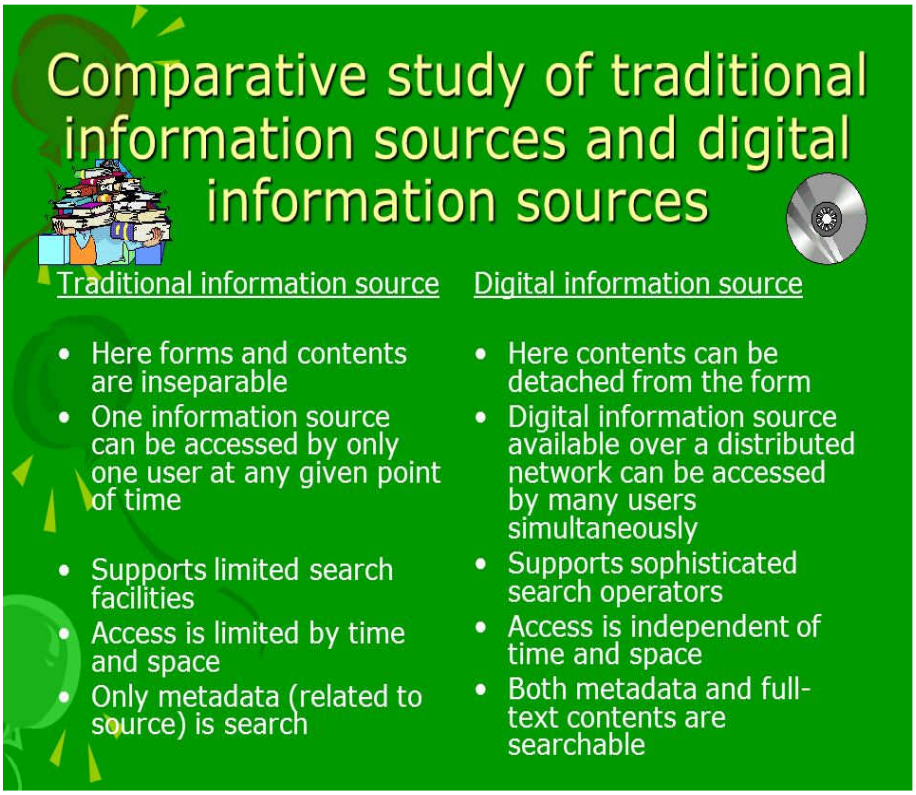

Fig. 4: Differences between Digital Information Resources and Print

Source: Slide Play (2021)

3.2 Challenges of Information Professionals in the Digital Age

The major differences between digital information resources and print format have changed the environment in which library and information professionals work. Jalil, Hussin, Yunus, Samsudin, Sani and Anwar, (2020). Shastri and Chudasma (2021**)** identified the challenging environment created by the digital age, which librarians need to respond to as follows:

- Shift from traditional library resources and services to digital library.
- Distance learning and web-based learning are becoming more popular in education, posing new problems for information professionals as service providers.
- keeping information secure and compliant in the face of increasing demands to analyze and extract information for possible business competitiveness and possibilities
- Increasing exposure to a plethora of information resources from around the world and in various formats, such as audio, multimedia, and textual.
- Increase the speed at which information professionals can obtain and provide access to information users.
- Increased difficulty in finding, analyzing, and integrating information for his clients.
- Information and communication technology (ICT's) are constantly evolving (hardware and software) and this pose a challenge both in terms of skills and monetary expenditure.
- Ongoing training for users and library employees, as well as significant financial investments in technology.
- There is a lack of hardware and software standardization and this involves constant upgrade, migration from one hardware or software to another which require financial and technological investment
- The nature of collection, the information environment, and the fundamental change in the expectations and demands of users have all presented challenges to library professionals as a result of globalisation through ICT.

3.3 Emerging Role of Librarians/Information Professionals in the Digital Age

The Librarian/information professionals' roles in the digital environment has undoubtedly changed, making their works more demanding and more complex. Jalil, Hussin, Yunus, Samsudin, Sani and Anwar (2020) identified some of the emerging roles of Librarian/information professionals as follows;

- ❖ Advancement in ICT, source options, information format, and information flow have a significant impact on the function of library professionals in today's digital age where the advancement of collection tools, techniques, and methods has become a global phenomenon.
- ❖ Library staff will act as agents of accessibility and integration, connecting users to a variety of digital resources through licensing agreements or other means.
- ❖ Selecting digital information resources and evaluating their quality. Since, in the digital age anyone can in turn produce and upload information online.
- ❖ Blending access to print and electronic resources so that they are mutually complementary, and relating digital materials to existing library materials.
- ❖ Disseminating information from digital devices such computers, mobile devices via varieties of milieu to users regardless of their location or time.
- ❖ Developing quick and accurate locator tools to make the complex web of resources more available to both savvy and inexperienced users.
- ❖ Provide value-added functionalities and indexing to the thread of information materials that will continue to grow in an unprecedented rate, because using the Internet everyone can effectively publish on the platform.
- ❖ Providing information resources to and being an involved catalyst that not only provides users with specific information resources or sources, but also analyzes, evaluates, synthesizes, and transfers the information in the most usable way.
- ❖ Developing mechanisms for granting access to digital libraries to significant segments of the population who do not have access to computers.
- ❖ Handle large-scale digital library projects including digitization, data storage, use, transfer and digital preservation activities;
- ❖ Instructing newcomers about how to locate knowledge sources. Similarly, experts should be taught how to find interesting

information, research findings that are relevant both within and outside of their own disciplines.

- ❖ Teaching users essential skills for assessing useful internet information resources, such as deciding the credibility and accuracy of what they find it worth downloading.
- ❖ Through having enough experience with programmers/system designers and knowing users' needs, librarians might act as the user's representative in information system design, analysis and evaluation while still interpreting to the user what is or is not technically feasible.
- ❖ The needs of library users are changing, and the resources, services, and products of libraries are changing as a result of ICT. Hence, the need for Library and information professionals to respond to these needs.

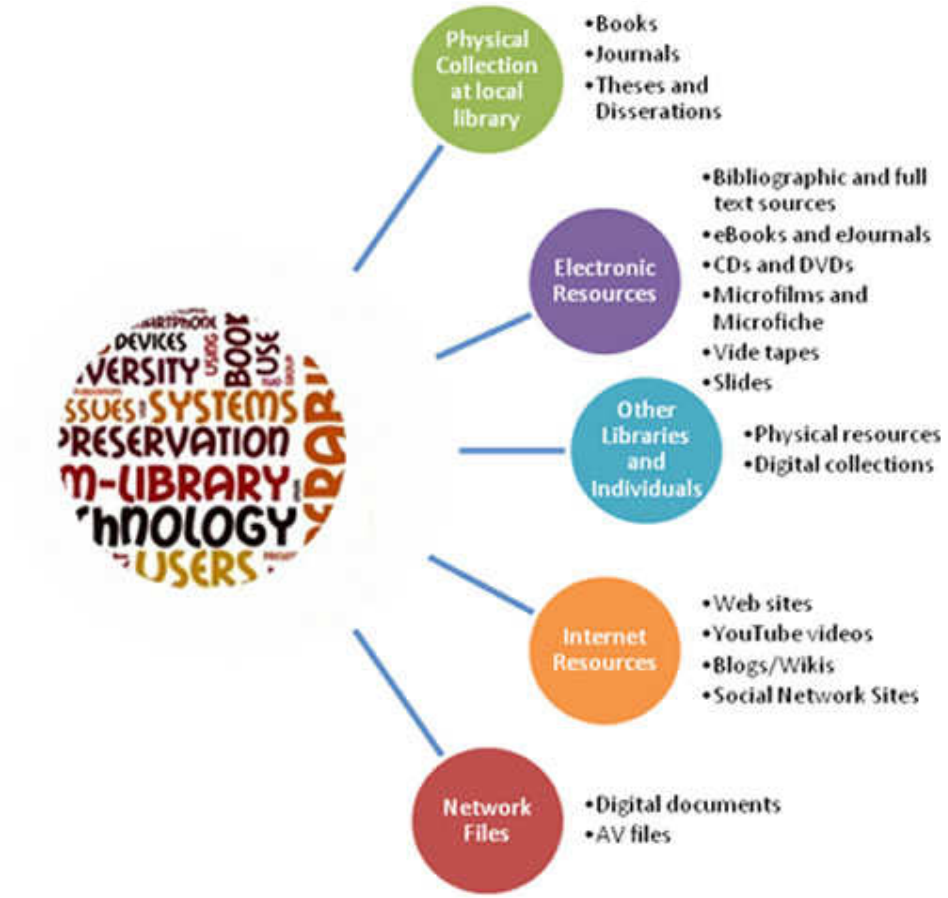

Fig. 5: Emerging Role of Librarians/Information Professional in the Digital Age

Source: Ecole Solutions Pvt Ltd. Library Solutions - Library

Management Software, RFID System for Library, Digital Library Management System - Ecole Solutions Pvt. Ltd. Bangalore in Bagalore India

4.0 CONCLUSION

In this unit you learnt the some of the advantages of digital information resources over print format. It also discusses the challenges affecting librarians/information professionals in the digital age. Lastly, the unit discussed the emerging role of information professional in the digital age.

5.0 SUMMARY

The summary of the unit is provided as follows;

- Digital information resources are easy to modify, share, distribute and disseminate across the globe regardless of time and geographical boundaries.

- Digital technology has posed a lot of challenges to librarians and information professionals which include; exposing information professional to diverse sources of information, constant changing of hardware and software, increase difficulty in analysing, evaluating and disseminating information, constant training and continuous education.
- Emerging role of information professionals include; developing expeditious information resource locators, evaluating quality of information resources, training users on essential information literacy skills and serves as intermediary between system designers and users.

SELF-ASSESSMENT

1 Differentiate between digital information resources and the print format.

The followings are the major differences between electronic documents and paper document;

- Digital information resources and services can be accessed anywhere, anytime regardless of time and geographical barriers unlike print where you need to be physically present.

- Unlike print, digital information can be accessed by multiple users simultaneously without any interference.

- Digital information resources occupy less space when compared with print and stored into compactible form with little difficulty.
- Digital information resources are very flexible; they can be easily edited, revised, rearranged, reproduced, reformatted or even combined with other information. But print information are static
- Unlike print information resources such as books, journals etc. digital information resources can easily be produced infinitely many times without reducing the quality or fidelity of the content.
- Digital information resources can be shared or distributed easily at a very minimum cost.

2 Identify and discuss the challenges affecting librarians/information professionals in the digital age.

The challenging environment created by the digital age, which librarian needs to respond to which are as follows

- Increasing exposure to a plethora of information resources from around the world and in various formats, such as audio, multimedia, and textual.
- Increase the speed at which information professionals can obtain and provide access to information users.
- Increased difficulty in finding, analysing, and integrating information for clients.
- Information and communication technology (ICT's) are constantly evolving (hardware and software) this poses a challenge both in terms of skills and monetary expenditure.
- Ongoing training for users and library employees, as well as significant financial investments in technology.
- There is a lack of hardware and software standardization and this involves constant upgrade, migration from one hardware or software to another which require financial and technological investment.

3- Discuss the emerging role of information professionals in the digital age.

The emerging roles of Librarian/information professionals are as follows;

- Selecting digital information resources and evaluating their

quality. Since, in the digital age anyone can in turn produce and upload information online.

- ❖ Blending access to print and electronic resources so that they are mutually complementary, and relating digital materials to existing library materials.
- ❖ Disseminating information from digital devices such computers, mobile devices via varieties of milieu to users regardless of their location or time.
- ❖ Developing quick and accurate locator tools to make the complex web of resources more available to both savvy and inexperienced users.
- ❖ Provides value-added functionalities and indexing to the thread of information materials that will continue to grow in an unprecedented rate, because using the Internet everyone can effectively publish on the platform.
- ❖ Providing information resources to and being an involved catalyst that not only provide users with specific information resources or sources, but also analyzes, evaluates, synthesizes, and transfers the information in the most usable way.
- ❖ Developing mechanisms for granting access to digital libraries to significant segments of the population who do not have access to computers.
- ❖ Handle large-scale digital library projects including digitization, data storage, use, transfer and digital preservation activities;
- ❖ Instructing newcomers about how to locate knowledge sources. Similarly, experts should be taught how to find interesting information, research findings that are relevant both within and outside of their own disciplines.
- ❖ Teaching users essential skills for assessing useful internet information resources, such as deciding the credibility and accuracy of what they find it worth downloading.

6.0 TUTOR-MARKED ASSIGNMENT

1 Differentiate between digital and print information resources.

2 Identify and discuss the challenges affecting librarians/information professionals in the digital age.

3 Discuss the emerging role of information professional in the digital age.

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UNIT 3 REFERENCE SERVICES IN DIGITAL SYSTEM

CONTENTS

1.0 INTRODUCTION

Evolving information technologies are dramatically changing every aspect of our personal, social and professional lives. In fact we are living in an amazing time, technologically. Frequency of new terms coined to accommodate the new emerging concepts/subjects is very high. The library and information profession is also facing the challenges of electronic age and has been transformed by technology. Advancement in information technologies have brought out incredible changes in almost every aspect of information services. Reference services are also not an exception. Easily accessible digital information has rapidly become one of the hallmarks of internet. Internet has also proved as a cost effective and efficient alternative to traditional retrieval methods. All these developments gave way to new range of reference services. In this series of developments digital reference is the latest trend of the digital era. Before discussing the digital reference service let us first understand the concept of reference service. Therefore, this unit discusses the definition of reference service, an overview of the

concept of digital reference, modes of digital reference service delivery, types of digital reference services. Also, the unit, identifies the benefits of digital reference services, discusses the how to implement and maintain digital reference service, training for librarians working with digital reference services. In addition, the unit, competencies the competency of librarians dealing with digital reference services. Lastly, the unit identifies the challenges experienced by libraries in providing digital reference services and evaluating digital reference services.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define reference service
- give an overview of the concept of digital reference
- identify and discuss modes of digital reference service delivery
- discuss types of digital reference services
- identify the benefits of digital reference services
- implement and maintain digital reference service
- provide training for librarians working with digital reference services
- highlight the competencies of librarians dealing with digital reference services
- identify challenges experienced by libraries in providing digital reference services
- evaluate digital reference services.

3.0 MAIN CONTENT

3.1 Definition of Reference Service

According to the American Library Association's Glossary of Library Terms, "Reference Service is that portion of library work that is directly concerned with assisting readers in obtaining information and using library resources in study and research." According to Ranganathan, Reference Service is “Personal assistance or service rendered to each reader in helping him to identify the information resources that would assist in answering his informational needs or interest at the time pin-pointedly, thoroughly, and speedily.”

Reference service, often known as “reference and information services” readers services is more encompassing and is described as personal aid

provided to library patrons in their quest for information. In contrast to other forms of library services, reference service is notable by a high level of personal interaction between librarians and library patrons, the service is typically provided to individual users or specifically identified small groups of users, and the users' information needs are known at the time of the interaction.

There are three key aspects or service strategies to reference service:

(1) information service, which comprises locating or supporting the user in locating needed information; (2) library instruction, which consists of assisting users in learning the skills required to locate and use library materials; and (3) direction, in which users are aided in selecting library materials that are suited for their educational, informational, or recreational requirements. In complement to these ‘‘direct" services, reference librarians offer ‘‘indirect" services. For example, building and maintaining a collection of bibliographical tools and other information sources, participating in cooperative projects to offer users with access to resources outside the library, and numerous administrative operations are among these responsibilities.

3.2 Concept of Digital Reference

The terms ‘digital reference service' and ‘virtual reference service' are frequently used interchangeably. The two names are used interchangeably in libraries to refer to the question-and-answer services offered by libraries. In the changing technological world, the digital reference service is just an advancement of the same old services that is emerging as a natural answer to suit consumers' information needs. Digital reference, in technical terms, refers to a network of expertise, human intermediation, and resources made available to users in an online environment. Wherever practical, it uses automated technologies, allowing human experts to focus on the "hard questions."

According to Preston (2020) Digital reference is “the provision of reference services involving collaboration between library user and librarian, in a computer based medium. These services can utilize various media, including e-mail, web forms, chat, video, web customer call center software, voice over internet protocol (VoIP), etc”. According to Lankes (2008) “Digital references service refer to the position of human intermediated service over digital network”

The Digital Library Federation's working definition of digital libraries reflects a point of view that defines digital libraries as institutions.

Digital libraries are organisations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities (Croft &Eichenlaub, 2006).

According Uutoni (2018) digital reference services and digital libraries connect the missions, techniques, and cultures of physical libraries with the technologies and cultures of computing and telecommunications, Also, digital reference services and 'Digital libraries (DLs) are extensions and augmentations of physical libraries' Regardless of how the digital library services is conceived, its primary function – must never be overlooked. One of the primary reasons for the physical library's existence is, without a question, to serve the user. The digital library fulfills the aim of the physical library by extending its service to the remote user without regard for location or time constraints.

3.3 Modes of Digital Reference Service Delivery

Digital reference services are widely classified into two sorts based on the way of receiving and responding to inquiries i.e. asynchronous and synchronous.

Asynchronous

An asynchronous digital reference service is one that only communicates in one direction at a time. To inquire about his or her information needs from a librarian, a library user may utilize a web-based e-mail, web form, or ask a librarian service. In this mode of reference service, to provide responses to library patrons, reference librarians use frequently asked questions, e-mail, and e-resources, which are made up of subject guides, lists, journals, and other information (Oluwabiyi, 2017).

According to Miulescu (2020) asynchronous services include a time lag librarian' services. Asynchronous reference systems "allow librarians to respond to queries in their own time, after conducting the necessary research, which may improve the accuracy and completeness of responses" (Ibacache, 2021).

Synchronous

A synchronous service is said to be ‘real-time,' with an immediate answer to a query. It is a two-way Internet conversation between a library user and a librarian. Chat, instant messaging, Voice-Over Internet Protocol (VoIP), and web cam services are among the methods utilized for this communication (Ibacache, 2021).

In a synchronous digital reference service, information is exchanged in ‘real time,' with an immediate response to the enquiry. In this example, the user and the reference librarian are interacting in real time. As a result, it is known as a real-time digital reference service.

3.4 Types of Digital Reference Services

There are various types of digital reference services. This is provided as follows:

1- Email reference service

In this type of reference service, a patron sends an email to a librarian or a specifically constructed reference email identity by the library's reference service section. A user submits a request by email to a librarian or a specified reference email identity provided by the library's reference service division. The most popular feature among users is the email reference service, which allows users to ask questions even when the library is closed and does not require any additional software to utilize.

2- Reference through Web

It is clear that, e-mail reference service has been found very valuable to users in rendering reference service. However, it has multiple flaws, and reference and information services librarians confront numerous challenges because it is not an organised type of service. It does not offer the user all of the information they require due to the poor nature of interaction between the user and the patron. In this context, various technologies were created to enhance the services capabilities which lead to the emergence of web reference services. Likewise, the "Ask a Librarian website" was created to give a structured web form where users are requested to respond to certain questions in response to their information needs. The web-based form must be accessed either from the library's main page or the reference homepage. The user must then fill in the appropriate fields before returning the form to the library by e-mail. Web forums were built for digital reference services to make it

easier for users to ask questions.

3- Chat using instant messaging

One of the most frequent kinds of digital communication is instant messaging or online chat. It is faster than using an e-mail reference service. The flow of information between the user and the reference librarian occurs in real-time, i.e. the user and the reference librarian are in constant communication. Most instant messages are identical in a setting that enables users to communicate with the librarians in real-time. Instant messages are one of the preferred methods of digital reference delivery by many librarians because they are simple to access, maintain, and communicate with clients. This service is quicker than e-mail because customers are not required to wait for a response. In this kind of service, user queries can be answered at any time. To avoid the system logging out and users becoming bored while introducing themselves, the reference librarian strives to keep the contact short. Because the typical length of an interview in a digital setting is 10 minutes, the reference librarian should take this into account. This service also requires the installation of instant messaging software on the users' and librarians' computers or handheld devices for them to connect.

4- Video based reference service/video conferencing/web camera service

It is a virtual reference service that uses video. It is also known as video assistance. It came up to address the communication challenges that text-based systems have. The reference librarian and the user can use both text and speech transactions in this method of communication, and they can see and hear each other in the same way they would in a face-to-face interview. Distance learning, online courses, research, and reference applications all benefit from video conferencing. It is also handy for university libraries' off-campus services. Today, video conferencing is used for viva voce tests and interviews.

5- Digital/Virtual Reference Robots

According to Chandwani (2018) and Honghai, (2020) virtual reference is an artificial intelligence-based service that is used to answer questions while the reference librarian is unavailable. The service entails the use of software to do database searches.

3.5 Benefits of digital reference services

The user group has generally recognized and benefited tremendously from the qualities of digital reference services. Also, libraries gain from digital reference services in a variety of ways. The following are some of the advantages, according to Sloan (2012):

- advise and instruct individuals on a one-on-one basis;
- establish and maintain a suitable assortment of print and electronic reference resources;
- convenience – the user might conceivably use the reference material in any location and at any time;
- assisting users in locating the most reliable sources of information;
- multimedia feature, etc. The multimedia feature of the digital resource allows the users to gain complete comprehension of the resource as possible. Furthermore, the digital material may allow the user to view the image in various resolutions, angles, and layers;

- assist library with the marketing of reference materials;
- to represent the company in public relations;
- assisting with online searches and cross search – the majority of the contemporary library systems allow the function of searching across multi-databases to access full content as well as bibliographic information (Online Public Access Catalog [OPAC], local and remote databases, variety of digital collections) with little or no difficulty;

- assist in professional activities for development and increased access to rare materials - the digitized collection comprises a large number of archives, manuscripts, and rare books that are not available to general users, let alone remote users, as originals. It allows access to these precious materials without fear of damage or loss;
- help in referral process; forward the enquiry or provide the user with live links to authoritative websites;

3.6 Implementation and Maintenance of Digital Reference Service

To successfully implement and maintain digital reference services, there is the need to follow several steps. These steps are as follows:

1. Staff Training: this involves wide range of training in new technologies, online synchronous and asynchronous software, and virtual reference techniques among others. The library staff is being educated on the foundations of virtual reference services and the methods through which they are delivered to users.
2. Recruiting new librarians: New librarians with vast knowledge and skills are recruited. The librarian should be recruited based on their exceptional skills in delivering digital reference services.
3. Interface Design: An interface design, often known as an online reference desk, is intended to provide clients with access to a variety of information resources and services. The interface enables the reference librarian to deliver services and expertise to a larger number of people, regardless of their language, technical capabilities, or physical limitations.
4. Prototype: Making a service prototype and testing it before final implementation and making it available to users is highly necessary in reference service delivery, a virtual/digital reference service must be pre-tested to ensure its efficacy and identify shortcoming within the system.

5. Legal Issues: All information workers including the reference librarians must be informed about their country's present ethical issues within the jurisdiction of public information legislation. Also, reference librarians should be aware of when and where it affects the breadth of digital reference services offered to their users.

3.7 Training of librarians working with digital reference services

Oluwabiyi (2017) defines training in a digital reference situation as "the intentional preparation of individuals involved in the construction, maintenance, and operation of a specific digital reference service." This training is critical since digital reference services are related to innovative technology uses that necessitate specific abilities. Lankes and Kasowitz (1998) emphasized on the need for libraries to incorporate a

training plan for their personnel especially, those who work with digital reference services both during deployment and afterwards.

According to Ronan (as cited in Luo 2009), the following training requirements exist for librarians who work with digital reference services: software training, training on chat reference transactions, mentoring, and ongoing training. These are detailed further below.

- **Software Training**

This refers to the process of preparing reference librarians to comprehend the characteristics and operations of the software used to provide digital reference services before they begin work. Because various chat soft wares or applications have distinct features, functionalities and interfaces, therefore, such training is critical. Typically, software developers or suppliers provide software training.

- **Training on Chat Reference Transactions**

Due to the nature of digital reference services that are rendered in a digital context, librarians must possess the skills and knowledge necessary to work in such an environment. As a result, librarians who work with digital reference services require enormous training in online communication skills, reference interview skills, web searching abilities, knowledge of electronic resource, and sources, policies and procedure. Training on digital reference transactions is essential for librarians because it helps them understand how to answer inquiries from users in a chat session.

- **Mentoring**

Mentoring entails more experienced librarians guiding and providing personal support to librarians who lack experience and exposure to digital reference services. Mentoring can help them overcome their apprehension about learning new technologies.

- **Continuous training**

Librarians who work with digital reference services require ongoing training or refresher sessions regularly to stay abreast with the constantly changing digital reference service and developments. These refresher classes will also assist reference librarians in becoming more comfortable in dealing with digital reference systems. Librarians in charge of answering queries via digital reference services should always have adequate training to be competent enough and comfortable at the digital reference desk (Lund, 2020). The training should also include

replying to e-mails, performing reference interviews, and other similar duties.

3.8 Competencies of Librarians Dealing with Digital Reference Services

According to the IFLA guidelines (2008), relevant skills for a digital reference librarian include multitasking; clear communication skills, particularly writing skills; database and online searching skills; interviewing skills (to compensate for inadequacies for visual and auditory cues); and knowledge of reference resources.

The IFLA recommendations support the conclusions of Luo's (2008) study, which identified the following digital reference service (chat reference) competencies:

- **Reference interview skills**.

Directing users to appropriate sources of information; using open probes to clarify questions; recognizing when follow-ups are required; offering a personal greeting at the start of a chat session to demonstrate clear interest and willingness to help. Also, confirming users satisfaction with their information needs are all examples of this competency.

- **Familiarity with electronic resources.**

This competency encompasses librarians' abilities to pick and search databases and Internet resources, as well as their familiarity with licensed library databases, a broad understanding of Internet resources, and the ability to quickly assess the quality of information resources and services.

- **Ability to work under pressure.**

In chat reference sessions especially in a synchronous mode, this competency comprises the capacity to think fast and adapt to unforeseen events; the ability to manage several tasks; and time management abilities.

- **Online communication skills.**

Mastery of online real-time written communication abilities, as well as an awareness and respect of online culture and chat etiquette, are all part of this ability.

- **Instructional role.**

This competency comprises the capacity to teach users how to improve their information literacy and the ability to provide peer teaching to colleagues on how to improve their conversation reference abilities.

- **Ability to recognised different groups of clients.**

This competency entails the librarian's capacity to comprehend various users and respond to their questions using a variety of methods.

- **Ability to handle irregularities of user behaviour.**

This skill sets covers the librarian's capacity to deal with any type of unlawful usage of digital reference services, such as abusive excessive demand from users, disrespect from users, and so on.

Oluwabiyi (2017) recommends that reference librarians working with digital information resources and services should possess skills such as being proactive, educated, and well-trained in communication, ability to react to all inquiries, and remain objective in their assessment of the information supplied. According to Naskar (2019), librarians working with digital reference services should have strong searching abilities, the capacity to produce short messages, and the ability to cope with anxious and demanding consumers. Noteworthy is the fact that many librarians who deal with digital reference services are accustomed to traditional reference services and face-to-face interactions. To be able to work in the digital environment, they will need to learn new skills.

3.9 Challenges Experienced By Libraries in Providing Digital Reference Services

The literature analysis found that building and maintaining digital reference services is fraught with difficulties. Many libraries have struggled to provide a consistent level of service to their patrons or to serve and answer to a flood of enquiries in a timely manner (Ikeagwuani, Anoka & Ugochukwu, 2020). Another issue with asynchronous digital reference services, particularly e-mail, is that reference librarians do not always respond quickly to library patrons. An issue of concern for reference librarians is that they rarely get the chance to conduct reference interviews, which are critical for evaluating library customers' needs because library users frequently ask incomplete inquiries.

Furthermore, reference interviews performed through e-mail and web forms do not take place in real-time. They are also limited or non-existent because answering these inquiries takes longer than answering queries addressed in person, over the phone, in chat rooms, or via videoconferencing. Answers to simple questions addressed by e-mail or the internet could take up to a day for the library user to view. It could take even longer if the request is elaborate or confusing (Schnitzer& Arndt, 2019).

Another issue, as Ikeagwuani, Anoka and Ugochukwu (2020) points out, is that librarians can easily misread reference requests submitted over e-mail or the web because they will not be able to see the requestor's gestures, facial expressions, or voice tone. Although this can be mitigated in libraries that offer ‘chat' or other real-time services, these are only available when a reference librarian is on duty. As a result, unlike e-mail or online form reference services, remote researchers would not be able to send reference requests 24 hours a day.

3.10 Evaluating Digital Reference Services

The phrases "evaluation" and "assessment" are frequently interchanged, because both require gathering information to make choices. Evaluation, on the other hand, is concerned with aspects such as programs, goods, and projects, whereas assessment is concerned with individuals, i.e., their abilities, attitudes, and accomplishments Khobragade and Lihitkar (2016) Evaluation is defined as follows by the Research Council of the United Kingdom (UK):

[It is] a process that takes place before, during and after an activity. It includes looking at the quality of the content, the delivery process and the impact of the activity or program on the audience(s) or participants. Taking the opportunity to understand whether you achieved what you set out to, how well you did it, what impact your activity has had and to reflect critically on both the activities and processes will benefit you and your audiences (Research Council UK, n.d,).

Mathankar (2021) defines evaluation as the methodical gathering and assessment of information to provide useful feedback on a specific object. Evaluation is critical in any service implementation, such as in libraries, because it offers feedback mechanism to the intended recipients, whether they are funders, staff members, or other stakeholders. This feedback is beneficial since it aids in the development of library activities or services, ensuring that the library performs better, and assessing the end impact of the library's operations (Research Council UK, n.d.).

“the process of identifying and collecting data about specific services or activities, establishing criteria by which their success can be assessed and determining both the quality of the service or activity and the degree to which the service or activity accomplishes stated goals and objectives” (McClure as cited in Novotny, 2001, p. 4).

The evaluation of the service is a crucial stage in making the service a success in the digital age. The evaluation of a digital reference service can be done in a variety of ways. They include the following:

- **User comments:** Library patrons are asked to provide feedback on the digital reference service provided by the institution.
- Rating: In this method, faculty and staff are asked to rate the library's services so that the reference librarian can evaluate them correctly in relation to the services provided.
- Survey and Questionnaire: In this form of evaluation technique, a questionnaire is used to collect data based on their level of satisfaction with the services rendered.
- Interviews: This involves interviewing user in an attempt to assess a specific digital reference service.
- Case Studies: This involves indepth analysis of a particular digital reference service or even the entire reference services with the aim of understanding the state of digital reference services. Case studies is effective method of evaluating digital reference service.

4.0 CONCLUSION

In this unit we defined reference service which refers to as personal assistance given to the reference librarian to the library user. We gave an overview of the concept of digital reference; which involves the use of information and communication technology in rendering reference services. It also refers to "the provision of reference services involving collaboration between library user and librarian, in a computer based medium. These services can utilize various media, including e-mail, web forms, chat, video, web customer call center software, voice over internet protocol (VoIP), etc." The two modes of digital reference service delivery i.e. synchronous and Asynchronous. We treated the types of digital reference services and also identified the benefits of digital reference services. Furthermore, you learnt the strategies for the implementation and maintenance of digital reference service. The types of training needed for librarians working with digital reference services were equally discussed. Lastly you learnt about the challenges experienced by libraries in providing digital reference services and as well how to evaluate digital reference services.

5.0 SUMMARY

The summary of the unit is provided as follows:

1- Collection development is defined as "the process of planning a stock acquisition programme not simply to cater for immediate needs but to build a coherent and reliable collection over a number of years, to meet the objectives of the services.

2- In the changing technological world, the digital reference service is just an advancement of the same old services that is emerging as a natural answer to suit consumers' information needs. Digital reference, in technical terms, refers to a network of expertise, human intermediation, and resources made available to users in an online environment. Wherever practical, it uses automated technologies, allowing human experts to focus on the "hard questions."

3- Digital reference services are widely classified into two forms based on the way of receiving and responding to enquiries i.e. asynchronous and synchronous. An asynchronous digital reference service is one that only communicates in one direction at a time. Asynchronous services include a time lag between the query and the answer, particularly with e-mail-based, web-form,

or ‘Ask a librarian' services. While, Synchronous digital reference services involves interacting with the patron in real-time. This mode of reference service gives room for an instant response as both the librarian and the patron communicate concurrently. Digital reference services offer some benefits which include:

- Helps to advise and instruct individuals on a one-on-one basis.
- Helps to establish and maintain a suitable assortment of print and electronic reference resources.
- Convenience – the user might conceivably use the reference material in any location and at any time
- Assisting users in locating the most reliable sources of information.
- Multimedia feature, etc. The multimedia feature of the digital resource allows the users to use all of sense organs to gain comprehension of the resource as possible. Furthermore, the digital material may allow the user to view the image in various resolutions, angles, and layers.

4- Concerning types of reference services, different kind of services are developed and a lot of libraries are using these services which include; email reference service, chat using instant messaging, video based reference service/video conferencing/web camera service, digital/virtual Reference Robots

5- On implementation and maintenance of digital reference service, staff training, recruiting new of librarians with vast knowledge and skills, interface design i.e. an interface design, often known as an online reference desk are among the necessary ingredients for successful implementation of reference services.

6- Digital training is defined as "the intentional preparation of individuals involved in the construction, maintenance, and operation of a specific digital reference service." There are various forms of training such as software training, training on chat reference transactions and mentoring among others training requirement.

7- According to the IFLA guidelines (2008), relevant skills for a digital reference librarian include multitasking; clear communication skills, particularly writing skills; database and online searching skills; interviewing skills (to compensate for inadequacies for visual and auditory cues); and knowledge of reference resources.

8- The literature analysis found that building and maintaining digital reference services is fraught with challenges. Many libraries have struggled to provide a consistent level of service to their patrons or to serve and answer to a flood of enquiries in a timely manner (Schnitzer& Arndt 2019). Another issue with

asynchronous digital reference services, particularly e-mail, is that reference librarians do not always respond quickly to library patrons.

9- Evaluation is defined as the methodical gathering and assessment of information to provide useful feedback on a specific object. Evaluation is critical in any service implementation, such as in libraries, because it offers feedback mechanism to the intended recipients, whether they are funders, staff members, or other stakeholders.

SELF-ASSESSMENT

a) Define reference service

Reference Service is “Personal assistance or service rendered to each reader in helping him to identify the information resources that would assist in answering his informational needs or interest at the time pin-pointedly, thoroughly, and speedily.”

b) Define Digital Reference service

Digital reference, in technical terms, refers to a network of expertise, human intermediation, and resources made available to users in an online environment.

Wherever practical, it uses automated technologies, allowing human experts to focus on the "hard questions."

c) Evaluate digital reference services

Evaluation is the process of identifying and collecting data about specific services or activities, establishing criteria by which their success can be assessed and determining both the quality of the service or activity and the degree to which the service or activity accomplishes stated goals and objectives.

The evaluation of a digital reference service can be done in a variety of ways. They include the following:

- **User comments:** Library patrons are asked to provide feedback on the digital reference service provided by the institution.
- **Rating:** In this method, faculty and staff are asked to rate the library's services so that the reference librarian can evaluate them correctly in relation to the services provided.
- **Survey and Questionnaire**: In this form of evaluation technique, a questionnaire is used to collect data based on their level of satisfaction with the services rendered.
- **Interviews:** This involves interviewing user in an attempt to assess a specific digital reference service.
- **Case Studies:** This involves in-depth analysis of a particular digital reference service or even the entire reference services with the aim of understanding the state of digital reference services. Case studies is effective method of evaluating digital reference service.

d) Identify and discuss modes of digital reference service

delivery

Basically, there are two types of reference services i.e. Asynchronous and synchronous An asynchronous digital reference service is one that only communicates in one direction at a time. To inquire about his or her information needs from a librarian, a library user may utilize a web-based e-mail, web form, or Ask a librarian service. Asynchronous reference systems "allow librarians to respond to queries in their own time, after conducting the necessary research, which may improve the accuracy and completeness of responses"

A synchronous service is said to be 'real-time,' with an immediate answer to a query. It is a two-way Internet conversation between a library user and a librarian. Chat, instant messaging, Voice-Over Internet Protocol (VoIP), and web cam services are among the methods utilized for this communication.

e) Give the strategies for the implementation and maintenance of digital reference service

The following are the strategies needed in the implementation and maintenance of digital reference services;

1. Staff Training: this involves wide range of training in new technologies, online synchronous and asynchronous software, and virtual reference techniques among others. The library staff is being educated on the foundations of virtual reference services and the methods through which they are delivered to users.

2. Recruiting new librarians: New librarians with vast knowledge and skills are recruited. The librarian should be recruited based on their exceptional skills in delivering digital reference services.

3. Interface Design: An interface design, often known as an online reference desk, is intended to provide clients with access to a variety of information resources and services. The interface enables the reference librarian to deliver services and expertise to a larger number of people, regardless of their language, technical capabilities, or physical limitations.

4. Prototype: Making a service prototype and testing it before final implementation and making it available to users is highly necessary in reference service delivery, a virtual/digital reference service must be pre-tested to ensure its efficacy and identify

shortcoming within the system.

5. Legal Issues: All information workers including the reference librarians must be informed about their country's present ethical issues within the jurisdiction of public information legislation. Also, reference librarians should be aware of when and where it affects the breadth of digital reference services offered to their users.

f) Identify the benefits of digital reference services

Digital reference service offer some benefits which include:

- Advise and instruct individuals on a one-on-one basis.
- Establish and maintain a suitable assortment of print and electronic reference resources.
- Convenience – the user might conceivably use the reference material in any location and at any time
- Assisting users in locating the most reliable sources of information.
- Multimedia feature, etc. The multimedia feature of the digital resource allows the user to use all of their sense organs to gain complete comprehension of the resource as possible. Furthermore, the digital material may allow the user to view the image in various resolutions, angles, and layers.

i) Identify challenges experienced by libraries in providing digital reference services

- Some of the challenges identified in the provision of digital reference services are provided as follows:

- Another issue with asynchronous digital reference services, particularly e-mail, is that reference librarians do not always respond quickly to library patrons. Besides, reference interviews performed through e-mail and web forms do not take place in real-time.
- An issue of concern for digital reference librarians is that they rarely get the chance to conduct reference interviews, which are critical for evaluating library customers' needs because library users frequently ask incomplete inquiries.
- They're also limited or non-existent because answering these inquiries takes longer than answering queries addressed in person, over the phone, in chat rooms, or via videoconferencing.
- Another challenge is that librarians can easily misread reference requests submitted over e-mail or the web because they will not be

able to see the requestor's gestures, facial expressions, or voice tone.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define reference service.
2. Define digital reference service.
3. Identify and discuss modes of digital reference service delivery.
4. Identify the benefits of digital reference services.
5. Give the strategies for the implementation and maintenance of digital reference service.
6. Highlight the competencies needed for librarians dealing with digital reference services.
7. Identify challenges experienced by libraries in providing digital reference services.
8. What is evaluate?

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UNIT 4 DIGITAL INFORMATION SYSTEM SERVICES

CONTENTS

1.0 INTRODUCTION

Information Systems (IS) are at the heart of every business and pervade almost every aspect of our lives (work, rest and play). Digital information systems (DIS) are electronic systems that combine software and hardware to allow for communication and collaborative work (Baskerville, Myers & Yoo, 2020). These systems do not emerge from thin air. They are a reaction to changes in economic institutions and structures, which govern industrial dynamics. The term "globalization" is a popular construct/concept for these developments. An information system is an integrated collection of components used to gather, store, and analyze data as well as to provide information, knowledge, and digital goods. Information systems are used by businesses and other organisations to carry out and manage operations, connect with consumers and suppliers, and compete in the marketplace. Inter-organisational supply chains and electronic markets are managed using information systems. Corporations, for example, utilize information systems to handle financial records, manage human resources, and reach out to potential consumers through online marketing. Many large corporations are based on information systems. eBay, primarily an auction marketplace; Amazon, an expanding electronic mall and provider of cloud computing services; Alibaba, a business-to-business e-marketplace; and Google, a search engine company that derives the majority of its revenue from keyword advertising on the Internet searches, are among them. Governments use information technology to serve citizens with cost-effective services. With information systems, digital commodities such as electronic books, video products, and software, as well as online services such as gaming and social

networking, are supplied. Individuals rely on information systems, most of which are Internet-based, to conduct most of their daily lives: socializing, studying, banking, shopping and entertainment. Looking at the nature of the activities that were carried out on the digital information system their security is of paramount importance. Therefore, this unit discusses concept of digital information service, types of digital information system, dimensions of digital information system and services.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define digital information service
- discuss concept of digital information service
- enumerate and discuss the types of information system service.

3.0 MAIN CONTENT

3.1 Concept of Digital Information Service

A digital service is the application of digital ‘‘competencies through deeds, processes, and performances for the benefit of another entity or the entity itself’’ (Ikeagwuani, Anoka & Ugochukwu, 2020). While, digital competencies refer to digital assets and digital capabilities that one entity makes available to another entity through access or temporary possession. Also, digital service refers to making any asset or capability applicable to others using information technology, thereby enabling digital processes of value co-creation.

Based on this notion, digital information service—referring to the contemporary mobility systems that are supported by physical, digital (information) and regulatory (rules) foundations. While physical (e.g. infrastructures) and regulatory (governance, policies) issues are well understood, the digital dimension has considerably evolved in recent years with the introduction of new information technologies. Among the most significant are:

- **Access devices.** Computers and smartphones are examples of computing devices that can connect to telecommunication networks and retrieve, analyze, and transfer data.
- **Geospatial services.** Computing equipment that can offer real-time locational information for a number of applications, including vehicle tracking and navigation. Other sensors that may provide visual information (optical character recognition or

environment processing) or attribute information can also be included (temperature, pressure, humidity, etc.).

- **Connectivity networks.** Wired and wireless networks are examples of telecommunication systems that enable components of an information system to communicate.
- **Open data exchanges.** A collection of standards that allows for the interchange and storage of data across all devices.
- **Integrated payments.** A system that enables players like financial institutions to settle transactions like contracts, purchases, tolls, and tickets.
- **Cloud services.** A dispersed network of servers capable of storing, retrieving, and processing large amounts of data.
- **Block chain.** An encrypted ledger system that can correctly record events and transactions in blocks of data.

3.2 Types of Information System Service

There is various information system that are designed to perform different kind of activities which are discussed as follows:

- **Operational support and enterprise systems**

Operation processing systems help to support the activities that allow goods to be created, marketed, manufactured and delivered. Large integrated systems known as enterprise systems are put to use in bigger businesses for transaction processing. In this example, the information systems that support multiple functional units—sales and marketing, manufacturing, finance, and human resources—are integrated into an ERP system, which is the most common type of enterprise system. ERP systems help to support the value chain, which is the complete sequence of activities or processes that a company uses to add value to its goods. For example, a person or another firm may place a custom order over the Internet, which immediately begins just-in-time manufacturing to the customer's requirements via a technique known as mass customization. This entails transferring orders from consumers to the firm's warehouses and perhaps to suppliers to provide input materials just in time for a batch bespoke manufacturing run. Financial accounts are updated, and delivery logistics and invoicing are begun.

Operation processing systems can aid in the integration of a company's value chain as well as the entire supply chain of which it is a part. From the raw ingredients through the ultimate delivery of the product, this covers all firms involved in developing, producing, promoting, and

delivering the goods and services. A supply chain management (SCM) system oversees the movement of products, data, money, and information along the whole supply chain, which begins with raw material suppliers and continues through the intermediate layers of processing firms to distributors and retailers. Purchasing an item from a large retailer, for example, results in more than just a cash register receipt: it also triggers the automated transmission of a restocking order to the relevant supplier, which may in turn trigger orders to the supplier's suppliers. Suppliers can also use an SCM system to access a retailer's inventory database through the Internet to arrange efficient and timely deliveries in suitable amounts.

Customer relationship management (CRM), the third type of business system, helps companies engage with their customers in marketing, sales, service, and new product creation. A CRM system allows a company to have a single picture of each client and their interactions with them, allowing for a more consistent and proactive connection. Customers may be involved in the development of co-creation projects. Customers may be involved in the development of the company's new goods through co-creation activities.

Electronic commerce through the Internet is supported by several transaction processing systems. Online shopping, banking, and stocks trading platforms are just a few examples. Information, educational services, and entertainment are all available on-demand through other platforms. Other systems aid in the search for items with desired characteristics (for example, keyword searches on search engines), price discovery (for example, through an auction), and digital product delivery (such as software, music, movies, or greeting cards). Social networking platforms such as Facebook and LinkedIn are effective tools for assisting consumer groups and people as they express their thoughts, develop new ideas, and are exposed to promotional messaging. As a worldwide infrastructure for electronic commerce emerges, many organisations are offering an increasing assortment of specialized services and information-based goods over the Internet. Transaction processing systems store data in databases and data warehouses, which are required by higher-level information systems. Many of these higher-level activities require software modules, which enterprise systems supply.

- **Support of knowledge work**

There are a lot of services aimed at supporting knowledge work. Today, a large proportion of work in an information society involves manipulating abstract information and knowledge ("defined in this context as an organised and comprehensive structure of facts,

relationships, theories, and insights") rather than directly processing, manufacturing, or delivering tangible materials. This type of labor is known as knowledge work. There are three broad types of information systems for knowledge work. Professional support systems, collaboration systems, and knowledge management systems are the three main kinds of information systems that assist knowledge work.

- **Professional support systems**

Professional support systems provide the resources required to complete activities unique to a given profession. Automobile engineers, for example, use computer-aided engineering (CAE) software and virtual reality systems to design and test new models as electronic prototypes for fuel efficiency, handling, and passenger safety before producing physical prototypes and then use CAE to design and analyze physical tests. Before investing in costly clinical trials, biochemists employ sophisticated three-dimensional modelling software to understand the chemical structure and likely action of novel medicines. Financial software is frequently used by investment bankers to assess the expected benefits and possible hazards of certain investment strategies. Indeed, most occupations today have dedicated support systems.

- **Collaboration systems**

The main objectives of collaboration systems are to facilitate communication and teamwork among the members of an organisation and across organisations. One type of collaboration system, known as a workflow system, is used to route relevant documents automatically to all appropriate individuals for their contributions.

Development, pricing, and approval of a commercial insurance policy is a process that can benefit from such a system. Another category of collaboration systems allows different individuals to work simultaneously on a shared project. Known as groupware, such systems accomplish this by allowing controlled shared access, often over an intranet, to the work objects, such as business proposals, new designs, or digital products in progress. The collaborators can be located anywhere in the world, and, in some multinational companies, work on a project continues 24 hours a day.

Other forms of collaboration systems include improved e-mail and videoconferencing systems, often with telepresence employing avatars of the participants. Another form of collaboration software, known as a

wiki, allows numerous people to add and update the material. (Some online encyclopedias are generated on such platforms.) Collaboration systems can also be set up on social media platforms or in virtual worlds. Members of the public, as well as present and potential consumers, can be pulled into the open innovation effort if desired, to enable the co-creation of new goods or the prediction of future results.

- **Knowledge management systems**

Knowledge management systems enable the collection and use of knowledge acquired within an organisation. Diverse types of information and sources can be incorporated; these may include texts and pictures found in patents, design approaches, best practices, competition information, and similar sources, along with elaboration and comments. Rich search capabilities are enabled by indexing and cross-referencing the organisation's documents and communications. Presently, several application packages are available to help share knowledge and expertise among professionals such systems, such as Microsoft's SharePoint. Because organisational knowledge is frequently tacit rather than explicit, these systems must also lead users to individuals of the organisation who have particular expertise.

- **Management support**

Those meant to support an organisation's management constitute a significant category of information systems. These systems rely on data received via transaction processing systems, as well as data and information obtained outside the company (for example, on the Web) and given by business partners, suppliers, and customers.

- **Management reporting systems**

Information systems assist all levels of management, from those in charge of short-term schedules and budgets for small workgroups to those in charge of long-term plans and budgets for the entire organisation. Management reporting systems generate routine, detailed, and voluminous information reports tailored to each manager's areas of responsibility. These systems are generally utilized by first-level supervisors. In general, such reports concentrate on past and current actions rather than forecasting future results. To avoid information overload, reports may only be issued automatically in unusual circumstances or at the request of management.

- **Decision support systems and business intelligence**

Although all information systems indirectly help decision making, decision support systems in most instances developed for this purpose. Because of the nature of the services these systems render, they are designed to evaluate huge quantities of data (known as big data), they are being referred to as business intelligence or business analytics solutions. Model-driven and data-driven decision support systems are the two main types of decision support systems. For example, a sales manager may utilize a marketing decision support system to determine the selling price of a new product. It includes a model that links several factors—the product's pricing, the cost of products, and the cost of advertising in various media—to the expected sales volume throughout the first five years on the market. The management may evaluate anticipated outcomes and choose the most lucrative selling price by providing several product prices to the model.

The primary objective of data-driven business intelligence systems is to analyze large pools of data, accumulated over longer periods in data warehouses, in a process known as data mining. A wide range of decision support systems allows a group of decision-makers to collaborate without having to be in the same location at the same time. Software tools for brainstorming and attaining consensus are included in these group decision systems. Data mining seeks important patterns, such as sequences (purchasing a new house followed by a new dining table), clusters, and correlations (big families and van sales), from which choices may be formed. Based on the identified trends, predictive analytics seeks to estimate future events. Text mining, for example, aids in the discovery of purchasing trends, the targeting of advertisements, and the detection of fraud in internet commerce.

Another category, geographic information systems, can aid in data analysis and visualization by utilizing digitized maps. Many businesses are engaged in the ongoing process of digital mapping of diverse locations. This type of data visualization facilitates quick decision making. A pattern of discrimination may be easily shown by looking at the geographic distribution of mortgage loans.

- **Executive information systems**

Executive information systems provide a range of essential information in a highly simplified and handy format, often via a graphical digital dashboard. Senior and middle-level managers tend to rely heavily on

informal sources of information, thus formal, computerized information systems can only help to a limited extent. Nonetheless, the chief executive officer, senior and executive vice presidents, and the board of directors require this support to monitor the company's performance, analyze the business climate, and establish strategic objectives for the future. These executives must compare their company's performance to that of its competitors and do general research at regional, national and international levels. Executive information systems, which are frequently personalized and rely on numerous media forms, allow users to "dig down" from summary information to progressively concentrated specifics.

3.3 Dimensions of Digital Information System Services

The dimensions of digital information services is provided as follows:

- **Integration of Digital Information System Services**

Digital information services are now frequently combined with other computer-based systems. In universities, for example, digital information services are frequently combined with library automation systems, student services, financial services, and research and grant data management systems. Digital information services are frequently linked to off-campus electronic learning, electronic government, and electronic commerce systems. Interoperability allows digital information services to be integrated with other on- and off-campus information systems.

In the recent past, a library has typically given access to its online catalogue, bibliographic and full-text databases, and table of contents services, electronic preprint archives, citation indexes, and Web-based resources via various user interfaces. In order to conduct effective searches, users had to invest time and energy in learning how to use each interface with different modes of interaction and studying each database with different record formats, metadata systems, and so on. Because of the recent availability of commercial, off-the-shelf software packages like SFX, libraries may now combine many digital information services and provide access to them via a single interface. Such systems connect several databases accessible in the library to produce more complete records that are likely to fulfil users' search queries. Certain portions of a bibliographic record describing an item, for example, may originate from a citation database, a library's online catalogue, serial holdings, subject gateways, or reference databases like Ulrich's or PubMed. A library can have access to the same source in many forms (e.g., printed, CD-ROM, online). Each format may have its own set of benefits and drawbacks. While the online copy may be the

handiest for users, it may not be the most cost-effective from the library's perspective. If a source is accessible in several formats in the library, such software packages can solve the "suitable copy" problem depending on the library's standards. Furthermore, link software packages are typically connected with library automation systems (e.g., Millennium by Innovative Interfaces, Inc.) that handle regular maintenance activities including acquisition, cataloguing, and circulation.

■ Personalisation of Digital Information System Services

Personalisation is described as "... choosing and filtering information items or goods for a person based on information about the individual" (Baskerville, Myers &Yoo, 2020) Using sophisticated IT, it became less expensive to manufacture individualized goods and services. Toffler observed that "...as technology advances, the costs of introducing variants decrease" (Toffler, 1970). In contrast, mass customisations and personalization are signs of a rich and complex society (Information Society), whereas mass manufacturing and mass distribution are hallmarks of the Industrial Society. The Industrial Society encourages the "make, store, sell" strategy, whereas the Information Society promotes the "sell, make, deliver" approach, as Mitchell M. Tsang put it. In other words, the cornerstone of industrial society has been the mass production of quicker, cheaper items in enormous quantities.

Personal banking services, on-demand publishing and on-demand video services, automated current awareness services, electronic document delivery services, recommender systems, and personal information agents should all be known to Internet users. The availability of personalized services simplifies our lives because it is generally easier to access, for instance, our bank accounts via networks from wherever we happen to be (home, work, etc.) rather than going to the bank.

Personal information about users (demographic characteristics, information seeking and usage habits) must be collected in order to tailor information services. This may be done in a number of ways, both implicit and explicit. Several search engines, for example, acquire personal information about users via "cookies" or click-stream analysis techniques. Users can also take a more active role in customization by willingly filling out online forms that indicate their interests. Once user profiles have been established utilizing both implicit and explicit data collection methods, the needed information can easily be disseminated.

There are three levels of personalisation that may be used. The

customizing of the display environment of information services like My CNN, My Yahoo!, My Bank and My Library is known to most online users. The location of any item or icon on the computer screen may be readily specified by the user. User data or requirements can also be used to customize the material. When users connect to the system, they may, for example, select the sort of news (sports, politics, etc.) or the weather prediction for their geographic location. Content personalisation is also utilized in libraries and information centres. Users' access to the library's digital resources might be restricted based on their status (e.g., student, academic) or the location of their network connection. For example, a library's digital collections are frequently limited to licensed users only.

Even if certain digital materials are available, remote users connecting to the library from computers outside the defined IP domain(s) may not be able to access them. Alternatively, certain electronic reserve collections may be restricted to students enrolled in a certain course. To put it another way, "availability" and "accessibility" are not the same thing. The digital material may be customized based on the characteristics of the users. Personalisation is also possible with digital information services such as "alert" or electronic document delivery services. Personalisation of services necessitates a more refined approach. Not only does digital information need to be customized, but services also need to be adapted to each user's rights and privileges. For example, if a library does not own or have access to a specific information source, a professor may place (up to a predefined threshold) electronic document delivery requests using the facilities provided by the library automation system, whereas a student may be unable to do so or may only do so with the assistance of information professional.

4.0 CONCLUSION

An information system is an integrated collection of components used to gather, store, and analyze data as well as to provide information, knowledge, and digital goods and services. Also, there are various information systems that are designed and deployed to perform different kind of services includes among others operational support and enterprise systems, support of knowledge work, professional support systems. Lastly, the dimensions of digital information services which are two i.e. integrated information system and personal information system are vividly discussed.

5.0 SUMMARY

The content in this unit is summarized as follows:

- Digital information systems (DIS) is defined as electronic systems that combine software and hardware to allow for communication and collaborative work. Also, it refers to an integrated collection of components used to gather, store, and analyze data as well as to provide information, knowledge, and digital goods.
- Digital information systems service is defined as the application of digital ‘‘competencies through deeds, processes, and performances for the benefit of another entity or the entity itself’’. Also, digital service refers to making any asset or capability applicable to others using information technology, thereby enabling digital processes of value co-creation.
- There are various information systems that are designed and deployed to perform different kind of services which include: operational support and enterprise systems, support of knowledge work, professional support systems, collaboration systems, knowledge management systems, management support, management reporting systems, decision support systems and business intelligence among others
- The dimensions of digital information services are two. Integrated information system and personal information system. The integrated information systems are designed to be combined with other computer-based systems to provide services. In universities, for example, digital information services are frequently combined with library automation systems, student services, financial services, research and grant data management systems. On the other hand, personalisation is described as “... choosing and filtering information items or goods for a person based on information needs of an individual” (Ågerfalk, Conboy, & Myers 2020). Using sophisticated IT, it becomes less expensive to manufacture individualized goods and services.

SELF-ASSESSMENT

a) Define Digital Information Service

A digital service is the application of digital ‘‘competencies through deeds, processes, and performances for the benefit of another entity or the entity itself’’

b) Enumerate types of information system services

The following are some of the information system services

- Operational support and enterprise systems
- Professional support systems
- Collaboration systems
- Knowledge management systems
- Management support
- Management reporting systems
- Decision support systems and
- Business intelligence among others

6.0 TUTOR-MARKED ASSIGNMENT

1. Define Digital Information Service
2. Enumerate and discuss types of information system service
3. Highlight the dimensions of Digital Information System Services

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MODULE 2 DIGITIZATION AND DIGITAL INFORMATION RESOURCES AND SERVICES

This module comprises of two (2) units as follows:

Unit 1 Digitization Information Resources
Unit 2 Digital Repository and Digital Preservation Techniques

UNIT 1 DIGITIZATION OF INFORMATION RESOURCES

CONTENTS

1.0 INTRODUCTION

This unit introduces you to the meaning of digitization which refers to the conversion of non-digital born information resources into digital. With the advancement in technology especially in the area of digitization there are a lot of software and hardware that could be used to digitize information resources. Therefore, this unit introduce the hardware and software requirement for digitization. Also, the unit presents the work flow, the benefit and the challenges of digitization.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define digitization
- identify hardware and software requirements for digitization
- enumerate the digitization work flow
- discuss the benefits of digitization
- identify the challenges affecting digitization.

3.0 MAIN CONTENT

3.1 Concept of Digitization

Digitization is the process of converting non-digital information resources into digital format or the act of converting hard copies into soft copies (machine readable format). Digitization simply refer to the process of creating digital file out of physical or analog format by means of scanning or otherwise called Optical Character Recognition (OCR), using scanner, camera or other electronic gadget. The essence of digitizing information resources is to ensure effectiveness and efficiency in the search, retrieval and preservation of information.

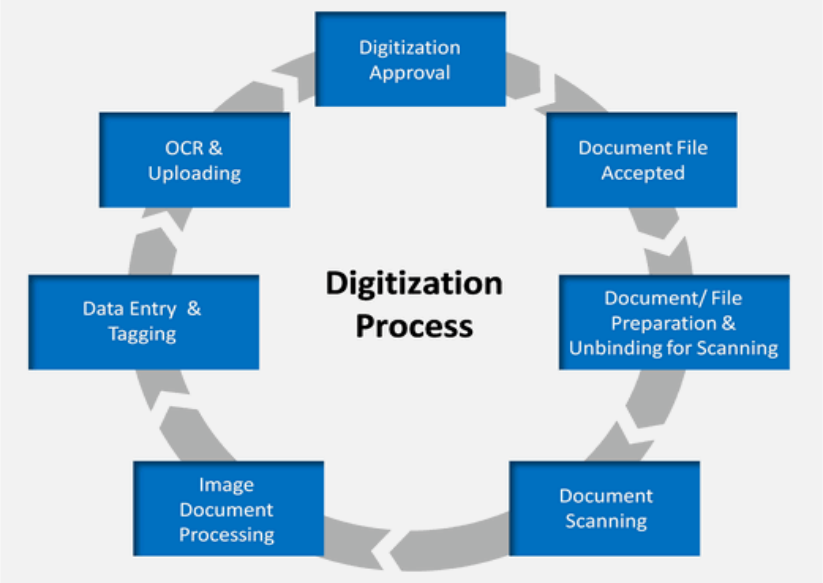


Fig 6: Digitization Process
Source: Sketch Bubble

3.2 Hardware systems requirements for digitization

In order to digitize information materials special equipment and software are required, some of which include:

i. Computers. As a result of advancement in Information and Communication Technology (ICT), there are high performance computer for every given task. This was possible due to constant upgrade in computer configuration and it capacity to meet up with constant changing time and needs. Various type of computers for varying need are available at the market. Fortunately, the computers in the market currently are fast enough to handle almost any scanning and other digitization tasks.

The minimum configuration of computer hardware needed for digitization project is as follows: Pentium IV 3.0GB, 5GB RAM, Large hard drive (80+ Gigabytes), DVD Writer Drive, and Flat Large Monitor (17 inch or larger) and 128 MB Video Card or better.

ii. Scanners. Like computers, various models of scanners are also available for diverse needs. Like computers, many basic scanners available in the market have enough quality to do scanning for digitization exercise. A large bed scanner (13 x 17 is a normal size) is desirable for digitizing large special collections materials. Look for a scanner with a minimum of 600 dpi optical resolution as opposed to interpolated resolution.

To scan manuscripts, printed materials and photographs for digitization use 300 dpi minimum. Several common types of derivative images may be created from master images. a. PDF (Portable Document Format); this is a file format from adobe compressed files. This includes.

a) Portable Document Format (PDF). Users need to install Adobe Acrobat Reader software on the system, however, adobe is presently a default feature of most machines and browsers. It provides the benefit of resizing on the screen and easy printing of a document.
b) Joint Photographic Expert Group (JPEG). This file format is extensively used for generating a medium and high-resolution image for web delivery.
c) Graphic Interchange Format (GIF). This format is used in creating images for the web and sprite image in programing. It

stores data using indexed image colour, a standard GIF may consist of 256 colours.

iii. Digital Cameras. Digital camera is used to take snapshot of special documents or objects that cannot be scanned to be saved in an appropriate file format for easy access and storage especially in computer systems, databases and other network system platforms. Digital cameras with high resolution above 7.1 mega pixels are required.

iv. External Hard drive: this is used for the storage and backup of digitized contents

3.3 Software requirement for Digitization

The digitization exercise may involve a combination of so many software throughout the digitization process. Some of the software required are discussed as follows:

1. Optical Character Recognition (OCR) software. This is a software that allows electronic conversion of hard text or images into machine readable format. This is possible with the use of scanners and with OCR advanced features that can be activated automatically to scan and convert print document and make it available into different file formats as required such as Portable Document Format (PDF), Joint Photographic Expert Group (JPEG), and Graphic Interchange Format (GIF) etc. OCR software has multiple benefits as it enables one to capture a scanned document either as text (editable format) or as image non-editable format picture. Today, there are a lot of OCR software' available and some of the examples include; Abby Fine Reader.

2. **PDF Converter: e**.g. Nitro PDF, Small PDF Converter etc. for conversion of different file formats and compression of file where necessary.

3.4 Digitization work flow processes

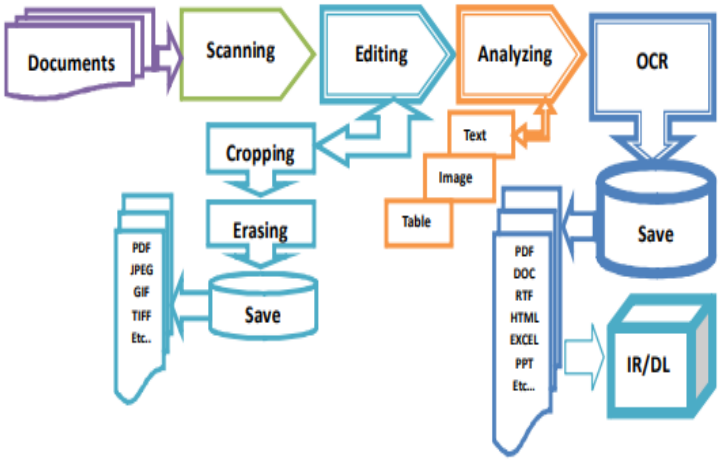
The digitization work flow processes are discussed as follows:

- Selection/ identification of materials to be digitized: at the selection stage the issues of copyright need to be considered as some of the materials may fall under the copyright ownership of a third party.
- Preparation of materials for the digitization: This may involve cleansing of the materials, sorting of the materials and in some cases where the materials are bound, if the scanner have automated document feeder it would be unbound into loose sheets for easy scanning unless otherwise.
- Scanning of the document: this involves the actual conversion of materials from analogue into digital format through Optical Character Recognition (OCR) for a high resolution. At this stage, the digitizer scans the document using scanner in conjunction with OCR software e.g. Abby fine Reader, after scanning,
- Editing: At this stage, you are to crop you scanned text or images and delete the unwanted dots, marks, lines etc. using the eraser

tools. Once you crop your document as image, you can save the same document as image i.e. in non-editable format, using pdf, JPEG, GIF, TIFF etc. However, if the scanned document is cropped as text you need to further analyse the document.

- Analyzing the document: Once you are done with the editing, you then analyse your document as text including table and images. With the advent of more sophisticated technology, presently there are softwares that allow auto-analysis of the scanned document.
- Submission of digital content into repository: The digitized content may be uploaded into digital repository, website, etc. for users to access. The mode of access could be open or closed access.

Fig. 7: Digitization work flow processes



3.5 Benefit of digitization of information resources

There are so many benefits of digitizing information resources, some of which include;

(a) Preservation of rare and endangered library resources: Digitization reduces wear and tear of fragile items. Also multiple copies of digitized content can serve as a backup to the original copy. Today, there are a lot of cloud technology that are used to protect digital content from lost or damage.

(b) To ensure efficiency of information search mechanism: several

users can search for a particular information resources simultaneously without one affecting the other.

(c) To improve access to library resources: Users can access information resources regardless of time and geographical boundaries. Also, they can access information resources more comprehensively and efficiently anywhere at any time.

(e) To ensure space management: digitized information resources occupy less spaces when compared to hard copies. Large copies of information resources can be stored in to a highly compatible and relatively small media.

(f) To ensure easy accessibility: Digitized contents can easily be sorted, organised, indexed and stored for easy retrieval.

(g) Cost benefit: digitised information resources reduces the cost of handling, maintaining and duplicating hard copies.

3.6 Challenges of Digitization

The digitization of information resources is faced with a lot of challenges which include: Lack of financial, copyright issues, technical skill, technological obsolesce, poor power supply, digital media deterioration.

1- Lack of financial resources or lack of funds: Digitization project requires a lot of funds. Therefore, the administration of any library that engages in digitization project must raise funds and work out strategies for the sustenance of the digitization exercise. Since the necessary required funds can be huge, and it is not always simple to obtain adequate funding for the exercise especially in resource constraints countries where the majority of libraries suffer from budget cuts. Therefore, the financial sustainability of the project must be taken into account. This is required to ensure sustainability after takeoff. Hence, clear decisions must be made about the type of digitization to be used, the cost implication and the sustainability of the project.

2- Copyright issues: The copyright issue is another major challenge affecting the digitization project. Most materials that the library may want to digitize are mostly covered by copyright. Therefore, such materials cannot be digitized unless copyright permission is duly granted.

3- Technical skill: The digitization project necessitates the use of individuals with specialized knowledge, which most libraries lack. A lot of developed countries suffer from a lack of

technological skills. Manpower resources with technological skills and expertise are in short supply. Very few librarians with computer science degrees (computer engineers) work in archives and libraries, resulting in regular system breakdowns and service disruptions in digitized libraries and archives.

4- Technological obsolesce: The rapid and constant change in technology poses a challenge to the digitization project. Due to these changes, the computer hardware and software become out of date as time passes by which ultimately lead to the loss of data. There is need for constant migration to cope with this challenge.

5- Poor power supply: Constant power outages are a major impediment to digitization in many African countries. This has a geometric effect of causing damage to digital devices, and where there are generator and inverter sets, the cost of operating them is prohibitively expensive.

6- Digital media deterioration: digital media deteriorate over time, this in effect, could lead to the loss or inaccessibility of most digital contents. This is because media storage including digital contents may deteriorate or decay within a few years of being digitized. Another issue is that digital media is lost during natural disasters or virus attacks. The possibility that electronic tools generated in previous years using older technology would not be available or compatible with the latest technologies makes re-digitization unavoidable (Hughes, 2010).

Fig. 8: Challenges of Digitization
Source: Merrilee P. (2015) Internet Archive book scanner | Wikimedia Commons

4.0 CONCLUSION

In this chapter you learnt the conceptual definition of digitization, where digitization is defined as a process of converting non-digital born document into digital. The essence of digitizing information resources is to ensure effectiveness and efficiency in the search, retrieval and preservation of information. In order to successfully implement and sustain digitization project the hardware and software must be met. Lastly, the unit discussed some of the major challenges affecting digitization project which include among others Lack of financial, copyright issues, technical skill, technological obsolesce, poor power supply, digital media deterioration.

5.0 SUMMARY

The unit is summarized as follows:

- Digitization is defined as the act of converting non-digital document into digital.
- The hardware requirements for digitization include: computer system, digital camera, external hard drive, scanners.

- The software requirement for digitization are as follows: Optical Character Recognition (OCR) Software, Pdf converter,
- The digitization work flow involved the following processes; Selection/ identification of materials to be digitized, preparation of materials for the digitization, scanning of the document, editing, analyzing the document, Submission of digital content into repository
- There are so many benefits of digitizing information resources, some of which includes; preservation of rare and endangered library resources, to ensure efficiency of information search mechanism, to improve access to library resources, to ensure easy accessibility among others.
- The digitization of information resources is faced with a lot of challenges which include, lack of funds, copyright issues, technical skill, technological obsolesce, poor power supply and digital media deterioration.

SELF-ASSESSMENT

a) Define Digitization

Digitization refers to the conversion of non-digital born information resources into digital. It can also be referred to as conversion of analogue information resources into digital formats.

b) Enumerate the hardware and software requirements for digitization

1- Hardware requirements for digitization
i. Computers
ii. Scanners
iii. Digital Cameras
iv. External Hard drive:

2- Software requirement for Digitization
i) Optical Character Recognition (OCR) software.
ii) PDF Converter: **e**.g. Nitro PDF, Small PDF Converter etc.

c) Enumerate the benefit of digitization

There are so many benefits of digitizing information resources, some of which include:

(a) Preservation of rare and endangered library resources
(b) To ensure efficiency of information search mechanism
(c) To improve access to library resources at any time
(d) To ensure space management
(f) To ensure easy accessibility

6.0 TUTOR-MARKED ASSIGNMENT

1. What is digitization?
2. Highlight the hardware and software requirement for digitization.
3. Discuss the benefit of digitization.
4. Discuss the digitization work flow process.
5. Discuss the challenges affecting digitization.

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UNIT 2 DIGITAL REPOSITORY AND DIGITAL PRESERVATION TECHNIQUES

CONTENTS

1.0 INTRODUCTION

With the advancement in information and communication technologies (ICT), Institutional Digital Repository (IDR) is increasingly becoming part of the intellectual discourse. In this unit, I will introduce you to the basic concept of Institutional Digital Repository. Also you will learn about digital repository software is as well as digital preservation techniques.

2.0 OBJECTIVES

By the end of the unit, you will be able to:

- define institutional digital repository
- define digital preservation
- identify various digital repository software
- explain various types of digital preservation strategies and techniques.

3.0 MAIN CONTENT

3.1 Institutional Digital Repository

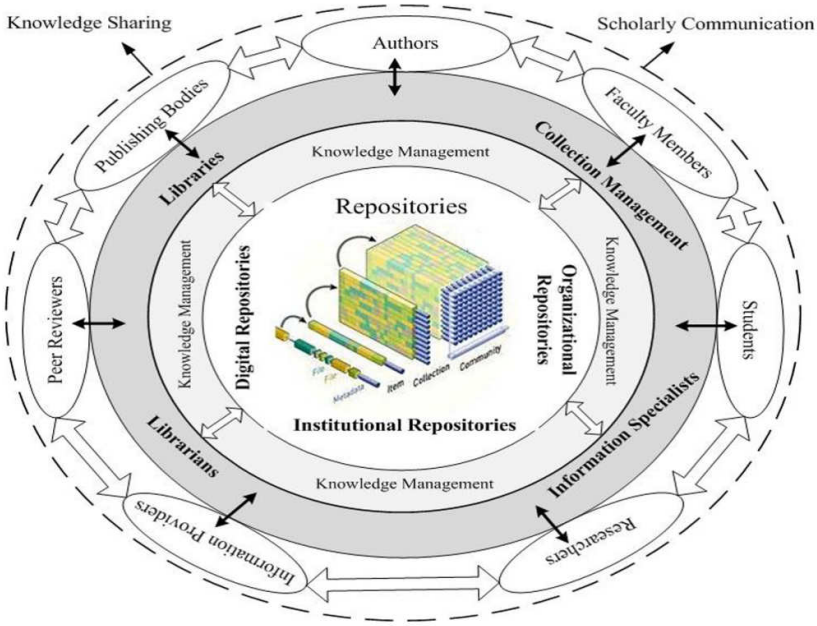
Advancement in information and communication technologies has led to the development of diverse digital outlets to aid information access, retrieval, storage and dissemination. According to IGI Global (2021) Institutional Repository is an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an

institution, particularly a research institution. Institutional Digital Repository is one of the byproduct of this development. In another related definition by Lynch (2003) he defined Institutional repository as

> *"a university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution." (2003; ARL)*

The primary goal of an Institutional Repository is to create a full-text archive of the intellectual/research output of an institution so that everybody within the institution or some other interested individuals from outside the institution may use it in their academic pursuit. However, the basic goals of providing an institutional repository are as follows:

- To increase the exposure and visibility of an institutional scholarly contents;
- To store, maintain and preserve the intellectual output of an institution, such as unpublished or otherwise easily lost literature (i.e., grey literature), such as theses/dissertations or technical reports, in a single location;
- To showcase and make institutional content more readily accessible to users.
- To facilitate scholarly communication



Source: Inspired from Van Deventer and Pienaar (2008)

Fig. 9: Goals of Institutional Digital Repository

3.2 Digital Repository Software

With the rise of digital information systems, libraries and information centers are now digitizing their non-digital materials to either protect or expand access to non-digital resources. Today, there are lots of proprietary and non-proprietary digital library software that allows management and preservation of intellectual output. Examples of proprietary software for Institutional Repository (IR) include CONTENTdm by OCLC and Innovative Digital Asset Management. Alternative open-source digital library software that have been deployed and tested on a wide scale include:

- Greenstone: is a byproduct of the New Zealand Digital Library projects at the University of Waikato and developed and distributed in cooperation with UNESCO and HUMAN INFO NGO. Greenstone Digital Library Software offers a new way of storing information and making digital content accessible online. Information collections are made up of a large number of documents (typically several thousands to several millions), and they are accessed via a standardized interface. Libraries can house numerous collections, each of which is arranged differently despite bearing a strong familial resemblance. A collection's layout is determined by a configuration file.

Greenstone can run on Unix/Linus, Windows, Mac OS X. Its reader interface is readily available in more than 600 languages.

- Dspace: DSpace is an Institutional Repository (IR) software that captures, stores, preserves, indexes and offers free access to all types of digital content, including text, videos, moving pictures, and data sets. DSpace is a free digital repository software for building digital collections for institutions, non-profit and commercial organisations. It is free, easy to install and customizable to suit the varying needs of users. DSpace is the joint product of Massachusetts Institute of Technology (MIT) and Hewlett-Packard (HP) Labs released in 2004 (Velmurugan, 2013). DSpace integrates user community orientation into the system structure. This gives room to create top-level communities, sub-communities and collection. DSpace is written in java and can be deployed on various operation systems including, UNIX, Ubuntu, Solaris and windows.
- E-print: is repository software that was developed by the University of Southampton USA. It is used to capture, store, index, and preserve different types of digital objects to make them more discoverable and reusable. In the United States and around the world, it is now at the center of science, education, and corporate digital repositories. E-print runs on Linux, Solaris Mac OS X. The Windows version was released in 2010.
- Flexible Extensible Digital Object Repository Architecture (Fedora): is a stable, scalable, open-source repository framework for digital content management and distribution. Fedora was a result of the Fedora Leadership Group and managed by the DuraSpace Community-Supported Project developed in 2003 and it was written in Java. It is ideal for digital libraries and archives, both in terms of access and preservation. It is also used to provide advanced access to massive and complex digital collections of historic and cultural artefacts, as well as scientific data. Fedora has been used worldwide being used by academic and cultural heritage organisations, universities, research institutions, academic libraries, national libraries, and public agencies.

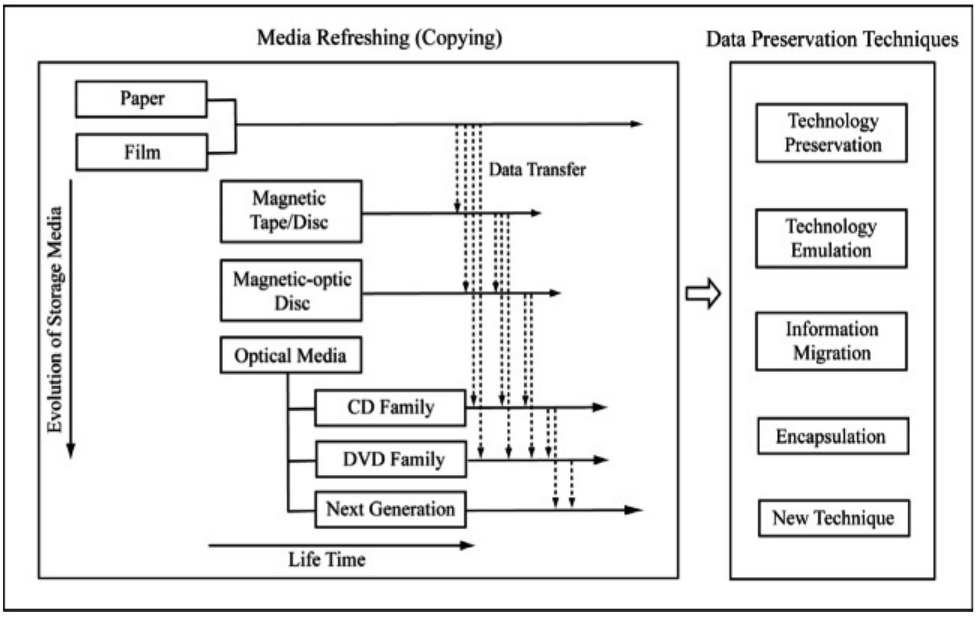
3.3 Digital Preservation Techniques and Strategies

According to Hawkins (2021) maintaining and taking care of rare, fragile and endangered materials and artefacts by means of digitization using digital technology, computer devices, cell phones, digital cameras, recorders, and digital displays to ensure perpetual access is regarded as digital preservation. Digital preservation efforts are carried out with an

item that is at risk of being lost or destroyed due to bit deterioration, degenerate activities, being outdated, and so on. However, there is no guarantee that all artefacts will be preserved and well-maintained in digital preservation (Lee, Slattery, Lu, McCrary, 2019). However, certain techniques are used to ensure the preservation of the digital object. Three basic techniques are used to maintain the dignity of digital objects while still allowing users to retrieve, view, and use them in the face of constantly evolving technology. There are three fundamental techniques use in preserving digital document which includes migration, emulation refreshing.

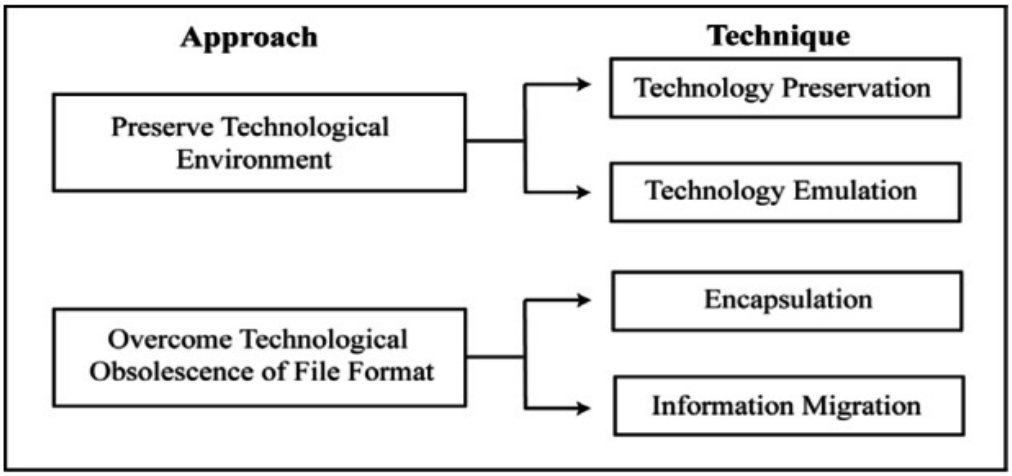
- Refreshing: entails transferring a file from one physical storage medium to another regularly to prevent obsolescence or deterioration of the storage medium. Since digital storage devices deteriorate and technological advances render older storage devices obsolete to new computers, ongoing refreshing is likely to be needed for several years to come. For example, as part preservation strategy, it is recommended that copies of electronic files maintain on other devices, such as external hard drives, and cloud technologies. The external hard drives should be reviewed regularly to ensure that it is still operational. When the drive is several years old, the data stored on it can be refreshed by transferring it to a new hard drive.
- Migration: Data migration is the method of transferring data from one hardware or software configuration to another, or from one generation of computer technology to the next while preserving the data's unique characteristics. The number of common file formats available will gradually be reduced as a result of migration. It has been shown that any data migration, when performed correctly, helps to create more transparent standards, simplified workflows, and best practices. While migration can be a challenging process, it does not have to be if it is well-planned.
- Emulation: In that it focuses on the application software rather than the data files, emulation is similar to migration. Emulation is a technique that uses software and hardware to mimic the essential characteristics of one computer on another, allowing programs written for one environment to run in another. The development of emulators, which are programs that translate code and instructions from one computer to another, is needed for emulation. Emulation allows for the use of older data on new computers.

Fig. 10: Digital Preservation Techniques and Strategies



Source: Lee K. H.,Slattery O.,Lu R.,Tang, X., McCrary V. (2019).

Fig. 11: Digital Preservation Approaches



4.0 CONCLUSION

In this unit, you learnt the definition of Institutional Digital Repository (IDR) as an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution. Additionally, various digital repository softwares were highlighted, these include; Dspace, Green Stone, Flexible Extendable Digital Object Repository Architecture (FEDORA) among

others. Also, in this unit, benefits of digitisation were discussed which include; increase the exposure and visibility of an institutional scholarly contents; store, maintain and preserve the intellectual output of an institution, such as unpublished or otherwise easily lost literature (i.e., grey literature), such as theses/dissertations or technical reports, in a single location; showcase and make institutional content more readily accessible to users. Also, you leant the meaning of digital preservation different type of digital preservation strategies and techniques. The three fundamental techniques use in preserving digital document includes migration, emulation refreshing.

5.0 SUMMARY

The summary is provided as follows:

- "An institutional repository is a digital archive of the intellectual products created by faculty, research staff, and students of an institution, with few, if any, barriers to access".
- The basic goals of providing an institutional repository are as follows: to increase the exposure and visibility of institutional scholarly contents; to store, maintain and preserve the intellectual output of an institution, such as unpublished or otherwise easily lost literature (i.e., grey literature), such as theses/dissertations or technical reports, in a single location; to showcase and make institutional content more readily accessible to users, to facilitate scholarly communication.
- Open-source digital library softwares that have been deployed and tested on a wide scale include; Green stone, Dspace, Fedora, and E-print among others.

SELF-ASSESSMENT EXERCISE

a) Define Institutional Repository

Institutional repository is a digital archive of the intellectual products created by faculty, research staff, and students of an institution, for usage within the institution and beyond.

b) List Any Four types of Digital Repository Software that you know

1. Dspace

2. Green Stone

3. Flexible Extensible Digital Object Repository Architecture (FEDORA):

4. E-Print

6.0 TUTOR-MARKED ASSIGNMENT

1- What is Institutional Digital Repository (IDR)?
2- Identify the primary goal of setting up Institutional Digital Repository (IDR).
3- Discuss digital preservation techniques and strategies.
4- Identify and discuss Institutional Digital Repository Software (IDR).

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MODULE 3 LIBRARY AUTOMATION AND INTEGRATED LIBRARY SYSTEM

This module consists of the following Units

Unit 1 Library Automation
Unit 2 Application of Open source and proprietary library automation software
Unit 3 Causes of Information Overload and Management Strategies

UNIT 1 LIBRARY AUTOMATION

CONTENTS

1.0 INTRODUCTION

This unit introduces you to the general concept of library automation and Integrated Library System (ILS) as an essential part of automation. Also, the unit present the rationale behind library automation and the associated benefits. In the same manner the unit discusses an overview of ILS module

2.0 OBJECTIVES

By the end of the unit, you will be able to:

- define library automation
- recognise the benefits of library automation
- explain the modules in the integrated library system.

MAIN CONTENT

2.1 Definition of Library automation

In the traditional library system, the library housekeeping activities or library routine is very slow, laborious, time consuming and very expensive, since all the basic operations or functions are performed manually. Globally, since 1970s, libraries are trying to simplify their basic functions with the advent of personal computers. This processes of replacing manual housekeeping activities with computerized version is known as automation. The term library automation refers to the use of computer and other related technology to perform basic manual routines of library operations such as circulation, cataloguing, etc. This is possible due to the advancement in information and communication technologies (ICT) where these technologies and related devices are used to replace manual routine activities in libraries and information centers. The application may cover one or more area of operations in the library or the entire subsystems within the scope of the library operations. Also, it may or may not be integrated and may can be access via Local Area Network (LAN) or Wide Area Network (WAN). The automation may cover one or all of the following basic routine operation in the library such as; circulation, cataloguing, acquisition, serials management and reference. "Library automation not only improves the image of the library services, but also provides additional services to the users with the existing staff" (Dhanavandan & Tamizhchelvan, 2012).

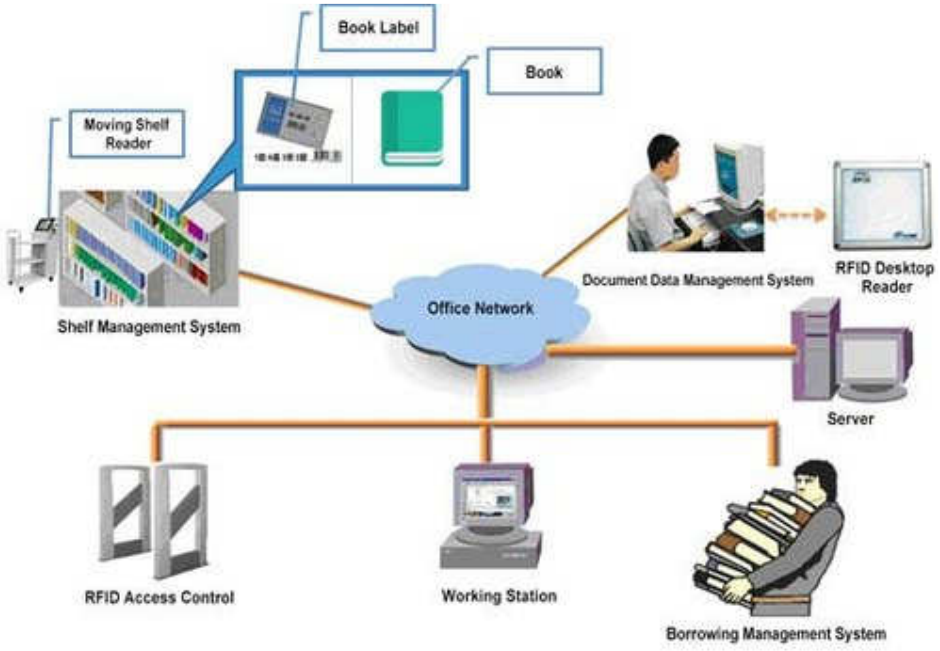

Fig. 12: Library automation

Source:IndiaMART (2020)

2.2 Benefits of library automation

The development witnessed in Information and Communication Technology (ICT) over the decades has translated into success due to the benefits associated with automation. The following are some of the benefit of automation:

- **Improved access to local information resources:**

The Integrated systems have enabled libraries to create bibliographic records at the time of ordering materials and to augment them with data needed for acquisitions, accounting, and cataloging. Not only did work flow and management reporting improve- but library users can have direct online access to library resources. Expanded and quick access to library resources from terminals in the library buildings, to terminals on university and organizational networks is now possible.

- **Improved sharing of cataloguing data:**

Due to interoperability in an automated cataloguing standard such as MARC (Machine Readable Catalogues) and network, cataloguing information of an item can easily be created and share at minimized cost. Since shared and distributed cataloguing practices is based on the believed that books are produced globally identical copies. If a highly qualified cataloguer created a record for example a book, other libraries should be able to copy without recreating another record for the same material. With online system it is possible to share. Instead of a one-way flow from a central distribution point to individual libraries, online systems made it possible to share records directly and instantly between many libraries. This is evidenced and possible with the creation of several bibliographic standards that enable sharing which include but not limited to International Standard Bibliographic Description (ISBD), universal MARC (UNIMARC) all these efforts is are to assist in international cooperation and data exchange between MARC formats. Hence, it enable library consortium and collaboration easier.

- **Access to external information resources:**

As a result of remote access to bibliographic information online, cataloguing records and other information can be easily access regardless of time and geographical constraints. This give room for wider and timely access to information resources and services.

- **Improved work flow:**

Automation has improved workflow and eradicated duplication of efforts. This is because most of the activities are centralized given the architectural design of the relational databases in ILS in which modification, deletion etc. in a single file will automatically reflected in all related file. This mean once a record is created or updated for example in cataloguing module, such modification would be automatically reflected in circulation module and vice versa.

- **Enhanced decision making:**

The automated system enhances decision making among managers and policymakers by generating daily statistics of a work performed in each user account on a daily basis, this gives room for monitoring work performance of staff. Also, it gives room to monitor usage statistics, overdue books and other vital information that will support decision making.

- **Better management of staff, financial and physical resources:**

The automation of basic library routine operations frees up professional staff from clerical routine tasks, making them available for end-user services. Moreover, large quantum of work can easily be accomplished with little or no difficulty, this in turn has reduces financial cost of operation.

Despite the numerous advantages of automation, noteworthy is the fact that that it requires significant initial investments in network infrastructure, hardware acquisition, software purchase/customization, staff retraining, and, in some cases, technical staff recruitment. During the transformation phase, it is possible that resource organization will be disrupted and user services will be interrupted. Library patrons and staff may be concerned at first, but the benefits of library automation will be realized by all decision makers in due course.

2.3 An Overview of Integrated Library System (ILS)

An Integrated Library System (ILS) also known as Library Management System (LMS) forms the core of library automation. The library system is integrated when it shares common databases to perform basic functions of library operations. This means that, they are based on relational database architecture. Whereas in such system files are linked with each other, any case of deletion, modification or addition will be

reflected in all the related files automatically. It implies that an Integrated Library System (ILS) uses a centralized database to perform all of a library's core routines. An integrated library system (ILS), for instance, allows a library to link circulation activities with cataloging, acquisition, serials control, generate report and other functions automatically at any time.

An Integrated Library System (ILS) may be deployed on a local area network or a wide area network, it uses a file server and clients. Automated Library Systems now support three main types of library operations: housekeeping, information retrieval, and on-the-fly integration of library materials with open datasets. These are access through Local Area Network (WAN) or through Wide Area Network (WAN). Modern library automation systems are Web-compatible and accessible via the Internet, Intranet, and Extranet for information retrieval and data entry. Furthermore, linked open data (such as name authority data, subject access systems, and other similar systems), open contents (such as book reviews, table-of-contents, and cover images), and social networking tools can now be fully integrated into automated library systems (like Facebook, Twitter etc.) via semantic technologies and information smashup.

2.4 An overview of Integrated Library System (ILS) application module

ILS are considered the brains of library automation, and they typically consist of several separate but interconnected modules: A typical integrated Library System must consist of modules that cover the basic library operations and routines. This includes:

Acquisition Module: This has to do with the acquisition of information resources into the library system. It covers all the acquisition processes that are done manually ranging from compilation of a “wish list”, ordering, receiving, and claiming of materials from the vendor or publisher, return of unwanted, cancellation, maintain statistics and manage financial information pertaining the acquisition activities. All these series of activities can be done online.

In acquisition module there are options for printing copies of the generated information concerning the acquisition in a situation where you may want to send an order via email. More recently, there advanced system that allows you to purchase information and make payment online.

Cataloguing Module: This is used in the creation and management of bibliographical record of an item. It defines record format e.g. Machine Readable Format (MARC) as well as storage and retrieval of records. The record created are usually linked with the Online Public Access Catalogue (OPAC).

Online Public Access Catalogue (OPAC) Module: It allows users to search for bibliographical information of a material which include; author, title, call number, subject and keywords. OPAC is an add-on module to the cataloguing module.

Circulation Module: This covers information relating to lending of books i.e. charging and discharging, tracking overdue books, renewal of the loan materials, generating usage report, managing material type, location and status, patrons databases, profile including their addresses and phone numbers, privileges and other vital information. It can easily track workflow, and workload statistics and automatically track and generate periodic notices for overdue materials, fines, lost and recalled materials.

Information tracking system and inventory such as barcode reader, digital smart chips are being used by some libraries. The most commonly used in advanced society is radio frequency identification (RFID) where smart chip is inserted into the material containing bibliographical information about an item. This assists in inventory, shelve reading, streamlining charging and discharging processes as well as provides security to the material to prevent from theft.

Serials Management Module: This is much more similar to acquisition module. It keeps track of newspaper, journals and magazines subscriptions processes such ordering, receiving, and claiming of materials from the vendor or publisher, return of defective items, cancellation, maintain statistics and manage financial information pertaining the acquisition activities. Like the acquisition module subscription can be done online. Although not all ILS have serials management module, it is important for bigger libraries with large volumes of serials collection which their management can become an issue. It is important for the management of course serials collections especially in bigger library.

Interlibrary loan: Interlibrary loan is a service provided by libraries in which needed resources (if not available in the library) can be tracked down and brought in from other libraries before being issued to the appropriate patron. Materials can also be issued to other libraries if necessary.

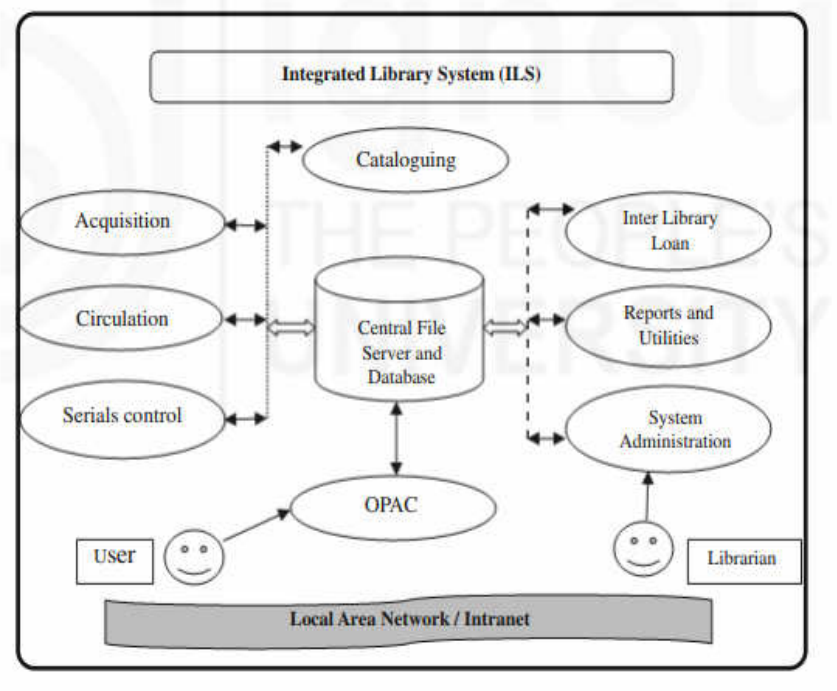

Fig 13. Integrate Library System Architecture

In recent times, ILS has gain considerable attention despite its complexity. This is because it brings together an array set of records for use in a single transaction.

3.0 CONCLUSION

In this unit, you learnt the about library automation which is refer to as the process or application of computer into basic library routine. The unit also discussed an Integrated Library System (ILS) also known as Library Management System (LMS) which forms the core of library automation. You were made to understand that the library system is integrated when it shares common databases to perform basic functions of library operations. Integrated Library System (ILS) are considered the brains of library automation, and they typically consist of several separate but interconnected modules: A typical integrated Library System must consist of modules that cover the basic library operations and routines. This includes; acquisition module, cataloguing module, circulation module, serial management. Also, you learnt the benefit or rationale behind library operation which includes; enhancing efficiency and effectiveness in the library operation, saving cost of operation and duplication of work and enhanced decision making process.

5.0 SUMMARY

This unit provides you with the definition of automation, which denotes the use of computer and other related technology to perform basic manual routines of library operations such as circulation, cataloguing, etc. Also, benefits of automation were discussed such as better management of staff, financial and physical resources, sharing of bibliographic records, access to external information resources, improve work flow among others. Lastly, we treated Integrated Library System (An Integrated Library System (ILS) also known as Library Management System (LMS) which refers to the use of a centralized database to perform all of a library's core routines.

SELF-ASSESSMENT EXERCISE

a) Define library automation?

Automation is the processes of replacing manual housekeeping activities with a computer. The term library automation refers to the use of computerized version and other related technology to perform basic manual routines of library operations such as circulation, cataloguing, etc. This is possible due to the advancement in information and communication technologies (ICT) as related devices are used to replace manual routine operations activities in libraries and information centers.

b) List any five benefits of library automation

Some of the benefits of automation are listed as follows:

- Improved access to local information resources
- Improved sharing of cataloguing data
- Access to external information resources
- Improved work flow
- Enhances decision making
- Better management of staff, financial and physical resources

7.0 TUTOR-MARKED ASSIGNMENT

1. Differentiate between Library Automation and Digitization.
2. Discuss the term Integrated Library System and it architecture.
3. Identify the basic feature of Integrated Library System.

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UNIT 2 APPLICATION OF OPEN SOURCE AND PROPRIETARY LIBRARY AUTOMATION SOFTWARE

CONTENTS

1.0 INTRODUCTION

This unit introduces you to library automation software i.e. open source and proprietary automation software. In addition the unit introduces metadata standard used by the different Integrated Library Systems. It highlights the use of open source software and its implications in Nigerian libraries. Lastly, the unit discusses the issue of training and retooling in the digital working environment.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define open source software
- differential between open source and proprietary software
- discuss various types of integrated library software meta data standard
- highlight some of the implication of use of open source software in Nigeria.

3.0 MAIN CONTENT

3.1 Library Automation Software

Generally, there are two types of Library Automation Software in the market namely; open source and proprietary library automation software. This means for most library activities that are automated using proprietary software there exist an open-source alternatives. These alternatives have been deployed and tested by many libraries across the world. The term software refers "to a set of computer programmes, procedures, and associated documents (flow charts, manuals, etc.) that describe the programme and how they are to be used. To be precise, software is a collection of programmes to enhance the working capabilities of the hardware". According to Pandey (1995) as cited in Patel, (2014). Library Automation Software is a set of programmes written or developed to enable the computer to performed desired Library operations (Pandey, 1995).

3.1.1 Open source automation software

This is a software for which source code is open. The user is granted a license to download, use, study, modify, and distribute etc. without any restriction. Open source software are byproduct of collective efforts of professionals to ensure wider and free access to software and the right to customize to suit user needs. According to Breeding (2016) "Open source software is free software. It is not necessarily cost-free, but is free to use, free to modify, and free to share. It is a model of dealing with software that presents an alternative to the commercial licensing that imposes many layers of restrictions". Open source software has caught the interest of people from all walks of life who use computers. Libraries have embraced open source software because it promises low-cost or no-cost library automation. Due to severe budget constraints, most libraries are unable to purchase high-priced commercial software. Today there are a lot of open source software which include but not limited to; Koha, Evergreen, Biblioteq, Openbiblio, newgenlib, etc.

- Koha is one of the most popular open source automation software which was first developed in 2000. It was initially developed by Katipo Communication Limited, wellington, New Zealand for the Horowwhenua Library Trust (HLT). The HLT being a regional library is located in Levin, a city near wellington. Although, Koha was first developed for HLT however, is now being used worldwide by growing number of libraries due to the fact that it has all features of a typical ILS. The system support building

bibliographical database using universal MARC (UNIMARC). Besides, Koha can be deployed in Linus and windows operating system respectively.

- It supports fine management
- Automated email notification
- Supports strong search facility
- No-vendor lock
- Self-checkout interfaces
- Remote access to database and dual authentication
- Facility to import badges from the catalogue in a single click
- Advanced matching

- **Evergreen:** Evergreen is an Integrated Library Software developed by Georgian public library services for the public Information network. The software started as a statewide resource sharing consortium covering with more 270 libraries at the takeoff.

Today, evergreen Integrated Library Management software is used by nearly 2000 libraries worldwide. It has a public catalogue interface as well as features to help users with back-end workflow operations. Some of the key features of the of the software are as follows:

- Request framework that is open and scalable
- Cataloguing module with flexibility to index, clarify and facilities to collection.
- Circulation module
- Online public access catalogue
- Facility to customize cataloguing
- Multiple payment options
- Powerful search facility
- Complete tracking of books procured, invoiced, etc.
- Automatic and customized report generation
- Option to retain circulation history
- Self-registration and self-checkout options

Evergreen is one of most top rate ILS because it caters for libraries of various sizes from big, medium and small as well as complex library set-ups.

3.1.2 Proprietary automation software

This is type of software in which the ownership remains with the creator under copyright provisions. The proprietor owns the copyright and

grants license to users based on terms and conditions. In this regard users are not given the permission to open, modify, or further distribute the source code because they have close source codes. Under the proprietary software the owner is being paid to payment grant a license to the user. Without pay, the source code remains closed. Majority of the time, proprietary software is a paid product, but it can also be made available for free if the owner agrees to certain terms and conditions. Regardless of whether such software is purchased or made freely available, the source code of such software remains closed. In this category, we have several library automation software. Libsys, Virtua, Trudan, Tulibs, Alice for Window and so on.

- **Libsys:** an Indian-based ILS developed by a New Delhi-based software firm, has been providing software solutions since 1984. Although, a proprietary software, Libsys has grown steadily over the last 30 years to become India's most trusted library brand. Libsys is a web based ILS with enhance feature and capabilities.

Besides, it is built on international standard technology, i.e. JAVA. It cover acquisition, circulation, serials management, article indexing, e-books, and Vendors portals along with an enriched OPAC. Its market acceptance strengthens its popularity as the most field-proven library system with unrivaled depth in functionality and features, and continuous growth is reflected in research and development efforts that have resulted in the incorporation of the latest technology features and globally accepted standards on a regular basis (Shaikh & Ankushe, 2019).

- Virtua: Virtua Virginia Tech Library System (VTLS) is a global leader in library automation, with over 900 libraries in 37 countries using its services. One of the top leading proprietary integrated library system, which introduced in 1998 as a replacement for the classic VTLS system, which ran on HP mainframes. Virtua is a multi-tier client/server application that uses Oracle as its relational database management system and Apache SOLR as its indexing and search engine. Virtua has been updated in recent years to include more sophisticated consortia support, allowing the consolidation of many previously separate Virtua installations into a single instance. Cataloging, circulation, serials management, and acquisitions are among the functions organized according to traditional ILS modules. F is supported natively by Virtua's metadata management modules. Virtua is the first Unicode-compliant ILMS, the first to incorporate functional requirements for bibliographic records (FRBR) functionality and

the first to support resource description and access (RDA) implementation (VTLS, 2013).

3.2 Metadata standards, development and practices for Library Automation

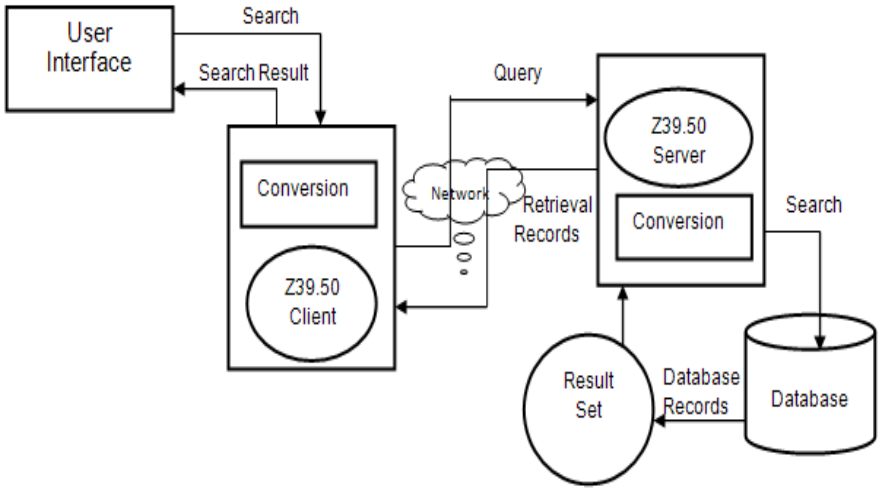
There are several metadata standard in use by the different Integrated Library System. This includes;

i. **The MARC (Machine-Readable Cataloging):** MARC is an international standard digital format for machine-readable representation and communication of bibliographic and related data. MARC was developed by the Library of Congress (LC) to facilitate creation and dissemination of bibliographic records between one library and another and also across countries. The library records in your online public catalog (OPAC) should be in MARC format. If you have a non-MARC OPAC, you can build a tape of MARC records from OCLC to reflect your library's holdings as long as your records are held by WLN or, more recently, by OCLC.

ii. **Universal MARC (UNIMARC):** The cataloguing and mechanization section of the International Federation of Library Associations (IFLA) took the lead in developing an international MARC format that would accept records created in any MARC format. UNIMARC was primarily designed to facilitate universal access to bibliographic information. As a result, the first version of the Universal Machine Readable Catalogue (UNIMARC) for monographs and serials was published in 1977 to make machine-readable bibliographic data more widely available. The ISO-2709 communication format is used by UNIMARC (1981).

iii. **Z39.50:** The Z39.50 standard is required for libraries that would like to search across multiple library catalogue systems. Z39.50 enables libraries to search at each other's catalogues through their local system's user interface. Z39.50 is indeed a set of formats and standards that guide the interaction of client and server computers,enabling users to search one or more local or remote databases via their library's interface (at the same time, if desired). Instead of addressing circulation records, Z39.50 focuses on cross-searching capabilities. The following fig. provide information search and retrieval model using Z39.50.

Fig. 14: Automated information Retrieval Architecture



4.3 Open source software use and its implication Nigerian libraries

With wide spread and deployment of open source software, a lot of libraries in African continent have picked interest to meet up with the users demand and the changing technology in 21st century library operations. Despite the fact that open source software is free, the cost of downloading and configuring it for library adoption is not. These tasks necessitate a certain level of information and technology skills, which Kolawole and Oladokun (2021) found to be in short supply in Nigerian libraries. Other consequences of implementing and deploying open source software in the library include:

i. Technical support: It has been discovered that Open Source Software suffers from a lack of technical support, which is either available for a fee or not available at all, which may cause significant inconvenience for some Nigerian users,
ii. Lack of Features/Standards: Not all packages cater to specific, specialized requirements.
iii. Lack of Packaging: Some open source library software does not include traditional packaging or support for hard copies,
iv. User-Friendly Limits: Installation and configuration of open software require more IT skills than traditional software.
v. Compatibility: The majority of open source software supports open source file types, but proprietary file types may not.

Freedom of access to technological tools, according to Kolawole and Oladokun (2021), aids in closing the digital divide. Developing countries have a lot of advantages thanks to open source software. Understanding the philosophies, implications, and responsibilities of open source software adoption will help you plan for the future and avoid disaster.

1.0 CONCLUSION

In this unit, you learnt library automation software both open source and proprietary. The some of the most popular open source automation software that are used by libraries across the globe includes Koha, Evergreen, Bibioteq, Openbiblio, newgenlib among others. Also, you learnt the various metadata standard for the Integrated Library System (ILS). Lastly, you learnt the implication of using open source software by the Nigerian libraries.

1.0 SUMMARY

In summary, Library automation software are divided in two namely; open source and propriety library automation software. Example of open source software include; Koha, Evergreen, Bibioteq, Openbiblio, newgenlib among others. While at the other hand the example of the proprietary software include; Libsys, Virtua, Trudan, Tulibs, Alice for Window and so on. Also metadata standard for ILS were discussed some of which are the MARC (Machine-Readable Cataloging), Universal MARC (UNIMARC), Z39.50. Lastly, some of the implication of using open source software includes; lack of technical support, lack of compatibility and standardization, user friendliness and lack of packaging.

SELF-ASSESSMENT

a) Explain the term open source software.

This is a software for which source code is open. The user is granted a license to download, use, and study, modify, distribute etc. without any restriction. Open source software are byproduct of collective efforts of professional to ensure wider and free access to software and the right to customize to suit user needs.

b) **List any 2 open source automation software you**

1- KOHA
2- Evergreen

What is metadata?

Metadata provides bibliographic information to describe digital object, it provide a structured reference that helps to sort and identify attributes of the information it describes.

6.0 TUTOR-MARKED ASSIGNMENT

a. What is proprietary software?
b. Identify and discuss various types of open source library automation metadata standard you know.
c. Discuss the implication of the use of open source software in Nigeria.
d. Discuss the deferent metadata standard of your choice within Nigerian context

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UNIT 3 INFORMATION OVERLOAD CAUSES AND MANAGEMENT STRATEGIES

CONTENTS

1.0 INTRODUCTION

The term Information Overload is mostly characterized by an overabundance of information, which calls for concern among general information users, researchers, and information managers. Because of the nature of Internet technology, the rate to which information production accelerated so rapidly, anyone with a basic understanding of technology and the necessary equipment can upload anything to the web without restriction or censorship. As a result, enormous amount of information are created and uploaded on the internet every second. Users of web technology are overwhelmed by the amount of information from which to choose. This has made web searching extremely difficult, time-consuming, and frustrating. This unit introduce you to the definition of information overload, causes and strategies to manage it.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define information overload
- examine the causes of information overload
- identify the effect and consequences of information overload
- provide strategies to manage information overload.

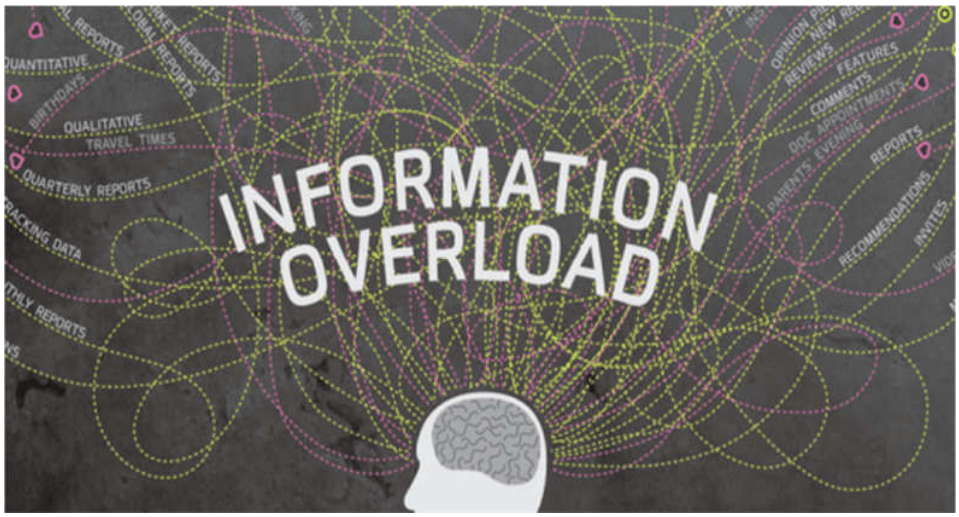
3.0 MAIN CONTENT

3.1 Definition of Information Overload

There is no universally accepted definition of information overload. However, Fan & Smith (2021) define information overload as receiving more information than is required or desired to function effectively and further an individual's or organization's goals. Bawden and Robinson (2020) define information overload as receiving too much information. Therefore information overload can be defined at two levels; individual and organizational levels.

The term "information overload" is also used to describe the simple concept of receiving too much information. This can make it difficult to find and use information to support decision making or fill a knowledge gap.

Fig. 15: Information Overload



Source: Kabithra (2020). Information Overload Day, International Days

3.1 Causes of Information Overload

"Information overload" is a problem with both technological and human components. The following are some of the main causes of information overload at the organizational and personal levels, according to Hong & Kim (2020). Gausul-Hoq (2014):

1. Multiple sources of information: The concept of information overload arose as a result of the numerous formats, channels and

sources available for communicating information. Information technology, such as the Internet and its associated components such as the World Wide Web and e-mails, is viewed as a major source of information overload. This and other online sources put together increase pressure on information users who are constraint by time to find, locate, retrieve and assess information from diverse sources. The situation is exacerbated by the fact that relevant information far outnumbered by unimportant and irrelevant information that are increasingly and constantly filing up in various media especially electronic media such as social networking sites, blogs, websites, emails, etc.

2. Too much information: When information is received in excess, it becomes a hindrance rather than a help, even if the information is potentially useful. The prevalence of ICT, especially the search engine technologies has resulted in overabundance of information from diverse sources in response to online searches, which outputs time constraints for the information user to scan all through the related searches or results to determine the needed information. Also with the advancement in myriad online publishing media there are too much information available which appear overwhelming for the user to track.

3. Difficulty to manage information: Changes in a company's organizational design due to disintermediation, centralization, or interdisciplinary teams can result in increased information processing requirements, and most organizations lack both the technological and human resources to manage the in/outflow of information. As a result, many organizations are unable to manage information to make better decisions. Also, at the individual levels most people lack the skills and capacity to manage information effectively and efficiently. Besides, majority of individuals lack adequate information literacy skills of recognizing when information is needed, locating the required information in appropriate sources in the right format as well as evaluating their qualities whether they are worthy of retrieving or not.

4. Irrelevant Information or unimportant information: Everyone has become an information producer as a result of various media and technologies for locating, retrieving, and sharing information. The problem is made worse by the fact that important information is vastly outnumbered by unimportant and irrelevant information, which is constantly piling up in various media, particularly electronic media such as social networking sites, blogs, websites, and emails.

5. Lack of time to understand information: People are overwhelmed

with information and spend a significant amount of time just trying to filter through them.

3.2 Effects of Information Overload

Information overload has been recognized as a problem in every sector of the society, and is of concern to information specialist in all environment including academic, special and public libraries. Mahdi, Ahmad, Ismail, Subhi, Abdulrazzaq & Qassim (2020) assert that information overload frequently leads to the premature abandonment of online search and unfulfilled information needs. Fan and Smith (2021) indicated that feelings of stress, confusion, pressure, anxiety or low motivation are the crucial factors that signal the occurrence of information overload.
Some other effects of overload were also identified in the Reuters report, including:

1. **Time is wasted:** due to the large volume of information available online people waste a significant amount of time searching for information.
2. **Delays in decision-making**: It is believed that having too much information causes decisions to be delayed or influenced negatively.
3. **Distraction:** A lot of people are often diverted from their primary tasks due to the large quantum of information available to scan through to execute some task.
4. **Stress:** The resultant frustration and displaced aggression tend to cause tension among coworkers, a loss of job satisfaction, ill health, decreased social activity and exhaustion.

1.4 Strategies to Manage Information Overload

Because the issue of information overload has become a source of concern worldwide, researchers have identified countermeasures to be implemented to address it. Some solutions to the problem of information overload have been identified by Saxena and Lamest (2018) and GausulHoq (2014), which are presented below.

1. **Filtering strategy:** a method of weeding out useless information from sources chosen for use based on symbiotic attempts. Filtering is a valuable mechanism for reducing information overload by eliminating useless information sources, in this regard information is extracted to meet users' needs. According to Savolainen (2007), He defined a filtering strategy as "a

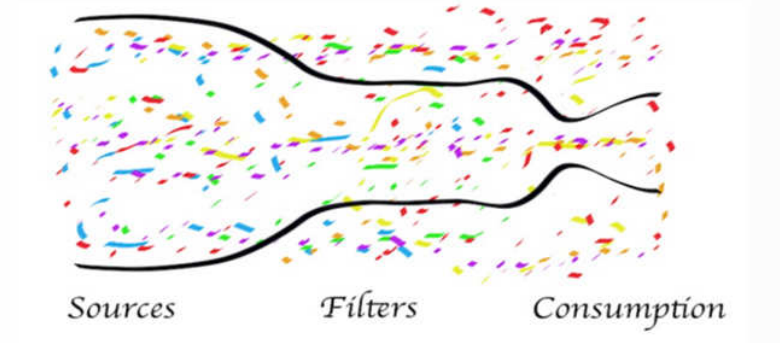
disciplined and systematic attempt to focus on relevant information from selected sources by specifying criteria for removing items from consideration immediately."

1. **Withdrawal strategy:** to protect oneself from information overload, a withdrawal strategy is used to reduce the number of daily information sources to a bare minimum. According to Saxena and Lamest (2018) "information withdrawal" is "a conscious decision to keep the number of sources to be considered to a minimum, ideally combined with intake filtering and rapid weeding of relevant but low-value materials." An example of this is avoiding daily newspaper or TV news.

2. **Training programme to augment information user education and information literacy skills:** A better approach would be for librarians to focus on training and teaching information literacy skills, as well as library instruction, to improve users' information and digital literacy and assist them in dealing with the information tsunami. Because of the increased efficiency of an ever-increasing volume of information search engines, etc., learning information search skills and web skills is a prerequisites for dealing with information overload.

3. **Enhanced capacity to manage information:** information overload in some cases results from the inability to manage information properly. Therefore, it is recommended that every organization need to have a comprehensive system of information processing, which in fact, is a part of its knowledge management infrastructure, including standerdised operation procedure that encourages collaboration in information processing, and handling.

Fig. 17: Strategies to Manage Information Overload



Source: NeiKakkar (2019) How to Deal with Information Overload

4.0 CONCLUSION

In conclusion, the term "information overload" is also used to describe the simple concept of receiving too much information. This can make it difficult to find and use information to support decision making or fill a knowledge gap. Information overload has been recognized as a problem in every sector of the society, and is of concern to information specialist in all environment including academic, special and public libraries. Several scholars pointed out that information overload frequently leads to the premature abandonment of online search and unfulfilled information needs. For example, Fan and Smith (2021) indicated that feelings of stress, confusion, pressure, anxiety or low motivation are the crucial factors that signal the occurrence of information overload. "Information overload" is a problem with both technological and human components. The causes of information overload include among others; multiple sources of information, difficulty to manage information, irrelevant Information or unimportant information. Because the issue of information overload has become a source of concern worldwide, researchers have identified countermeasures to be implemented to address it. Some solutions to the problem of information overload include enhanced capacity to manage information, withdrawal strategy, filtering strategy among others.

5.0 SUMMARY

The lesson in this unit is summarised as follows:

- Information overload is defines information overload as receiving more information than is required or desired to function effectively and further an individual's or organization's goals.
- Causes of information overload include: multiple sources of information, lack of time to understand information, irrelevant information or unimportant information, difficulty to manage information and too much information.
- Effects of Information Overload such as stress, distraction, poor decision making, and waste of time are highlighted among others.
- Lastly, strategies to reduce information overload are filtering strategy, withdrawal strategy, training programme to augment information user education and information literacy skills and increased information management capacity.

SELF-ASSESSMENT EXERCISE

a) Highlight the causes of information overload?

The following are the causes of information overload

- Multiple sources of information
- Too much information
- Difficulty to manage information
- Irrelevant Information or unimportant information
- Lack of time to understand information

b) Enumerate the effects of information overload on individual and organisations

Some other effects of information overload were enumerated as follows

1. **Time is wasted:** due to the large volume of information available online people waste a significant amount of time searching for information.
2. **Delays in decision-making**: It is believed that having too much information causes decisions to be delayed or influenced negatively.
3. **Distraction:** A lot of people are often diverted from their primary tasks due to the large quantum of information available to scan through to execute some task.
4. **Stress:** The resultant frustration and displaced aggression tend to cause tension among coworkers, a loss of job satisfaction, ill health, decreased social activity and exhaustion.

6.0 TUTOR-MARKED ASSIGNMENT

a. Define the term information overload.
b. What are the causes of information overload?
c. Discuss the effects of information overload on individual and organisations.
d. As an information professional provide strategies that will reduce information overload.

7.0 REFERENCES/FURTHER READING

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MODULE 4 DIGITAL INFORMATION RESOURCES MANAGEMENT

The module is divided into two units.

Unit 1 Electronic Resources Management
Unit 2 Open Access Information Resources
Unit 3 Information Search, Techniques and Strategies
Unit 4 Collection Development in Digital Systems
Unit 5 Digital Publishing
Unit 6 Digital Security Resources

1.0 Introduction
2.0 Objective
3.0 Main Content
    3.1 Electronic Resources Management
        3.1.1 Electronic Resources licensing and subscription management
        3.1.2 Role of Library Consortia in the Digital Age
    3.2 Open Access Information Resources
        3.2.1 Open Access Models
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 References/Further Reading

UNIT 1 ELECTRONIC RESOURCES MANAGEMENT

CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Electronic Resources Management
    3.2 Electronic Resources licensing and subscription management
    3.3 Role of Library Consortia in the Digital Age
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 References/Further Reading

1.0 INTRODUCTION

This unit introduces you to the concept of Electronic Resource Management (ERM). It also introduce the basic features of electronic resource management, electronic resource licensing and subscription management, as well as the role of library consortia was discuss.

1.0 OBJECTIVES

By the end of this unit, you will be able to:

1. define electronic resources management
2. highlight the features of electronic resources management
3. discuss issues relating to license and subscription management in digital environment
4. discuss the role of consortia in the digital age.

2.0 MAIN CONTENT

2.1 Electronic Resources Management

Electronic Resources Management (ERM) denotes practices and software systems used by libraries to track key information on electronic resources, in particular online resources, such as digital newspapers, databases and electronic books. The management of metadata for mutable resources, like many online products, was lacking in the traditional library and integrate library systems, which in the early 2000s prompted the development of ERM.

According to Tatterson, (2020)"ERM systems are developed to assist librarians with the acquisition and management of electronic resources. They provide tools to help manage the licensing and acquisition process and to provide access to materials. Besides, new standards and XML schema are being developed to automate the sharing of licensing information between libraries and publishers".

The delivery of electronic information resources has transitioned from traditional formats due to the rapid acquisition of information resources in an electronic format. As a result of this transformation libraries had to quickly create new work flow to carter for technical processes such as managing license agreement and renewal, virtual products as well as developing new communication structure and staffing workflow related to electronic resources.

As libraries acquire more electronic information resources, such as online journals and databases, they realized the need for a good recordkeeping system to help manage the details of resource maintenance. Recognizing that there was no off-the-shelf product and traditional serials vendors did not provide management services for electronic resources, some libraries began developing tools to assist them in this regard.

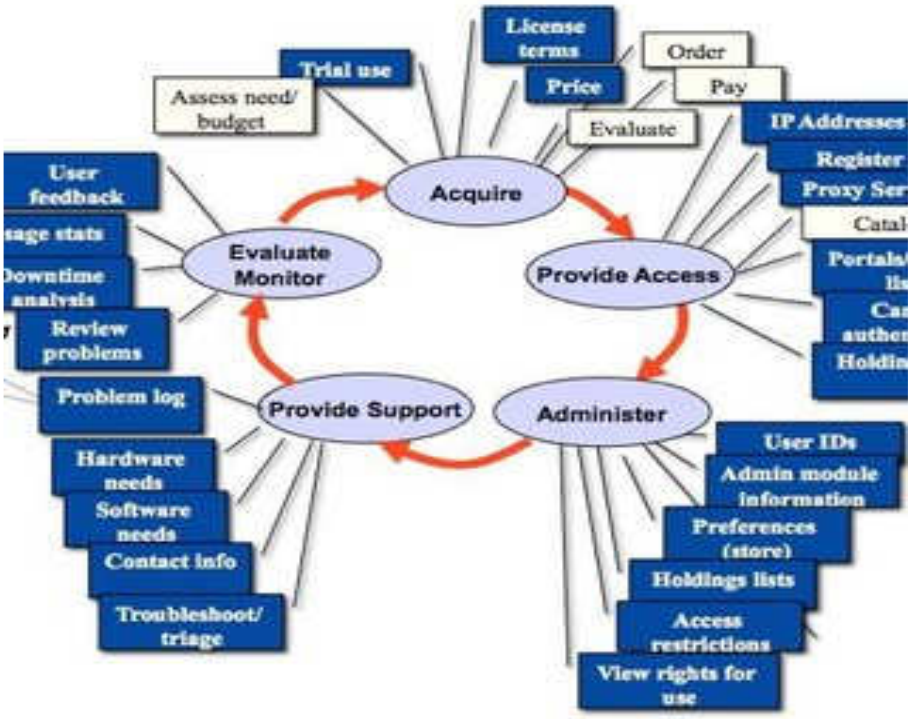

Fig. 18: Electronic Resources Management

3.2 Features of Electronic Information Resources Management

The features of Electronic Information Management are as follows:

1. At the package (database) level, providing resource descriptions and linking package contents (e.g., e-journals) to the package record
2. Encoding and possibly publicizing licensed rights such as e-reserves, module packs, and interlibrary loans
3. It may have a public interface that can be used independently or integrated into the Online Public Access Catalogue (OPAC).

4. It could be a stand-alone system or may be integrated with other library system modules.
5. Assisting in the acquisition and management of licensed e-resources.
6. Keep track of the ordering process from the point of order to licensing and final access.
7. Data providers, consortium agreements, and access platforms are all covered.
8. Contact information for all content providers are provided.
9. Troubleshoot logging issues with resources and providers using this interface.
10. Providing e-mail alerting systems that can be customized (for example, notifying managers when actions are expected or required)
11. Establishing a connection between license documents and resource records
12. Allows you to get usage statistics of e-resources and services.

Electronic resource management systems are used by collection development librarians to provide A-Z journal lists, content acquisition, and license renewal for electronic resources. In accordance with the acquisition policy, the collection development librarian considers the shift from owning information resources to licensing information, as well as the aggregation of information in multi-disciplinary databases.

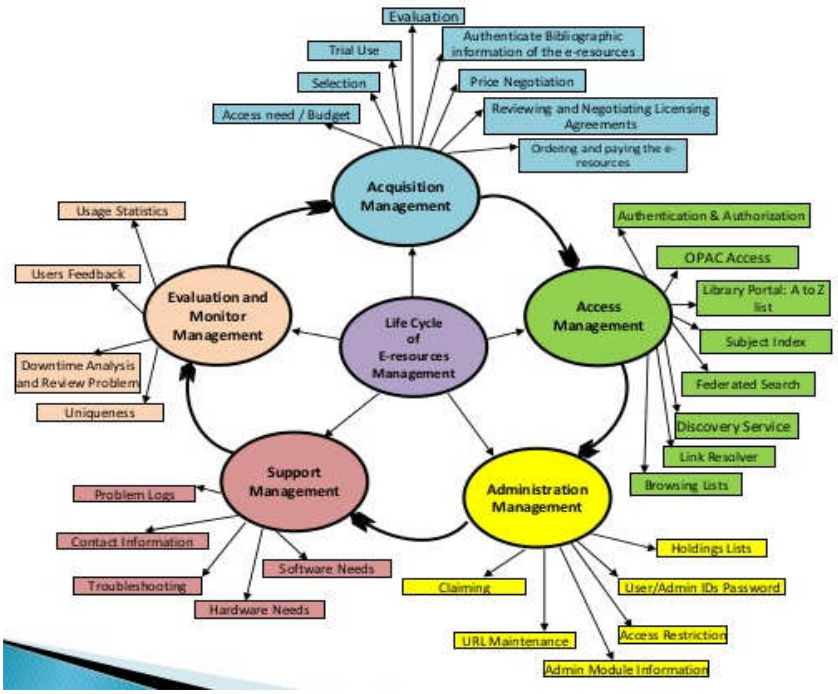

Fig. 19: Electronic Resources management (ERM): Progressive trends
Source: Nihar K. P. (2021)

3.3 Electronic Resources Licensing and Subscription management

Licensing is required for several reasons. The majority of rights to use content in the print environment are governed by copyright law. Contract law governs the rights to use content in the online environment, with license agreements serving as the primary means of enforcement. Libraries typically purchase materials with implicit rights in the print environment. In the electronic environment, libraries typically license or lease access to content. Therefore, it is important to for a librarian to have versatile knowledge of the license terms and conditions that relate to subscription. Some of the major elements of license include; remote access, site definition, authorization of user definition, period of subscription and bundles covered by the subscription, perpetual access (lease vs own), term of payment, warranties, copyright law, scholarly share among others need to be clearly understood and well delineated during negotiations.

Unlike printed information resources, which have a set price with a possible discount, electronic resources are regularly priced in a flexible manner. Negotiating a price becomes easier with practice, but the evaluator should be able to figure out how the vendor sets its price. Checklists, for example, have been developed by the European Bureau of Library, Information, and Documentation Associations (http://www.carli.illinois.edu/reports/board/LicensingPrinciples.pdf) to assist inexperienced librarians in evaluating offers from publishers or even developing their own model licenses. It is worth noting that the license agreements clauses can be negotiated.

3.4 Role of Library Consortia in the Digital Age

A library consortium is a cooperative organization of libraries that are governed by widely accepted agreements and contracts and formed for resource sharing and reciprocity. It refers to a collection of libraries that collaborate to coordinate activities, share resources, and pool expertise. Vidas (2020) explained that “Library Consortia is a generic term to indicate any group of libraries that are working together towards a common goal whether to expand cooperation on traditional library

services such as collection development or electronic information services".

Library consortia have played a significant role in the following areas;

- Improve access to information;
- Stretch of limited resources
- Improvement in networking relationship among the participating libraries
- More cooperative development between vendors and publishers
- Ensure wider and consistent access to resources
- Ensure best practices
- Optimization of financial, human resources, information resources and infrastructural capabilities

3.0 CONCLUSION

Electronic Resources Management (ERM) denotes practices and software systems used by libraries to track key information on electronic resources, in particular online resources, such as digital newspapers, databases and electronic books. Electronic management systems are used by collection development librarians to provide A-Z journal lists, content acquisition, and license renewal for electronic resources. In accordance with the acquisition policy, the collection development librarian considers the shift from owning information resources to licensing information, as well as the aggregation of information in multi-disciplinary databases. Due to the high cost of acquiring information resources libraries are increasingly launching into consortium. A library consortium is a cooperative organization of libraries that are governed by widely accepted agreements and contracts and formed for resource sharing and reciprocity. It refers to a collection of libraries that collaborate to coordinate activities, share resources, and pool expertise.

4.0 SUMMARY

The unit is summarized as follows:

Electronic Resources Management (ERM) denotes practices and software systems used by libraries to track key information on electronic resources, in particular online resources, such as digital newspapers, databases and electronic books.

The basic features of electronic resources management include: establishing a connection between license documents and

resource records, providing assistance in the acquisition and management of licensed e-resources, stand-alone system or may be integrated with other library system modules among other features

Licensing is required for several reasons. The majority of rights to use content in the print environment are governed by copyright law. Contract law governs the rights to use content in the online environment, with license agreements serving as the primary means of enforcement. Therefore, it is important to for a librarian to have versatile knowledge on the license terms and conditions that relate to subscription. Unlike printed information resources, which have a set price with a possible discount, electronic resources are regularly priced in a flexible manner negotiating a price becomes easier with practice, but the evaluator should be able to figure out how the vendor sets its price.

Role of library consortia in the digital include: more cooperative development between vendors and publishers, ensure wider and consistent access to resources, ensure best practices, optimization of financial, human resources, information resources and infrastructural capabilities.

SELF-ASSESSMENT

a) Highlight the role of consortia in the digital age

Library consortia play a significant role in the following areas;

- Improve access to information;
- Stretch of limited resources
- Improvement in networking relationship among the participating libraries
- More cooperative development between vendors and publishers
- Ensure wider and consistent access to resources
- Ensure best practices
- Optimization of financial, human resources, information resources and infrastructural capabilities

b) Identify the distinguishing features of electronic resources management

Features of Electronic Information Resource Management

The features of Electronic Information Management are as follows:

1. At the package (database) level, providing resource descriptions

and linking package contents (e.g., e-journals) to the package record

2. Encoding and possibly publicizing licensed rights such as e-reserves, module packs, and interlibrary loan
3. It may have a public interface that can be used independently or integrated into the Online Public Access Catalogue (OPAC).
4. It could be a stand-alone system or may be integrated with other library system modules.
5. Assisting in the acquisition and management of licensed e-resources.
6. Keep track of the ordering process from the point of order to licensing and final access.
7. Data providers, consortium agreements, and access platforms are all covered.
8. Contact information for all content providers are provided.
9. Troubleshoot logging issues with resources and providers using this interface.
10. Providing e-mail alerting systems that can be customized (for example, notifying managers when actions are expected or required)
11. Establishing a connection between license documents and resource records
12. Allows you to get usage statistics of e-resources and services.

5.0 TUTOR-MARKED ASSIGNMENT

1. What is electronic resource management?
2. Identify the features of electronic resource management.
3. Discuss electronic resource licensing and subscription management.
4. Give justifications with clear example why consortium is necessary in the 21st century library operations.

6.0 REFERENCES/FURTHER READING

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UNIT 2 OPEN ACCESS INFORMATION RESOURCE

CONTENTS

1.0 INTRODUCTION

This unit introduces you to the concept of open access and the models of open access that are available in the present digital working environment as well as the method of training and retooling in the digital working environment.

2.0 OBJECTIVES

By the end of the unit, you will be able to:

- define open access
- identify various models of open access
- identify the various methods of training in the digital environment.

3.0 MAIN CONTENT

3.2 Open Access Information Resources

With the advancement of information and communication technologies ICT's coupled with the escalating journal and serials prices, several initiatives came up to relieve libraries from this problem. Open access is one of these initiatives. The term open access refers to free and unrestricted access to scholarly content, where users can view, read, download, copy, and print some copies for non-commercial purposes without any financial, technical or legal barriers.

As opposed to the traditional publication system, open access means unfiltered access to information resources and at no cost. One important aspect of open access is that it increases visibility and reuse of scholarly content. According to University of St Andrews (2021) Open access "means research literature that can be freely accessed by anyone in the world via the internet so that it can be used without licensing restrictions for research, teaching or other purposes. Scholarly norms for attribution still apply to open access publications, so authors should always be properly acknowledged. Copyright also applies, and the rights holder (often the publisher) controls the right to permit open access".

According to Frandsen (2009) several political actions taken to support open access have resulted in a number of declarations. Suber (2008) opined that the Budapest (February 2002), Bethesda (June 2003), and Berlin (October 2003) definitions of open access are the most central and influential for the OA movement. They are collectively termed the BBB statement. According to the Budapest (February 2002), Open Access Means:

[Literature which is freely available] on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited (Budapest Open Access Initiative, 2002)

To achieve broader open access to research similar international statements were devised that further supported these initiatives; including The Bethesda Statement on Open Access Publishing (2003), Open access is defined by the Bethesda Statement on Open Access Publishing as follows:

An Open Access Publication is one that meets the following two conditions: [1] The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium

for any responsible purpose, subject to proper attribution of authorship, [2] as well as the right to make small numbers of printed copies for their personal use. A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in a suitable standard electronic format is deposited immediately upon initial publication in at least one online repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving (for the biomedical sciences, PubMed Central is such a repository).

The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003) being the third "BBB definition" of Open Access came up as a result of such broad, international commitment (Frandsen, 2009), The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities is the most recent of the three definitions. Following a three-day conference in the Harnack House of the Max Planck Society in Berlin, the declaration was signed by the invited attendees from German and international research organizations that commit to implementing this definition of open access who signed the declaration with the following definition of open access:

Open access contributions must satisfy two conditions: The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, worldwide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship (community standards, will continue to provide the mechanism for enforcement of proper attribution and responsible use of the published work, as they do now), as well as the right to make small numbers of printed copies for their personal use. "A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards (such as the Open Archive definitions) that is supported and maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, inter-operability, and long-term

archiving."

These series of international meetings were held from 2002-2003 in Berlin, Bethesda and Budapest. The purpose of these meetings was to bring together like-minded individuals and organizations with a common desire to make scholarship freely available online, and to work out a common term and definitions (Morrison 2012). The Budapest Open Access Initiative (2002), the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003), and the Bethesda Statement on Open Access Publishing (2003), embrace very similar definitions of open access, so that collectively this is referred to as "the BBB definition" of open access. There is more to the Budapest, Berlin, and Bethesda (BBB) statements than defining open access; each statement includes strategies for, and commitment to, implementing open access. The Budapest definition is the first and most succinct of the definitions of open access, from the Budapest Open Access Initiative (2002).

Type of Open Access Sources/Resources

The model of open access that exists is divided into two broad types (OASIS; Albert, 2006; Rossini, 2007 & Ghosh, 2009); they are the open access journals ("gold road") and open access repositories or institutional repositories ("green road"). Examples of open access journals include "Library Philosophy and Practices", while a directory of open access journals has been developed by Lund University Library after the First Nordic Conference on Scholarly Communication in Lund / Copenhagen in 2002. In more specific terms, Harnard (2013) stated that there are two ways authors can provide OA:

i) By publishing in a journal that makes its articles freely accessible online (this is called
OA publishing, or ("Gold OA") or
ii) By publishing in any journal at all, and making their peer-reviewed final drafts freely accessible online by self-archiving them in an OA repository upon acceptance for publication (this is called OA self-archiving or ("Green OA").

OA journals follow procedure of peer-review for their contents. These journals are published to make their online contents free immediately after publication. This is also called as the "golden" road to OA. Some of the publishers such as BioMed Central and the Public Library of Science are providing OA journals. Directory of Open Access Journals (DOAJ) defines OA journals as journals that use a funding model that

does not charge readers or their institutions for access (Kumar and Bansal, (2008).
Green OA (self-arching or repositories) involves simply making research output freely available on the World Wide Web. They may belong to institutions, such as universities and laboratories or disciplines such as chemistry and biology. They do not perform peer-review. They may have preprint and post print or both. This is also known as the "green" road to OA.

Preprint is pre-peer-review article submitted to a journal. Post prints are articles which are post- peer-reviewed. Both pre-print and post-print in electronic format are called e-prints (Kumar & Bansal, 2008).

3.2.1 Open Access Models

There are different types of open access journal models, namely:

1. Gold route to open access;
2. Hybrid route to open access
3. Diamond route to open access.

1. Gold route to open access:

a. Under this method full open access model; the authors or the authors' institution covers the Article Processing Charges (APC). Besides most research funders support and are always willing to cover these charges. A list of journals that provide open access model are listed in the Directory of Open Access Journals (DOAJ) website.
b. Hybrid Journals: these are subscription-based journals that allow open access to individuals on payment of Article Processing Charge (APC).

2. **Green route to open access:** this provides access to journal articles via Institutional repository by self-arching i.e. upon acceptance of manuscript for publication by the publisher, the author can deposit pre-print copy of his manuscript into the institutional digital repository.
3. **Diamond:** Publications under this model do not charge Article Processing Charges (APC) since it is covered under library subsidy models or by institutions and societies. Hence the reader can access the journal free of charge.

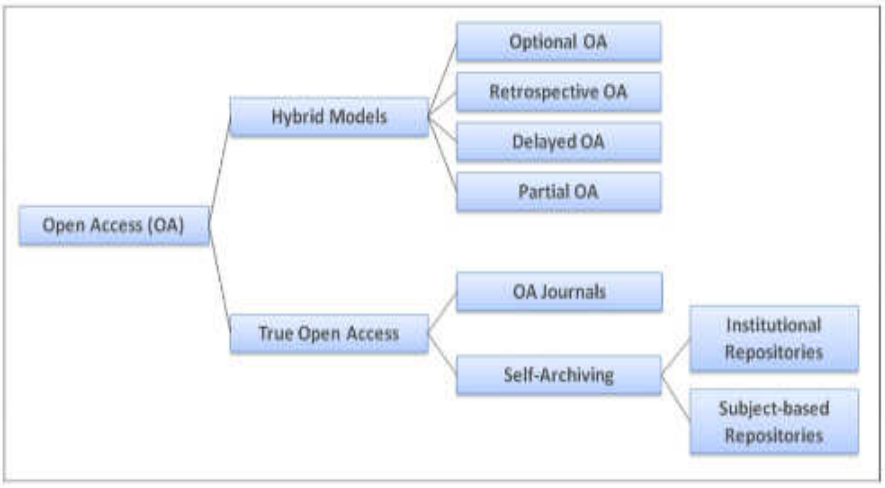

Fig. 20: Open Access Model

4.0 CONCLUSION

With the advancement of information and communication technologies ICT's coupled with the escalating journal and serials prices, several initiatives came up to relieve libraries from this problem. Open access is one of these initiatives. The term open access refers to free and unrestricted access to scholarly content, where users can view, read, download, copy, and print some copies for non-commercial purposes without any financial, technical or legal barriers. The model of open access that exists is divided into two broad types they are the open access journals ("gold road") and open access repositories or institutional repositories ("green road").

5.0 SUMMARY

The unit defines open access as free and unrestricted access to information resources by users. In this regard users can view, read, copy, download and distribute copies of information resources without any legal or technical restrictions. Also, the unit discussed open access models; where we have gold, green and diamond route to open access

SELF-ASSESMENT

a) Define the Term Open Access

Open Access refers to free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the

work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship.

b) List the Three "BBB" of Open Access

The three BBB of Open Access are as follows:

1. Budapest Open Access Initiative (February 2002),
2. Bethesda statement on open Access publishing (June 2003), and
3. Berlin Open Access Initiative (October 2003)

6.0 TUTOR-MARKED ASSIGNMENT

1. What is open access?
2. Discuss the two models of open access you know.
3. Discuss the Three "BBB" Definition of Open Access.

7.0 REFERENCES/FURTHER READING

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UNIT 3 INFORMATION SEARCH, TECHNIQUES AND STRATEGIES

CONTENTS

1.0 INTRODUCTION

Within the information and communication Technology (ICT) environment diverse information resources are accessed through Internet, portals, aggregators, repositories, online databases. These media contain diverse information resources in different format such as books, journals, reports etc., the information contained therein are massive and complex. This makes users to become frustrated while looking for information due to the complex nature of the web resources. To demystify and simplify the complex nature and ensure seamless access to relevant information, therefore you need to have search skills, techniques and strategies. This would assist you to obtain relevant and quality information for your users. Therefore, this unit introduces you to the conceptual meaning of information search, types of information search, the search strategies, search techniques and information search tools.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define information search
- identify the types of information search
- use search strategies
- identify information search tools.

- **3.0 MAIN CONTENT**

3.0 Meaning of Information Search

Searching is a task or an activity aimed at looking thoroughly in order to find something. Within the context of Library and Information Science, searching connotes navigating thoroughly through the records, databases, search engines and other media when seeking for required information. Within this unit you will get acquainted with the relevant ways and techniques to get the required information. You will also be introduced to search strategies and techniques to retrieve information from an organised body of information as well as unorganized sources of information. Carol Kuhlthau proposed the information search process in 1991, which discusses the behavior of the user searching for information and the process that follows. The following are the six stages of the procedure:

- Initiation: At this point, the user has a desire for the knowledge but is unsure of the source of the information or the procedure.
- Selection: At this point, the user is confident in the information source and can proceed as needed.
- Exploration: During this stage, the user seeks information, improves his knowledge base, and attempts to meet the requirements.
- Formulation: At this stage, the user gathers information and begins the evaluation process. The collected information is analyzed by the user to provide the desired results.
- Collection: In this stage user is with all the processed information and they do the task of collecting the desired information
- Search completion: After gathering the information and meeting the requirements, the user summarizes the information and completes the information search process.

Fig. 21: Information Search
Source: MBA Skool Information Search Process

3.2. Types of information search

There are various types of information search depending on the level of search skills of the users and the amount of information need. You may adopt different search skills. Searching for information requires adequate preparation and critical thinking to enable you come up with a good search. A lot of search skills are available to enable you come up with good result. However, search result entirely depend on the user skills and his level of permutation of terms. The following search types are discussed as follows;

1. Simple search:

This is a form of search in which the user uses keyword to quickly search for information from a database, repository or search engine. In this regard you search for information without considering the database architecture or behavior of the search engine and the impact of their operators or connectors. Nearly all information carriers in an online environment have facility for simple search. For example, at the first point of searching information using Google in most cases you just type a keyword without considering the above mention factors. Beside, you can use one or more keyword to search for information. The users in most cases use simple search when they are not certain about the information needed and when the topic is not well focused or articulated. For example, a topic like “Tuberculosis and Africa” may cover any period, may also include male or female as well as ranging from English speaking country, French or Portuguese. Using this search term you can retrieve information on Africa not necessarily tuberculosis. Moreover, no effort was made to focus the search by applying various search strategies.

2. Advanced search:

This is a form of search where the user uses various search techniques to make the search more focused and precise in order to get more relevant and highly precise information. In this type of search you create search string using diverse parameters and operators within the database or search engine. In advanced search you apply filters to reduce the amount of information and make for more specific and more focused. In advanced searching you use fields to narrow or expand your search based on the topic been searched.

The use of advanced searching assists the user to:

- Apply filtering
- Reduce number of items retrieved
- Apply multiple search fields

Advanced searching tools are available in most search tools such as repositories, databases etc.

3. Meta search:

This is a form of search where the user uses a variety of search tools in a single interface concurrently. A Meta search engines allow you to run simultaneous charges on more than one search engine. It searches diverse search engines, diverse search tools such as Google, Yahoo, Bing, AltaVista, etc. concurrently. This is performed with the usage of Meta search engine such as Dogpile, Search.com; Metacrawler and Vivisimo. Meta searches are conducted the same way like in many other search engines. However, the only difference is that the search result will come from different search engines even though using single search engine.

4. Keyword search:

This involves the use of phrases or word that are used within the document. A term could be searched using a phrase or word and this may comprise multiple keywords or phrases. This form of search, is one of the simplest form of searches where by single search term or a keyword search captures the ideas or terminologies used in the document. It is always important to consider variation in spellings. For example American and British forms of spelling (e.g. Anesthesia and An aesthesia) as well as use of plural and plural. Likewise, it is highly useful to consider synonymous terms such as newborn and infant, or use

of controlled vocabulary that gives alternative terminology to a word e.g. Cancer is referred to as 'neoplasm' in controlled vocabulary terminology.

3.3 Search preparation and strategies

When preparing for a search, in most cases the term is presented as a question. Only by coming up with a topic you will be able to come up with words that are relevant. Coming up with a topic is very important because most search tools such as Google use keywords in searching for information. For instance a search topic such as "What is the prevalence of Maternal mortality among rural women in Nigeria?" would break the topic in keywords such as (prevalence, maternal mortality, rural women, Nigeria). The user may also decide the publication period to be covered by the search, the type of information required whether reviews, journal articles or any other information.

The process of preparing for the search and coming up with a search plan is referred to as 'search strategy.' The user should also be familiar with certain search tools in the area of subject interest. Therefore, search strategy could be refer to as blue-print or schematic plan that assists user referred articulate search topic that will bring desired information or result. A search strategy is a guide that assists users to answer query such as:

- What is the purpose of the information?
- Is there a time-frame for the required information?
- Is the information required general or specific?
- What sources would best retrieve the required information, general or specific tools?
- Would the information be specific to a certain geographical location?

A search strategy relates to having good guidelines that will lead to a successful search output.

Having a search strategy helps the user to:

- Define the topic e.g. reduction of maternal mortality in Nigeria.
- Break the topic into concepts or keywords such as: maternal mortality, Nigeria.
- Use search techniques such as Boolean operators to refine the search
- Try out the search strategy and refine it as necessary for better results

- Identify the appropriate search tools and search techniques
- Decide on whether to start with a general search engines such as Google or a specific tool such as Agora, Biomed central, Hinary or a more specialized database such as science Direct or Ebscohost
- Have alternative choices such as starting from print-based information sources such as reports or grey literature.

Advantages of search strategy

- It saves users time
- Assists in the retrieval of relevant information resources
- Can be bookmarked for subsequent usage.

Requirements for a successful information retrieval

- Defining the search problem
- Developing a search strategy
- Using search techniques
- Learning how to use a search tool e.g. PubMed
- Using correct spelling
- Considering other forms of information sources such as print and audio-visual
- Evaluating the retrieved information
- Using the information appropriately

Noteworthy is the fact that the pre-searching stage presupposes the existence of a search interview which serves as an intermediary. In an online environment it is vital to have clear understanding of the concept "search interview", because it will assist user to understand the pre-requisite for search and search requirement. The concept of pre-search interview, although is very important in a mediated search process, has very little relevance in the context of information retrieval from the World Wide Web and digital libraries, since these systems are designed to be used by the end users without any direct involvement of human intermediaries. Nevertheless, an understanding of the activities involved in a search interview process may be quite useful for designers of information retrieval systems in the web and digital library environment.

The involvement of intermediaries reduces the uncertainty of retrieval to a great extent, thus, providing effectiveness in retrieval. The functions of the intermediaries are to ascertain exact information needs of the users as far as possible, identifying the concepts that describe the needs,

translating these concepts into the terms of IR system and delineating the relationships among them, stipulating the parameters of the search. This, they do by interpersonal communication and participative discussion. The other functions are selection of database(s) for search, identification of alternative sources, formulation of alternative search strategies, matching of formulated search expression with the features of database(s) and conducting past search review. Many times, these are done by users interface. According to Taylor (1968), "queries of a searcher shift from actual need to unexpressed need. The need is refined to the conscious description need or conscious need which is finally formalized as formalized need. The searcher's actual query formulation is done with interactive interface, in case of online systems and reference interviews".

3.4 Search techniques

Search techniques are ways in which the user adopts or uses some methods such as the use of "conjunction" or "symbols" in order to have more fruitful results. There are various search techniques ranging from simple to complex. Therefore, it is always necessary to develop good search techniques that would allow you to come up with fruitful result. Some of the search technique are identified as follows:

- Boolean operators
- Truncation
- Wild Card
- Parenthesis
- Boolean operator is referred to as logical relationship among terms
  during search through the use of "AND" "OR" "NOT". The Boolean operator was named after George Boole (1815-64) a British mathematician. The Boolean operators are used to narrow or broaden a search.

These are used to connect and define the relationship between the search terms. Thus, resulting in more focused and productive results. These three terms are widely accepted by the designers of the search engines. They have well defined meaning when used as operators in information search. The three operators of Boolean logic are the logical sum (+) OR, logical product (x) AND, and logical difference (-) NOT. All the information retrieval systems allow the users to express their queries by using these operators. Let us now understand the implications of these three operators.

It could also be used to make your search more focused depending on

the type of information you want to retrieve. For example,

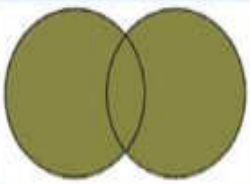
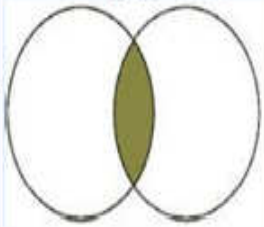
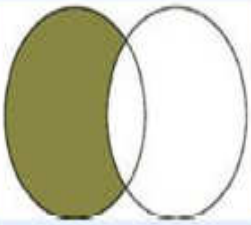
- OR – the OR operator allow you to broaden your search, it also allows you to specify possible options among the search terms. When a thread is created using OR operator, the information carrier allows you to retrieve those possible options as indicated during the search process that means either of the alternatives. For instance, granted you create a search string like, 'Information OR Data' and search it, then the result of the search will be a list of references of all those resources, available in the system, where either information or data exists.

- AND – operator allows you to narrow your search, it to combine two or more terms. When a string is created using AND operator, the search engine retrieves all those resources where all the terms or keywords connected with 'AND' exist. For instance, if when you design a search string like, 'information AND data' then you search, the result of the search would bring out all documents that contained information and data.
- NOT- operator helps you to narrow your search by removing unnecessary wordings. The NOT operator is used to exclude the term from a set of documents. For instance, if we create a search thread like 'Information NOT Data' then you search, the outcome of your search will bring out documents that only contained information but not data.

Majority of search tools use AND as a default. For example, in PubMed, the search term *Tuberculosis in Nigeria* will be searched as *Tuberculosis* AND *Nigeria* automatically, hence the operator AND is unnecessary. Other search tools may default to OR. Therefore, it is always important to understand the architectural design of the search engine especially the default field and subfields provided for search.

Beside, almost all search tools have an advanced search facility that allows the user to apply filters and focus the search. There are provisions for template in advanced search that automatically allows you to present your query which guides the user in selecting the relationship of the terms – NOT, OR, AND

An example of a Boolean search

Search statement- Mosquitoes and malaria	Types of records retrieved	No of records Retrieved from PubMed
Mosquito OR Malaria	Documents that discuss either mosquitoes OR malaria. The OR operator searches the keywords simultaneously and independently of each other to broaden the search. The OR operator is most useful when a user wants to include words that represent the same concept. The OR operator broadens the search as the operator provides a wider selection of the search by retrieving records that have either of the keywords. This operator can be helpful when the user wants to look at a subject area comprehensively.	OR=81883 
Mosquito AND Malaria	Documents that discuss both mosquito AND malaria. The use of AND helps in refining the search to reduce the number of results especially if a search term is too general. **AND** is useful when performing a search that is focused to specific keywords or phrases.	AND= 8557 
Mosquito NOT Malaria	Documents that discuss mosquitoes as parasites but excludes malaria. This operator widens the search for better results. NOT should be used, when a search retrieves many items that are not related to the search topic. The use NOT may block relevant items from retrieval and it should be used with caution.	NOT =24430 

Source: Ajuwon, G. A. et al (2011).

3.5 Information search tools

This phrase is frequently used in a broad sense to refer to a variety of internal and external search engines, directories, and information repositories. Most search tools are made to work with a computer program that was intended to retrieve documents or data, such as a

crawler, spider, indexing bot, or similar system. Search tools are utilities available to assist you search information amid the millions of information resources on the Internet. Internet directories, search engines, and meta-search engines are the three categories of search tools. Each type of search engine fulfills a different goal and locates data in a unique way.

Search engine:

Search engines (SE) are one of the twentieth century's most remarkable innovations. Information and communication technology (ICT) has enabled everyone to obtain any information in seconds. Search engines have transformed the universe of knowledge and are properly regarded as the Internet's cornerstone. The capabilities of search engines have greatly advanced in the recent decade, and some individuals have commented that if you cannot find something on a SE, it might not exist at all.

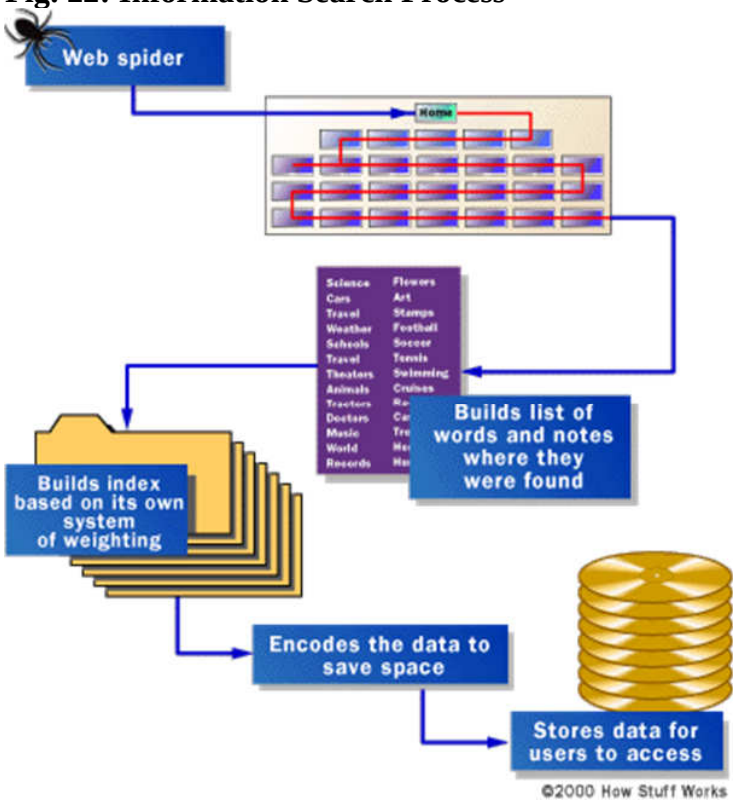
According to Raikar, Byatnal and Tejaswini (2020)

A search engine is defined as “a web application that gathers information items from the web using various strategies (such as crawlers or spiders) and then performs the basic retrieval task, which includes accepting a query, comparing the query to each of the records in a database, and producing a retrieval set as output.”

A web search engine generates a list of "pages"—web-based computer files—that contain the terms in a query. The user can join terms with and, or, and not to filter queries in most search engines. The Web is mainly disorganized, and the information on its pages is of diverse quality, including commercial information, government databases, research reference collections, and personal material collections. Search engines aim to discover trustworthy pages by weighing (or rating) them based on the number of other pages that link to them, identifying "authorities" that many pages refer to, and identifying "hubs" that link too many pages. These methods can be effective, but the user must still be skilled in selecting acceptable search phrase combinations. A file or document must first be found before a search engine can tell you where it is. A search engine uses special software robots called spiders to compile lists of the words found on Web sites in order to find information on the hundreds of millions of Web pages that exist. Web crawling is the method by which a spider builds its lists. Search engines are the most important and visible resources on the Internet. At the same time, reference services are regarded as the most important service

provided by a library. Since the advent of the Internet in 1991, visits to a library's reference desk have decreased by nearly 48 percent (Carlson, 2007)

Fig. 22: Information Search Process



In order to construct weighted indexes, search engines use crawlers, which are programs that explore the Web by following hypertext links from page to page, recording everything on a page (known as caching), or sections of a page, along with some unique technique of identifying content.

Database:

"Any orderly collection of data or information that can be searched and retrieved quickly by a computer." Databases are designed to make data storage, retrieval, modification, and deletion as well as other data-processing tasks easier". In response to queries, a database management system (DBMS) retrieves data from the database. To allow the retrieval of information, database records and files must be arranged. Users get database information mostly through queries. The power of a database management system derives from its capacity to create new relationships from the basic ones provided by tables and use them to answer queries.

Directories

A search directory is a website index that is organized into categories. Search directories are populated through application and approval processes, unlike search engines, which utilize web crawlers to visit websites and collect data for indexing. These are the subject-specific Internet search tools that include only specified sites. A directory component or partner is present in many portals and search engines. Most directories allow you to search by keyword, but entries are also listed by one or more hierarchical subject terms or categories.

Portals:

An Internet portal, according to IBM, is "a single integrated, omnipresent, and usable access to information (data), applications, and people." A portal resembles a website, but it is much more. While the latter is an important component of every university's communications strategy, it is mostly used to give static information (Katz R.N. and Associates, 2006, chap 8).

There are several kinds of portals:

- Vertical portals give users access to a wide range of information and services about a specific area or topic. A vertical portal, for example, provides information and services aimed at targeting group of audience (e.g., Postgraduates, faculty members, research fellows, members of associations).

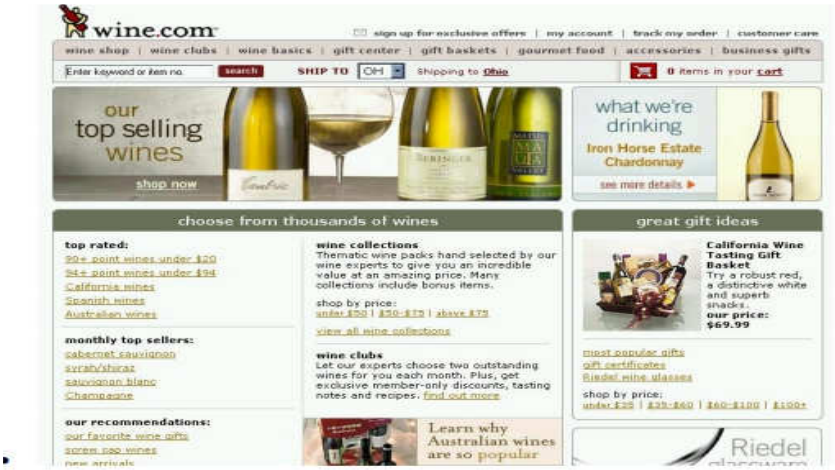
- Horizontal portals, often known as "mega portals," are designed to serve the whole Internet community. These websites always have search engines that allow users to customize the page by providing multiple channels (i.e., "access to other information such as regional weather, stock quotes or news updates"). Mega portal providers hope that consumers will come to their sites first to access the rest of the Internet. Their business strategies are based on a mix of advertising revenue and/or "click-through" revenue.

  Enterprise portals can be either:

- Vertical – in most cases vertical portal lay emphasis or concentrate on a single application for a particular activity, such as human resources, accounting, or financial assistance data.
- Horizontal - providing access to practically everything a single user in the company needs to perform his or her job. Verification

and access are determined by the individual's function or roles inside the company. HEPs (horizontal enterprise portals) can be customized and personalized. They can replace a lot of the subscriber's computer "desktop" if they're well-designed.

Fig. 23: Vertical Portal



Source: www.wine.com

Fig. 24: Horizontal Portal

Source: www.yahoo.com

Repositories:

Digital repositories provide a simple framework for storing, managing, reusing, and curating digital materials. They are utilized by a wide range of communities, may perform a wide range of purposes, and come in a variety of shapes and sizes. The current understanding has evolved from

a primary focus on software systems to a broader and more comprehensive commitment to the management of digital materials, which encompasses not only software and hardware but also guidelines, operations, services, and people, as well as content and metadata. To perform well, repositories must be long-term, trustworthy, well-supported, and well-managed. Institutional repositories and digital archives are terms used to describe digital repositories.

"At the most basic and fundamental level, an institutional repository is a recognition that the intellectual life and scholarship of our universities will increasingly be represented, documented, and shared in digital form, and that a primary responsibility of our universities is to exercise stewardship over these riches: both to make them available and to preserve them. An institutional repository is the means by which our universities will address this responsibility both to the members of their communities and to the public. It is a new channel for structuring the university's contribution to the broader world, and as such, invites policy and cultural reassessment of this relationship"

– Clifford A. Lynch in Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age (February 2003).

Digital repositories are fast evolving as a critical component of research cyber infrastructure. Even though research organizations are facing difficult budget considerations in the current economic climate, they must have a strategy in place for delivering repository services.

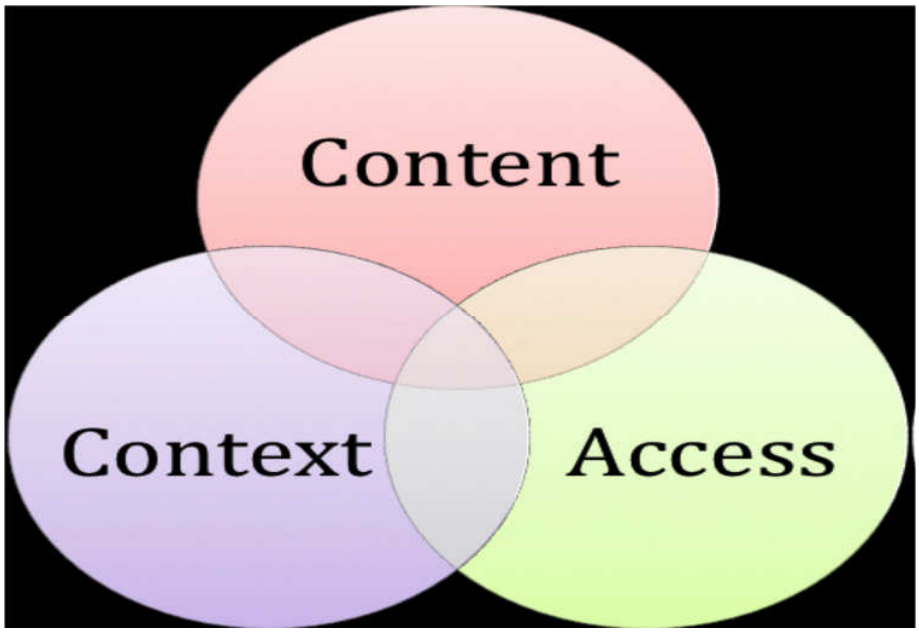


Fig. 25: Element of Digital Repository
Source: **Murugan** (2021) Element of Digital Repository

Long term Benefit and short term Value of Repository

A digital repository, in the short term,

- Allows for quick, easy, simultaneous, and remote access to deposits.
- Enables establishments to effectively manage and retain their intellectual assets.
- Digital repositories are progressively being recognized as an important instrument for the Research Assessment Exercise (RAE)
- Allows deposited resources to be reused for recent research, education, and learning.
- Manages both metadata and intellectual assets in the same area
- Allows external confirmation of research results
- Reduces physical storage requirements while expanding the potential mass of deposits Over time, a digital repository can:
- offer enduring access to deposits independent of external publishers
- be utilized to preserve incremental deposits of unique observational data to spatially significant and new collections for developmental analysis
- increase institutional research visibility
- Enables long-term confirmation of authorship or assurance of credibility for unpublished works if repository is certified/trusted
- Increases the potential of an institution or organisations
- Return on Investment from asset creation.

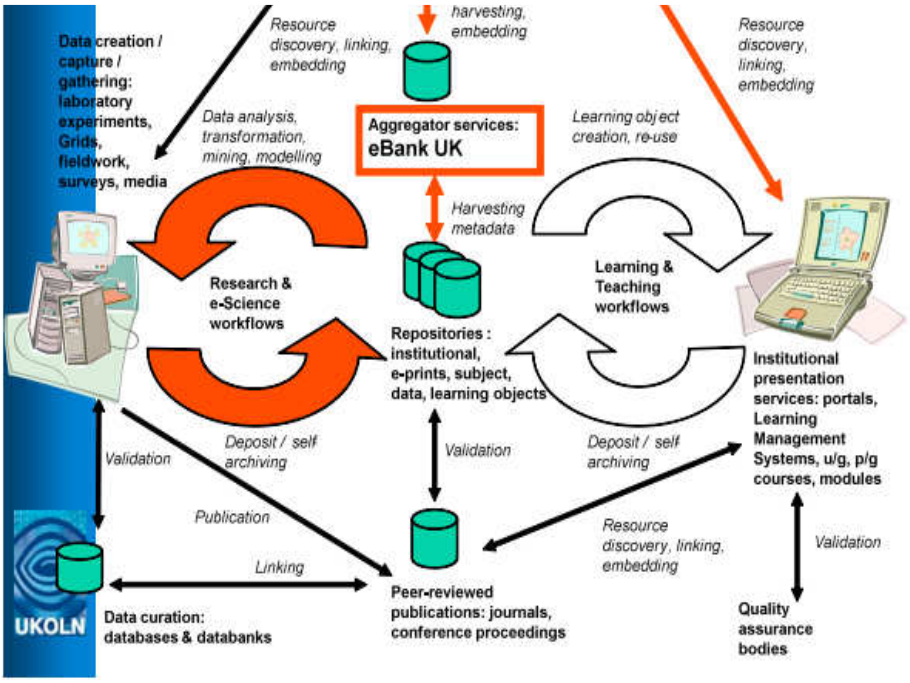


Fig. 26: Long term Benefit and short term Value of Repository

Source Richardson, Wolski (2012)

Roles and Responsibilities in the Creation and Maintenance of Repository

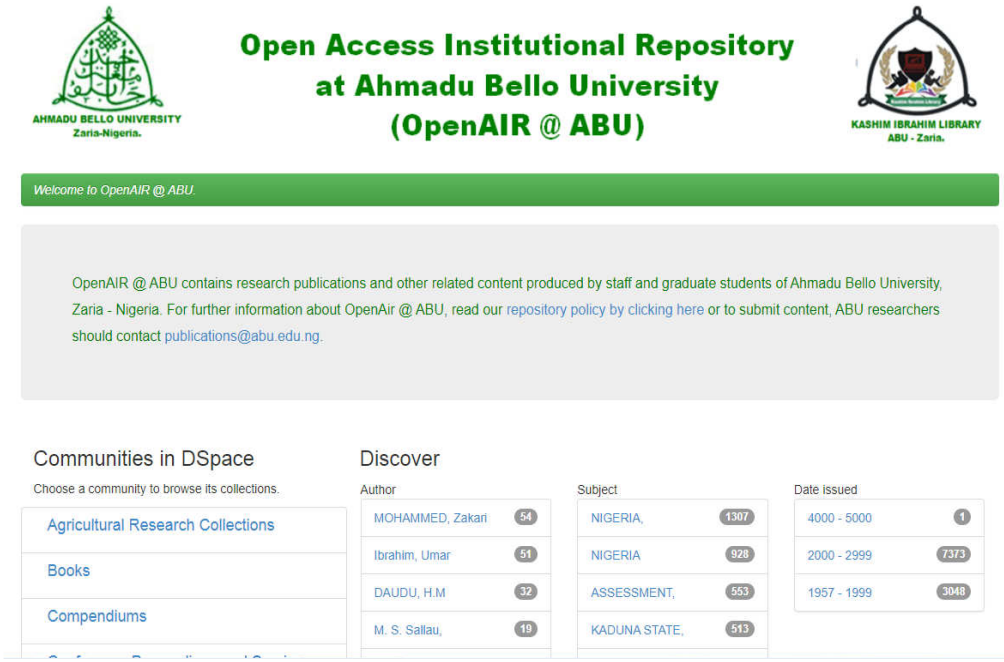
Digital repositories rely on the activities of a variety of stakeholders to be successful; success in this context means that the repository receives regular deposits of target material, that the material is properly curated so that it can be reliably re-used, that the material can be located and retrieved, that an infrastructure beyond software alone is developed, and that sufficient infrastructure is developed.

- Clear guidelines for creating reusable resources should be promoted to data creators, whether they are scientists, researchers, lecturers, or students. This entails developing well-documented data resources that adhere to copyright and intellectual property restrictions and can be reused without requiring significant additional permissions.
- Data curators, which include librarians, archivists, and IT personnel, must create/select and implement an acceptable repository architecture. The design should be scalable and adaptable enough to satisfy the institution's changing needs throughout time.

- The repository must be promoted within the institution to potential depositors, and the benefits of deposit must be made tangible. It is critical to specify reasonable deposit requirements in order to keep depositors' responsibilities from becoming overly burdened.
- Internal promotion of the digital repository to institute directors, vice-chancellors, and faculty heads will be required to ensure that continuous maintenance and development of the repository receives support and financing.
- Internal promotion of the digital repository to institute directors, vice-chancellors, and faculty heads will be required to gain support and money for the repository's continuous management and development.
- Institutions might want to think about ways for validating the repository. Certification can aid in establishing trust in the repository, encouraging deposits, and improving long-term prospects.

  Effective communication of potential advantages to all stakeholders, together with clearly defined policies about duties and responsibilities, will assist to assure the viability of repositories and the services they constitute in the short and long term.

Fig. 27: Institutional Digital Repository



Websites:

According to Ivana, Ambarita, Yuniarty, Prabowo and Ngatindriatun (2021) a “website is referred to as collection web pages that use World Wide Web (WWW) as a pathway for sending and receiving information and messages via Uniform Resource Locator (URL). Understanding the aspects that influence the complexity of a web site is essential for effective information retrieval and distribution, as well as its ultimate use in collaborative activities.”

A website (sometimes spelled web site) is a collection of web pages and related material recognized by a common domain name and hosted on at least one web server. Wikipedia.org, Google.com, and Amazon.com are all good examples. The World Wide Web is made up of all publicly accessible websites.

Websites are created for various purposes for instance, educational sites, news sites, forums, social media sites, e-commerce sites, and so on are just a few examples of websites. A website's pages are typically a combination of text and other media. However, there are no regulations prescribing how a website should look. A webpage may be made entirely of black and white photographs of flowers, or the phrase "cat" could be connected to another Web page with the word "mice." Many websites, on the other hand, follow a traditional pattern of having a homepage that links to different categories and materials on the site.

The homepage (or simply "home") is the primary page of the website. The homepage is frequently used as a "hub" through which all other pages can be visited. A "parent page" is an internal web page to which multiple other sites are linked in a logical structure (such as a specific category of topics).

Every page is a distinct HTML document, and they are all linked together via hyperlinks (or simply "links"), which might be grouped together in a navigation bar for convenience. The navigation bar appears on every page, not just the homepage, and helps users to travel around the main website structure easily.

The footer, which is yet another recurring area at the bottom of every page, is another key section of most websites. External links to comparable websites and other external resources are usually found in the footer, along with other important information such as disclaimers, links to the terms of service, privacy policy, and contact pages, as well as the company's physical location.

Websites are hosted on a dedicated servers and must be accessed via a web browser such as Chrome, Firefox, or Internet Explorer (either on a computer or mobile device). A website can be accessed directly by typing its URL address into a browser or by using a search engine like Google or Bing to find it. Previously, websites are classified according to their top-level domains. Here are a few examples:

- .gov = “Websites of government agencies”.
- .edu = “Websites of educational institutes”
- .org = “Websites of non-profit organizations”
- .com = “Websites of commercial organization”
- .info = “Sites that provide information”

Although these top-level domain extensions are still in use, they provide minimal information about the content of a website. The ".com" extension, along with many other country-specific extensions, is by far the most common domain into day's internet (.it, .de, .co.uk, .fr, etc.).
Tim Berners-Lee, a British physicist at CERN, created the first website in 1990. CERN stated three years later, in 1993, that anybody could access and utilize the World Wide Web for free.

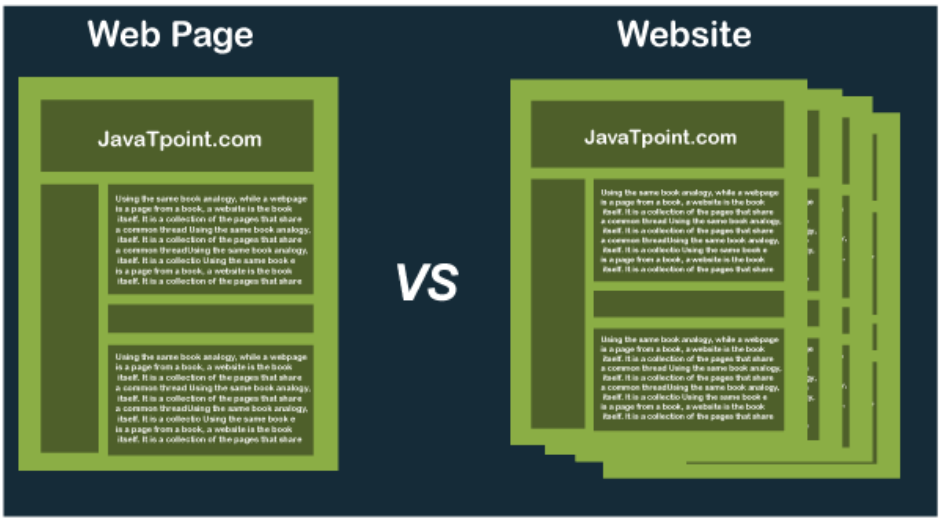


Fig. 28 Webpage VS Website

Aggregator:

The advancement of information technology has had a significant impact on the development of information sources and has contributed to the creation of a new type of information source. The advent of digital

information sources has impacted on libraries, publishers, and digital information. Digital technology has significantly influenced and redefined the functions of libraries and information producers.
For example, indexing and abstracting information sources used to be functions of libraries, but this role is now performed by vendors and aggregators. Libraries used to handle their own collections as well. Today, aggregators play a significant influence in library e-book purchase decisions. This is largely due to the wide range of products, access models, and workflow solutions they can offer. The unit will further discuss the concept of Aggregators, Types of Aggregators, Advantages of Aggregators, Disadvantages of Aggregators, and the Importance of Aggregators.

The term ‘aggregators' refer to the sum of all objects added together. Aggregation can be defined as the gathering of various information sources into a coherent collection. Library in the digital context, users desire quick access to the whole text. Aggregators and other content providers are collaborating with libraries and publishers to achieve this goal. The term aggregators was interpreted by the user to signify the collection of full-text material. As a supplementary publication purpose, aggregators typically sell their collection to libraries. Aggregators facilitate interaction between libraries, publishers, and published documents.

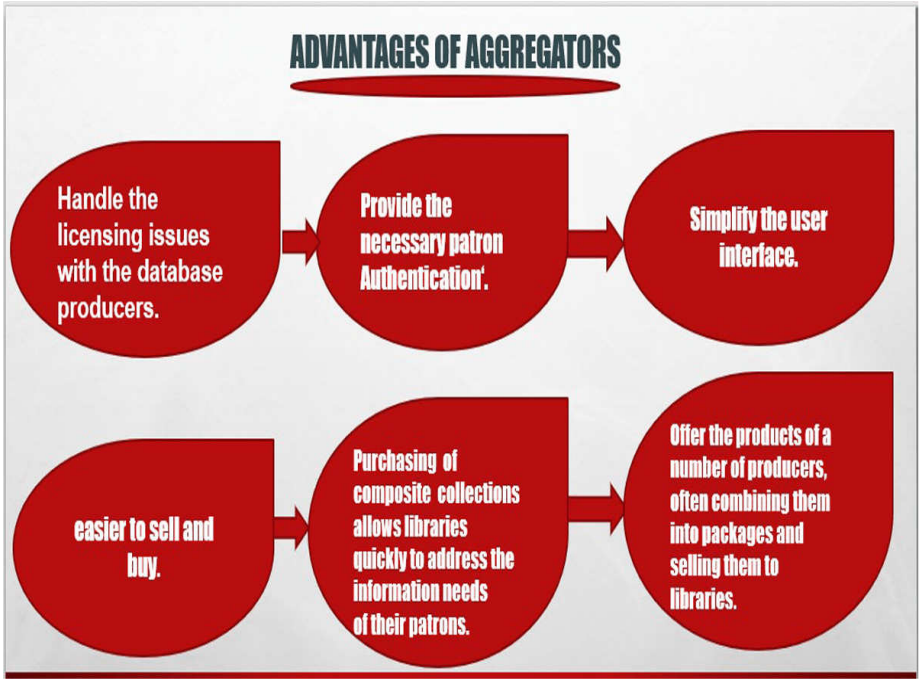


Fig. 29 Advantage of Aggregator
Source: Harun Ar-Rashid (2021)

Importance of Aggregators:

Having analyzing various types of aggregators, the resultant importance to the library and information services include:

- Aggregators have played an important role and their services have been based on libraries.
- Aggregators have performed functions such as handling orders, billing, payments, renewals, and cancellations.
- Aggregators have challenged the librarians' role in collection development.
- The emergence of aggregator's packages has had a considerable impact on the role of the collection manager in the library.
- Aggregators maintain the customer-supplier relationship with publishers.
- Aggregators help small publishers to gain a very much careful deal-market.
- Aggregators also offer libraries a great range of choices with different access models available for different subsets of content.
- Aggregators increase options for libraries and publishers.
- Aggregators facilitate the diversity of publications from large numbers of publications.
- Many large libraries are themselves becoming aggregators.

Users need an integrated interface that allows them to search and access quickly any document they seek in an electronic environment.

Analysis of the varying roles of companies collectively termed aggregators illuminates the distinctively different business models of the three types of aggregators. An aggregator is an entity that transparently collects and analyzes information from different data sources. In the process, the aggregator resolves the semantic and contextual differences in the information. Based on the results included in this study, it is clear that aggregators provide a service of high value to academic libraries. Currently, librarians are very focused on the long term conservation of their collection. Thus we have developed a business case for aggregators, shown the emergence of this model through some real case sand at the same time we continue to develop technologies that will enable aggregation. So it is right to say aggregators played a vital role in the development of Library and information resources.

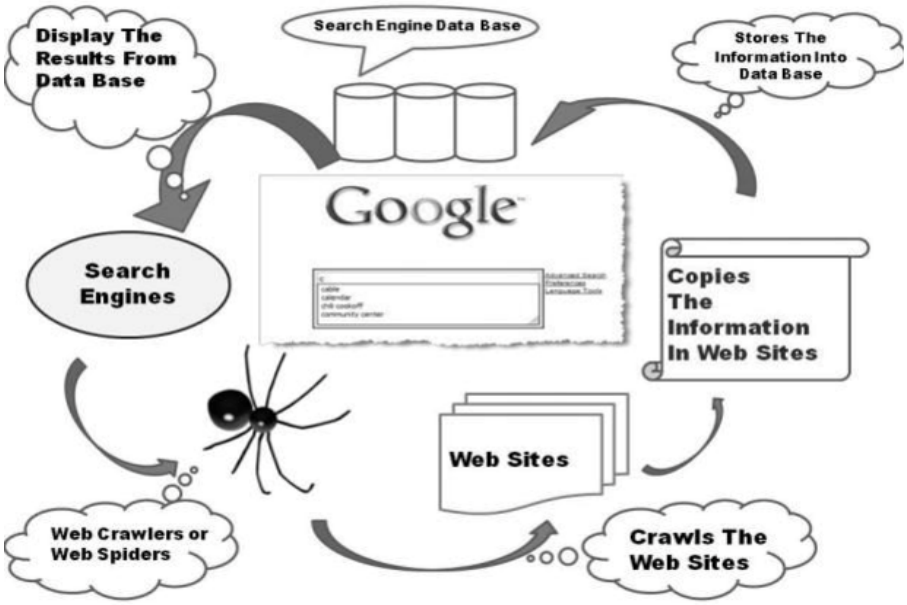


Fig. 30 Importance of Aggregators
Source: Prashant, A. (2017).

4.0 CONCLUSION

To make maximum use of this information and to avoid frustration while looking for relevant information, the user need to have search skills. The use of search techniques and strategies is aims at helping the user retrieve relevant and quality information. Searching is a task or an activity aimed at looking thoroughly in order to find something. Within the context of Library and Information Science, searching connotes navigating thoroughly through the records, databases, search engines and other media when seeking for required information. As the web and its usage continues to grow, many opportunities to analyse web data and extract all manner of useful knowledge from it become possible. The web presents new challenges to the traditional data mining algorithms that work on flat data. Search engines (SE) are one of the twentieth century's most remarkable innovations. Information and communication technology (ICT) has enabled everyone to obtain any information in seconds using varying search tools.

5.0 SUMMARY

The content in this unit is summarized as follows:

1. In this unit we defined information search as a task or an activity aimed at looking thoroughly in order to find something. Within the context of Library and Information Science, searching connotes navigating thoroughly through the records, databases, search engines and other media when seeking for required information.

2. In this unit we discussed various types of information search such as simple search, advanced, among others. Simple search connotes the use of keyword to quickly search for information from a database, repository or search engine. In this regard you search for information without considering the database architecture or behavior of the search engine and the impact of their operators or connectors. While in advanced search you use various search techniques to make your search more focused and more precise in order to get more relevant and highly precise information. In this type of search you create search string using diverse parameters and operators within the database or search engine.
3. The process of preparing for the search and coming up with a search plan is referred to as 'search strategy.' It was indicated that when preparing for a search, we should try as much as possible to come up with a topic that best describes the needed information. Coming up with a topic is very important because most search tools such as Google use keywords in searching for information.
4. Also, the unit defined search techniques as ways in which the user adopts or uses some methods such as the use of "conjunction" or "symbols" in order to have more fruitful results. There are various search engines ranging from simple to complex. Therefore, it is always necessary to develop good search technique that would allow you to come up with fruitful result.
5. Various Information search tools such as search engine, directories, portals, repositories, websites and aggregator were vividly discussed.

a- search engine
b- directories
c- portals

d- repositories
e- websites
f- aggregator
g- aggregator

SELF-ASSESSMENT

a) What is search engine?

A search engine is defined as "a web application that gathers information items from the web using various strategies (such as crawlers or spiders) and then performs the basic retrieval task, which includes accepting a query, comparing the query to each of the records in a database, and producing a retrieval set as output."

b) What is Website?

A website is refers to collection web pages that use World Wide Web (WWW) as a pathway for sending and receiving information and messages via Uniform Resource Locator (URL).

c) Discuss the Importance of Aggregator as an information search tool

After analyzing various types of aggregators we got several importance of aggregators which are given below;

- Aggregators have played an important role and their services have been based on libraries.
- Aggregators have performed functions such as handling orders, billing, payments, renewals, and cancellations.
- Aggregators have challenged the librarians' role in collection development.
- The emergence of aggregator's packages has had a considerable impact on the role of the collection manager in the library.
- Aggregators maintain the customer-supplier relationship with publishers.
- Aggregators help small publishers to gain a very much careful deal-market.
- Aggregators also offer libraries a great range of choices with different access models available for different subsets of content.
- Aggregators increase options for libraries and publishers.
- Aggregators facilitate the diversity of publications from large numbers of publications.

- Many large libraries are themselves becoming aggregators. Users need an integrated interface that allows them to search and access quickly any document they seek in an electronic environment.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define the term information search
2. Discussed four types of information search you know
3. What is search techniques?
4. Identify and discuss strategies and procedure to follow when searching for information
5. What is information search tools?
6. Identify and discuss any five search tools of your choice

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UNIT 4 COLLECTION DEVELOPMENT IN A DIGITAL SYSTEM

CONTENTS

1.0 INTRODUCTION

Recent advancement in communication technology, networking, Internet use, and electronic products have ushered in a revolutionary shift that has had a significant impact on the library scene. It has had an impact on the process of selection, acquisition, and information transfer. The entire concept of a library is integrally related with the concept of a collection, the words "library" and "collection" are almost synonymous, the concept of collection development is central to the professional practice of librarianship. According to Ogbonna et al., (2014) efforts in automation have been made at ensuring that academic library collection consists of both electronic and paper-based resources that are easily accessed and meet the demand of library users.

Greenstein (2000) claims that the digital library expands the scope and depth of intellectual and cultural evidence, as well as supporting original research and lifelong learning. As a result, the library becomes responsible for managing and securing access to a world of information of which it owns or maintains only a portion while creating a digital library service environment. According to Mwilongo, Luambano, and Lwehabura (2020) collection development in the digital age refers to the steady building up and sustaining digital collections that meet up the

user's needs. The collection may consist but not limited to e-books, e-journal and online database, as well as an archival facility. The goal of collection development is to make some e-journals, e-resources, e-conference proceedings, and databases more accessible. Therefore, this unit discusses the meaning of collection development, effects of e-publishing on collection development**,** challenges in electronic collection development.

Fig. 31: Collection Development and Management

2.0 OBJECTIVES

By the end of the unit, you will be able to:

- define collection development
- discuss collection development in the digital age
- discuss effects of e-publishing on collection development
- identify challenges bedeviling collection development.

3.0 MAIN CONTENT

3.1 Definition of collection Development

Academics and practitioners in the subject have defined and described

collection development and the associated phrase "collection management" in various ways over the years. Despite the literature's confusions and ambiguities, we may recognize numerous repeating motifs. Collection development is more closely linked to the selection and/or acquisition of library materials (which can also include the 'de-selection' or 'de-acquisition' of stock), whereas collection management is a more general term that encompasses the entire range of activities involved in managing access to information resources. However, there is some confusion about the relationship between the terms: some authors see the two concepts as related but distinct; others see collection management as a broader term that includes collection development, and many go so far as to claim that collection development has simply been replaced by collection management, while others simply regard the terms as interchangeable. According to Msonge (2013).

It is meant to build an appropriate collection that meets library users' information demands and entails strong sustenance and obligation from the parent institution managerial system in terms of funding and stakeholders' involvement in the collection development processes

The development of a collection is a dynamic and ongoing process. On the selection team, users, library personnel, and subject experts are all involved. It is not an objective in itself, but rather a way of developing a need-based, up-to-date, and balanced collection that meets the users' informational demands (Roll & Bernhardt, 2019).

The seminal work by Hendrik Edelman from 1979 is highly recognized in the literature and serves as a suitable beginning point for discussion. He points out that book selection in academic libraries has been a neglected topic in the literature in the United States, especially when compared to book selection in public libraries. He uses a hierarchy to illustrate the relationship between "collection development," "selection," and "acquisition," and defines collection development as follows:

"Collection development is a planning function. A collection development plan or policy describes the short- and long-term goals of the library as far as the collections are concerned, taking them into account and correlating them with the environmental aspects such as audience demand, need, and expectation, the information world, fiscal plans, and the history of the collections. From the collection development plan flows the budget allocation in broad terms." (Edelman, 1979, p. 34).

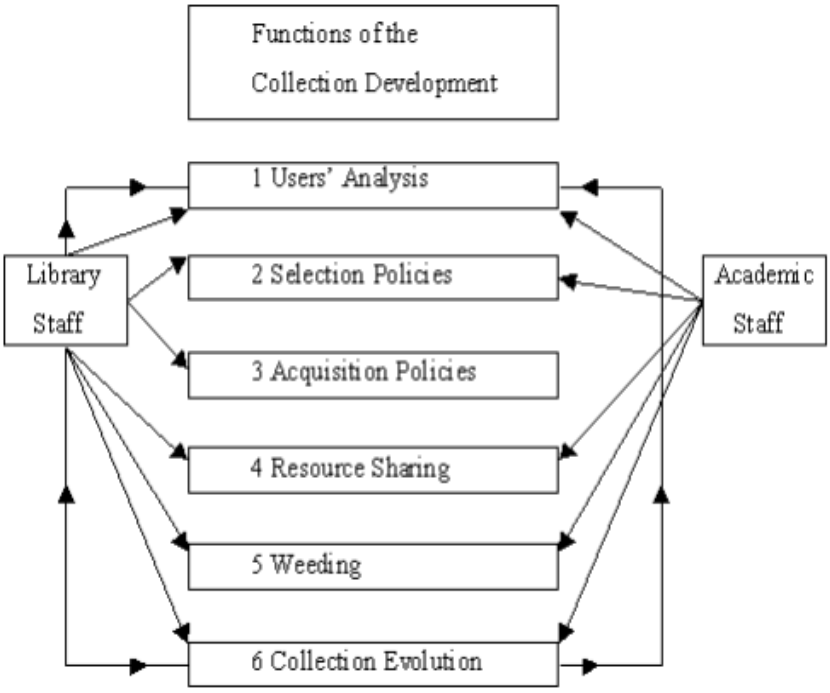
According to Edelman (1979), selection is the next step, which enacts the collection development goals using pre-determined criteria and techniques; acquisition then enacts the selection judgments and gets the content into the library. He also points out that the three levels interact and may overlap organically. Gorman and Howes' (1989) offers a similar straightforward and logical view, complementing Edelman's (1979) triad by defining the link in terms of the questions each process is meant to solve.

"In the hierarchy of [collection development] policy-'selection' and 'acquisition', three questions are asked and answered in a sequence: why? what? how?" (Gorman and Howes, 1989, p. 28).

Table 1 summarizes this first understanding of the topic, combining the arguments of Edelman (1979) and Gorman and Howes (1989) and tying them to strategic thinking levels.

Collection process	*Relevant question*	*Management level*
Collection development	Why?	Strategy
Selection	What?	Tactics
Acquisition	How?	Operations

Fig. 32 Collection Development Hierarchy
Source: Sheila Corrall (2015).



Source: Sanjay Patel Collection development in academic libraries

3.1 Collection Development in the Digital Age

Recognising that information can be accessible through numerous networks, the impact of collection of books has reduced in the context of new breakthroughs in information technology. In today's electronic information world, the emphasis is on establishing quality collections rather than massive collections, as well as developing effective methods of accessing remote databases. The definition of collection development has evolved, and we may need to look for a new description of the librarian's job. We've gone from a time when we had a lot of money to a time when we have a little money but with a lot of demands on it. This has altered the focus of collection growth away from local collection building and toward more cooperative initiatives, as well as a greater emphasis on research and development. With this development, the collections in the digital library are stored in digital formats and can be accessed by computers. The digital content could be kept locally and accessed remotely across a network. A digital library, on the other hand, is a collection of documents in an organized electronic form that is accessible via the internet or CD-ROM databases.

In an academic library, as well as any other type of library, collection development is a necessary component. The steady building up, maintaining and sustaining digital collections is known as collection development in the digital world. It also contains e-journal and database subscriptions, as well as an archival facility. The goal of collection development is to make some e-journals, e-resources, e-conference proceedings, and databases more accessible (full-text and bibliographic databases) to the users on request basis within the campus of the university library. Michael Gorman (2000,) indicated that the word ‘collection' presents as a quadruple configuration that includes:

- The library's tangible assets (books, for example)
- The library's intangible (electronic) resources (CD ROMs, etc.) are owned and controlled locally.
- Other libraries' tangible objects are available to local patrons through union catalogues and interlibrary loan schemes.
- Remote intangible resources to which the library provides access but does not possess.

Base on the definitions above there are a lot of dichotomies such as local vs remote access; owned and not owned but accessible; physical and intangible are all part of the challenges posed in digital collection building. A task force established by the Association of Research Libraries discovered that its members have “expanded the traditional

understanding and definition of collections" (ARL, 2002, p. 8). Kempf, (2013) indicated that in the age of the "hybrid library," which houses both printed and digital resources under one (physical and virtual) roof, libraries must first design a cohesive service model that takes into account the media break. They have been put under a lot of pressure from both the demand and supply sides. On the one hand, users have freed themselves from the library and its position as information mediator through their information behavior. On the other hand, because to the Internet, the information and media market is dominated by fierce rivalry. Newcomers to the market, commercial information suppliers, search engine operators such as Google and others, and a globally running Internet bookshop such as Amazon are all continually generating new appealing offers. To stay up with this transition, libraries must make a modification, if not a paradigm shift, in their traditional service concept: they no longer function primarily in terms of collection or media, but rather on the basis of specific user demands, which they strive to meet to the best of their ability (Kempf, 2013).

3.2 Effects of E-publishing on Collection Development

The use of computer technology in publishing or distributing information is referred to as electronic publishing. Electronic publishing (e-publishing) has a wide range of effects on library collections, services, and administration. The issues of managing the collection, archiving, and access to e-publications, as well as their application in library services, have no simple solutions.

Working together within a National Framework (Department of Education and Science, 1982), In the United States, a LISC FD2 report, is highly impactful as one of the first exhaustive attempts to articulate a strategy that would enabling libraries and information centres to fulfill their respective mandate in the face of severe financial constraints and an abundance of information resources. The report came to the following conclusion:

"Libraries and information services should move more purposefully from a mainly 'holdings' strategy requiring the accumulation of large stocks towards a mainly 'access' strategy in which emphasis is placed on the efficient procurement of material and information as required... Emphasis needs to be placed on obtaining, from whatever source, quick and accurate answers to today's questions, using printed, electronic or other media or personal contacts

as circumstances demand" (Department of Education and Science, 1982: p. 25).

FD2 anticipates that the development of databases combining bibliographic citations with the full text of articles, as well as electronically-mediated document delivery services, will facilitate a rebalancing between the library's traditional storehouse role and its newer "gateway" role. Rising cost of electronic information resources and insufficient library funding are identified as important causes in the case studies from the universities of Arizona, Aston, and East Anglia, with technology serving as a critical enabler of the access options discussed (Roll& Bernhardt2019).

The following are some of the issues that libraries and their users face when it comes to managing e-publications:

- Providing access that is compatible with both librarians' and users' technological capabilities.
- Providing access to commercial e-publications that satisfy their economic motivation.
- Collection development that necessitates an understanding of electronic distribution systems as well as e-publication subject content.

The following are some of the benefits to libraries and their customers in resolving these issues and implementing the solutions in delivering library services:

i- More people have access to a larger number of publications than particular libraries can buy and store.
ii- Because libraries can share central storage and retrieval facilities, collection development and cooperative collecting are made easier.
iii- The relative simplicity of duplication and archiving of electronic publications make preservation easier.
iv- There are also fantastic chances for libraries to perform their own e-publishing using Internet services like e-mail and the World Wide Web.

Electronic publishing's main products are reference materials, secondary sources like abstracting and indexing, and primary periodicals like full-text electronic journals, which are gradually displacing print on-paper sources.

3.3 Challenges in electronic collection Development

There are numerous challenges besetting collection development in the digital age. Some of the challenges are listed as follows:

1- Complicated procurement and preservation system: in most developing countries there are just a few dependable digital information suppliers. There is also a challenge in locating thorough and up-to-date selection tools. There is also a difficulty with today's hardware and tools, which may cease to function in a decade as technology continues to evolve rapidly. As a result, when analyzing the preservation or maintenance system, we must consider the limits that we may face in the future.

2- Technological obsolesce: because of the continual evolution of computer technology, the technology required for the digital library collection must be updated or migrated on a regular basis. Migration aids in the preservation of digital items' integrity and ensures that clients can continue to utilize them in the future. For the digital information to last a long time, it must be upgraded on a regular basis.

3- Financial constraints: The financial implication or cost of maintaining a digital information resources and services is quite highly prohibitive. The finances granted to libraries are very small and dwindling especially in the face of increasing merging in term of currency value in developing countries and its corresponding exchange rate with foreign currency, causing libraries to have difficulty upgrading their digital collections, and the quality of their collections is deteriorating day by day.

4- Decentralization of library services: Due to the changing nature of digital information resources and services librarians and information professionals are concerned that, as a result of the digitization of information resources and library services, may likely lose their relevance among readers, as all information about library resources and services will be available right at the reader's desk. Even though that assertion has been dispelled by extant literature, yet a lot of librarians and information providers still hold the opinions.

5- Access issues: Not everyone has access to all of the materials or resources available on the internet since they may require specific programs, software, or licenses to download, which are not always economical. This used to be a major impediment to the growth of digital collections.

6- Security in the library setting: Computer attacks by viruses,

spyware, malwares, sperm ware and Trojan horses are on the rise in the computer working environment, causing librarians a lot of grief. Antivirus and associated security software's must be installed and updated on a regular basis by librarians in order for it to perform properly. If not updated at regular intervals, the entire database of information stored could become corrupt in a fraction of a second; piracy must also be addressed. These issues have been partially alleviated as a result of the intellectual property rights (IPR) act and trade-related components of the IPR act, which has provided some relief to producers of digital data and resources at the international level.

7- The lack of a national or federated digital resource repository and legislative provisions in this area: In Nigeria, there are no designated venues for electronic publications by the National government, and there is no facility for depositing electronic and optical publications at a national center. Although Nigerian and Research Education Network (NgREN) had made an attempt through the National Universities Commission the noble idea has not been implemented.

8- Problems with verifying the reliability and validity of digital data include: The large pool of information available on the internet is useless due to lack of proper authentication mechanism, and it is quite difficult to locate data that is correct and thoughtfully organized, as well as having vital virtues in the transmission of an assertion. So we have to hear news that contradict or condemn earlier impregnations from time to time, and we also have to be highly judgmental in determining the veracity and validity of digital data.

4.0 CONCLUSION

This unit discussed the concept of collection development which refers to the process of identifying and acquisition of information resources into the library; the information resources may include both print and electronic. It is evident that the information and communication technology has had a significant impact on collection development where time and geographical location of information resources are no longer an issue as far as collection development is concerned. Due to this development, the use of computer technology in publishing or distributing information is gaining considerable traction and is referred to as electronic publishing. Electronic publishing (e-publishing) has a wide range of effects on library collections, services, and administration. Despite the development witnessed in collection development yet there are a lot of challenges bedeviling collection development which include financial issues, technological obsolesce,

issues relating to access and decentralization of publishing process.

5.0 SUMMARY

The unit is summarized as follows:

- ❖ Collection development is defined as "the process of planning stock acquisition programme not simply to cater for immediate needs but to build a coherent and reliable collection over a number of years, to meet the objectives of the services,"
- ❖ Due to the nature of digital collection where information can be accessible through numerous networks, the impact of print collection has reduced in the context of new breakthroughs in information technology. In today's electronic information world, the emphasis is on establishing quality collections rather than massive collections, as well as developing effective methods of accessing remote databases.
- ❖ Looking at the effects of e-publishing on collection development, the publishing landscape has greatly been affected as a result of use of computer technology in publishing or distributing information which is referred to as electronic publishing. Electronic publishing (e-publishing) has a wide range of effects on library collections, services, and administration. The issues of managing the collection, archiving, and access to e-publications, as well as their application in library services, have no simple solutions.
- ❖ On the challenges affecting the collection development, complicated procurement and preservation system, technological obsolesce, financial constraints, access issues, lack of a national or federated digital resource repository and legislative provisions in the area of digital publishing among other factors constitute the challenges affecting electronic collection development.

SELF-ASSESSMENT

d) Define the term collection development

It is meant to build an appropriate collection that meets library users' information demands and entails strong sustenance and obligation from the parent institution managerial system in terms of funding and stakeholders' involvement in the collection development processes.

e) Discuss the effects of E-publishing on Collection Development

The use of computer technology in publishing or distributing information is referred to as electronic publishing. Electronic publishing (e-publishing) has a wide range of effects on library collections, services, and administration. The issues of managing the collection, archiving, and access to e-publications, as well as their application in library services, have no simple solutions. According to Ogbonna et al., (2014) efforts in automation and E-publishing have been made at ensuring that library collection consists of both electronic and paper-based resources that are easily accessed and meet the demand of library users.

6.0 TUTOR-MARKED ASSIGNMENT

1- Discuss collection development in the digital age
2- Identify challenges affecting collection development in the 21st century library operations

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UNIT 5 DIGITAL PUBLISHING AND DIGITAL SECURITY

CONTENTS

1.0 INTRODUCTION

National reading habits and reading environments are changing so rapidly, as digital publishing technologies and Internet apps continue to grow at an incessant rate. As a result of this development, the global digital publishing industry is entering a period of rapid growth. The output value of the digital publishing industry has increased rapidly, owing to the rapid growth of the economy, the advancement and popularization of Internet technology, and the application of mobile communication technology, as well as clear changes in national reading habits and environments. As these changes continue to evolve over time, publishing has become an important business for national development since it has an educational foundation, allowing it to have a substantial and flexible impact on growth. The significance of the publishing business to education and national development is based on the fact that, in the past, there were three primary sources of production that were considered as factors of production: land, labour, and capital. Therefore, this unit discusses digital publishing, evolution of e-publishing, digital publishing in Nigeria, advantages of digital publishing and challenge of digital publishing in Nigeria

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define of digital publishing
- highlight the evolution of e-publishing
- discuss digital publishing in Nigeria
- discuss the advantages of digital publishing
- discuss the challenge affecting digital publishing in Nigeria.

3.0 MAIN CONTENT

3.1 Definition of Digital Publishing

The term "Digital Publishing" has been defined in various ways due to its broad nature and scope. For instance, electronic publishing encompasses all types of electronic author aids, ranging from simple word processing to actual typesetting and mark-up tools (Tawakalit & Bolu, 2020), as well as networking support for collaborative authorship and electronic communication among authors, editors, referees, and other participants in the publishing process. However, because “publishing” involves both production and dissemination, the term most clearly relates to the creation of publications in electronic form or with the help of technology. Digital publishing has resulted in rapid publication of research results and author integration; makes more efficient and marketing process; more convenient presentation of information with new forms of presentation, such as novel ways of presenting research results and other forms of data and information.

The use of digital technology to replace written material so that it can be disseminated and accessed through electronic devices." According to Ziyue, Yongjian, and Digital Publishing is a very broad concept, which refers to the binary digital technology in publishing activities related to copyright, faxing, payment platform and specific service mode, which not only refers to direct online editing and publishing content, also refers to the traditional print version of the digital stuff, or the traditional things on the web called digital publishing. Electronic publication will thus include "electronic bulletin boards, online newspapers, books, email, electronic journals, real-time downloadable information services, software, and even long-distance conferencing".

"E-publishing refers more precisely to the storage and retrieval of information through electronic communications media. It can employ a variety of formats and technologies, some already in widespread use by businesses and general consumers and dissemination via internet. It has encouraged more and more self-publication through individual web sites, through institutional information providers, and through subject oriented preprint servers. Electronic publishing is increasingly popular in works of fiction as well as with scientific articles. Electronic Publishing can be represented as a digital form- Electronic Publishing = Web Technology + Computer + Communication Technology. Others still being developed" (Electronic Encyclopedia, 2019).

Noteworthy is the fact that digital publishing also includes the use of CDROM and other forms of cloud technologies as a means of electronic transfer. Because of the nature and scope of the WWW and the Internet, the primary mode of electronic delivery is on digital platforms.

3.3 Evolution of Book Publishing In Nigeria

The history of book publishing in Nigeria could be traced to the Presbyterian mission's installation of the first press in Nigeria in Calabar in 1846. The quest to spread Christianity lead to the spread of non-secular publications by offering books to potential believers. In 1959, Henry Townsend established another press in Abeokuta, which finally produced Nigeria's first newspaper, IweIrohin Fun AwonAraEgbaAti Yoruba (Adelekan, 1995). In the hands of colonialists, the missionary press was also utilized deftly as a vehicle for political dissemination. Not long after, famous Nigerians such as Herbert Macauley founded the first indigenous newspaper, the Lagos Daily News, in 1926, the same year the Daily Times debuted (Ojeniyi, 2002). Oxford University Press (OUP) established a sales branch in Nigeria in 1949, attracting several western publishing firms such as Macmillian, Longman, and others. The first book published in Nigeria by a foreign firm was Ijala Ere Ode, a Yoruba poetry genre by Yemitan, in 1963 by the local division of OUP. Aside from international firms, several more home-based publishing businesses came up by local entrepreneurs. Fourth Dimension, Aromolaran, Ilesanmi, Literame, and a slew of others were among them. It is worth noting that book publishing has continued to develop rapidly in Nigeria (Adegoke, 2001).

3.3 History of Digital Publishing in Nigeria

Traditional publishing, which used to be the means of communication among academics, no longer provides the essential facilities for scientists' works to be available to the rising number of masses who seek faster, simpler, and cheaper access to scientific information. This unique need coupled with the fast-changing knowledge corpus, calls for the modernization of publishing industries to conform to contemporary realities. This development has brought a move toward digital publication, allowing writers to post their work on the internet, which is accessible to the vast majority of science communities worldwide.

In this narrower meaning, electronic publishing evolved progressively over three decades of active activities. In this mode of publishing, computers are employed to create traditional digital copies of diverse information resources. This trajectory of trends in digital publishing could be traced as far back as early 1960s (e.g., the production of Index Medicus at the National Library of Medicine).

In the 1970s, computers were employed to aid in the publishing of abstracting and indexing services. For the last four decades, it has progressed in tandem with technological advancement. Databases originally appeared online in the late 1960s, and Dialog was the first commercial online service in 1972. (Lancaster, 1995). The creation and remote accessibility of online bibliographic databases are considered a watershed moment in electronic publishing. The scope of publication has extended from conventional to electronic publishing with the introduction of digital information systems and the Internet. The digital revolution that touched the entire globe has had much impact on Africa as well. Therefore, African nations have joined this wave of technological development and transformation. Nigeria, Africa's colossus, became entangled in this web of technological development.

A wide range of books and journals are published in Nigeria, including trade books, professional books, instructional books, reference books, religious books, and mass-market paperbacks, to mention a few. Nigerian publishers have had to keep up with new trends in the industry through the acquisition and use of current technology and skills and deploy them to meet international standards, to meet market demands and stay relevant and in tune with international standards and trends in the global publishing industry. Today, Direct Image (DI) is one of the most rapidly evolving technologies in Nigeria's printing and publishing sector. It entails using "print engines" that work straight from data files

with "a re-imageable master." Planet Press Lagos brought this technique to Nigeria in 2001. According to Clem and Link (2005), the digital press is more cost-effective for short-run printing since it requires less set-up for production than traditional printing processes.

The creation of audiobooks and e-books is another element of publishing in Nigeria where technology has transformed the dynamics (Ubogu, 2018). Audiobooks are accessible in Nigeria, according to Ubogu (2018), and are popular among the visually impaired, drivers, and those who exercise. Audiobooks are also significant advancement in the publishing industry, involving sound recording in the process. It is also known as books on tape, talking books, or computerized voices that read shortened versions of popular novels that readers listen to on the radio. Electronic books or e-books are good examples. E-books are digital books that readers read on a computer by accessing them on a website. Some e-books can be downloaded and accessed through portable reading devices or cell phones.

The publishing business in Nigeria is undergoing a digital transformation. In Nigeria, the influence of digital publishing is felt, albeit not to the extent that it is in richer nations. Abegunde (2003) examined recent advances in Nigeria's publishing industry and concluded that the use of computers for pre-press activities is merely the first step toward a digital future. In the author's words, "computerization of pre-press has transformed word processing, layout and integration of pictures and text, colour separation and halftone photos, page assembly, plate manufacturing, and imposition". begunde (2003) looked at recent developments in Nigeria's publishing sector and concluded that using computers for pre-press operations is just the beginning of a digital future. "In the words of the author," "Pre-press computerization has revolutionized word processing, layout and integration of pictures and text, color separation and halftone photographs, page assembly, plate production, and imposition," according to the author, the trajectory is as follows:

a. Previous/past : Wooden and metal form preparation
b. Present : Linotype, monotype, photocom posing, proofing paste up, camera work (filming), stripping, retouching and platting
c. Current : Desktop publishing (computer), camera work (filming), platting
d. Most Current : Digital imaging, colour correction, separation, colour manipulation and computer to plate (no film)

To this aim, the book publishing process is evolving internationally; technology has altered its operations, and the ramifications may be seen

all over the world. That is why the conventional process of book publishing has evolved. In the developed world, modern equipment makes book manufacturing easier and faster. The Nigerian publishing business is plagued by epileptic technology, and there is a pressing need for Nigerian publishing enterprises to acquire contemporary technology in order to keep up with the worldwide trend (Awoniyi, 1997). It is not an exaggeration to state that the Nigerian publishing business is booming, with a rise in electronic publishing. As a result, there is a push to stay up.

Advantages of Digital Publishing

The relevance of digital publishing cannot be over-emphasized in the present and future because the effects of technology on the publishing business has potential benefits. Higher peer engagement, increased interaction, quicker review, faster navigational design, reduced long-term production costs, and faster access to information resources. An academic journal published online may have numerous benefits over one published on paper. Some of the benefits of digital publishing are as follows:

1. faster publication of research findings due to electronic article submissions, network communication among authors, editors, and referees, and the fact that approved contributions can be uploaded to a database rather being kept to construct the next "issue."
2. More effective information distribution by connecting freshly accepted articles into databases with the interests of future readers.
3. Innovative approaches to displaying study findings and various types of data and information-analog models, motion, music, hypertext, and hypermedia connections (including linkages among journals and other electronic resources).
4. The ability to link reader comments and ratings to published papers facilitates public peer review.
5. Lower cost per successful article-to-reader match.
6. Because of the speed with which articles are published and the simplicity with which they are communicated, the journal becomes more interactive, with one contribution eliciting fast comments from other scholars.

3.6 Challenges of Publishing in Nigeria

There are a lot of challenges affecting publishing industry which are as follows:

Financial

Electronic publishing has changed the landscape in terms of production, duplication, distribution, and storage associated costs are demonstrably lower than those of paper type, and these cost-benefit analyses do not tell the entire story of electronic publishing. Increased print volume creates economies of scale, lowering the cost per unit for a given publication. This is true in the print sector, but it is much truer in electronic publishing. In the electronic publication, the cost of distribution does not grow proportionally to the size of the item published. A source of comfort for people considering electronic publication, although there are additional considerations to be made. We must understand that a publisher can only enjoy all of these benefits if they already have a team of electronic publishing specialists who are fully equipped with advanced automated markup software and the high-end gear required for effective electronic production of data and content. In the electronic publication, the cost of the distribution does not grow proportionally to the size of the item published. A source of comfort for people considering electronic publication, although there are additional considerations to be made. Not to mention that the data must be labelled using SGML or HTML in order to be accessible across all systems (if Internet publishing is the idea). Furthermore, if full multimedia capabilities are desired, the inclusion of Javascript and the usage of Shockwave become necessary, which often doubles the effort of print-based publishing. Aside from that, there will be difficulties with computer expenses, salaries, and other indirect expenditures to deal with.

In addition to production and distribution costs, in a rapidly evolving sector like electronic publishing, there is a constant need for research and development as well as equipment. Those who wish to thrive in the electronic world must be able to evaluate the viability of various software and hardware platforms, build prototypes, and test all of their competitors' products, and they will require ever more complex equipment to do so which is capital intensive.

Pricing

Electronic publishing, unlike paper type, currently lacks a widely recognized price pattern. This is due to a persistent issue for electronic product publishers: digital products have an intrinsic propensity to jeopardize income from their paper counterparts that are running concurrently, for the reasons stated above. This is prevalent throughout any transitional period in which both paper and electronic items are produced, adding a considerable amount to the cost base. Many will attempt to recoup this loss of income from the newer electronic product by charging a premium for online access to the printed publication or adding 5% to the membership fee of the online edition, with little regard for the market expectation on pricing. It appears that the market expects digital technology to be inexpensive and efficient, thus cheaper digital products will inevitably follow, providing greater access to a larger range of data for the same or less money. The availability of free information on the Internet complicates matters even more. When it comes to this, it is a balancing act that everyone must learn via experience and by taking into account the many influencing elements, such as market response.

Online Subscription

With the same old mailing system as the mechanism for dispatch, subscription is never an issue for a paper product. Things became more difficult with the electronic version since the publisher may be more selective in the types of information resources preferred or chosen. with the availability of full-text direct search tools, a client can usually select only the specific articles or information they require (whereas paper journals, in the interests of balance issues, tend to include something of interest to the entire constituency, resulting in few readers reading the entirety of an issue's contents, relevant themes aside) or fields of information to give to their clientele. This, however, creates a new issue since anything that can be seen on a computer screen can be simply copied on a hard disk. As a result, the full text of the article cannot be viewed. What may be done is to create a teaser site where only a portion of a journal's information is provided, which is generally the abstract of each article.

Copyright

Because of the freedom we have on the Internet and its lack of structure, most publishers will have a tough time assuring authors that when they publish electronically online, they will receive proper acknowledgement

and citation. It must be stated that copyright constitutes an impediment to publishers seeking mass-market for their books. Although publishing a journal (maybe quarterly) on a proprietary CD-ROM will reduce the problem, we cannot guarantee that it will be free of illegal copying because the technology to replicate a CD-ROM is getting cheaper and more prevalent by the day. Piracy has become an institution in the Nigerian publishing sector because pirates are copying copiously digital copies of information resources for their gains. It is reducing the profit margins of publishers. There are several claims of book vendors colluding in pirating bestselling titles at exorbitant costs. (Tiamiyu, 2005). As a result, publisher stocks are down, while pirates benefit from patronage. Regrettably, the government and regulatory bodies such as the Nigerian Copyright Commission, the Book Publishers Association of Nigeria, and others are yet to find a long-term solution to the vexing.

Poor ICT infrastructure and Digital Divide

According to Walsham (2000), the developed countries have dominated the production, development, and transfer of information technology, and their interest in the use of IT/S in developing countries has often been motivated by the profitability of their businesses rather than any larger goals for the development of the receiving countries. As a result, developing nations have the choice of either becoming an important part of the knowledge-based global civilization or risk falling on the wrong side of the digital divide. However, according to the STC (2004) the developing world's low ICT levels in comparison to the West are not an argument against digital journals; rather, they emphasize the need for greater ICT capacity development to fully harness the promise of digital technology. According to Crispin Davis the transition to a digital-only environment would reduce access to scientific research since it is only available on the internet, and it would exclude more than half of scientists globally.

Bandwidth

Bandwidth availability in poor nations varies greatly but is typically quite low (international bandwidth in bits per capita is a new metric of internet use that illustrates how a country is advancing towards an information-based economy). If a high-bandwidth internet connection is not generally available in colleges, businesses, and individual residences, participation in open-access activities is severely constrained. As a result, access to the global network is, unsurprisingly, relatively limited in most poor nations.

4.0 CONCLUSION

Electronic publishing encompasses all types of electronic author aids, ranging from simple word processing to actual typesetting and mark-up tools (Pilachowski, 1993), as well as networking support for collaborative authorship and electronic communication among authors, editors, referees, and other participants in the publishing process. The history of book publishing in Nigeria could be to the Presbyterian mission's installation of the first press in Nigeria in Calabar in 1846. The quest to spread Christianity led to the spread of non-secular publications by offering books to potential believers. The history of digital publishing could be traced as far back as early 1960s (e.g., the production of Index Medicus at the National Library of Medicine). On advantages of benefits which include low cost effectiveness, efficiency and speed. Despite the advantages of digital publishing, there are a lot of challenges affecting publishing industry which include, financial, pricing, online subscription, copyright, poor ICT infrastructure and digital divide, bandwidth.

5.0 SUMMARY

The unit is summarized as follows:

- The term "electronic publishing" has been defined in various ways due to its nature and scope. For instance, electronic publishing encompasses all types of electronic author aids, ranging from simple word processing to actual typesetting and mark-up tools, as well as networking support for collaborative authorship and electronic communication among authors, editors, referees, and other participants in the publishing process.

- The history of book publishing in Nigeria could be to the Presbyterian mission's installation of the first press in Nigeria in Calabar in 1846. The quest to spread Christianity led to the spread of non-secular publications by offering books to potential believers. In 1959, Henry Townsend established another press in Abeokuta, which finally produced Nigeria's first newspaper, IweIrohin Fun AwonAraEgbaAti Yoruba (Adelekan, 1995).In the hands of colonialists, the missionary press was also utilized deftly as a vehicle for political dissemination. Not long after, famous Nigerians such as Herbert Macaulay founded the first indigenous newspaper, the Lagos Daily News, in 1926, the same year the Daily Times debuted (Ojeniyi, 2002).

- The history of digital publishing could be traced as far back as early 1960s (e.g., the production of Index Medicus at the National Library of Medicine). Traditional publishing, which used to be the means of communication among academics, no longer provides the essential facilities for scientists' works to be available to the rising number of masses who seek faster, simpler, and cheaper access to scientific information.

- In the 1970s, computers were employed to aid in the publishing of abstracting and indexing services. For the last four decades, it has progressed in tandem with technological advancement. Databases originally appeared online in the late 1960s, and Dialog was the first commercial online service in 1972. (Lancaster, 1995). The creation and remote accessibility of online bibliographic databases are considered a watershed moment in electronic publishing.
- On advantages of digital publishing **we discussed** numerous benefits that are attached to digital publishing which are as follows:

1. faster publication of research findings due to electronic article submissions, network communication among authors, editors, and referees, and the fact that approved contributions can be uploaded to a database rather being kept to construct the next "issue.
2. More effective information distribution by connecting freshly accepted articles into databases with the interests of future readers.
3. Innovative approaches to displaying study findings and various types of data and information-analog models, motion, music, hypertext, and hypermedia connections (including linkages among journals and other electronic resources).
4. The ability to link reader comments and ratings to published papers facilitates public peer review.
5. Lower cost per successful article-to-reader match.
6. Because of the speed with which articles are published and the simplicity with which they are communicated, the journal becomes more interactive, with one contribution eliciting fast comments from other scholars.

- There are a lot of challenges affecting publishing industry which include, financial, pricing, online subscription, copyright, poor ICT infrastructure and digital divide, bandwidth.

SELF-ASSESSMENT

a) Define Digital Publishing

Digital publishing is defined as the use of computer and other forms of electronic tools by the authors and publishers, ranging from simple word processing to creating, publishing, and selling printed materials in a soft rather than a hard format.

b) Highlight the advantages of digital publishing

The following are some of the advantages of digital publishing:

1. faster publication of research findings due to electronic article submissions, network communication among authors, editors, and referees, and the fact that approved contributions can be uploaded to a database rather being kept to constitute the next "issue."

2. More effective information distribution by connecting freshly accepted articles into databases with the interests of future readers.
3. Innovative approaches to displaying study findings and various types of data and information-analog models, motion, music, hypertext, and hypermedia connections (including linkages among journals and other electronic resources).
4. The ability to link reader comments and ratings to published papers facilitates public peer review.
5. Lower cost per successful article-to-reader match.
6. Because of the speed with which articles are published and the simplicity with which they are communicated, the journal becomes more interactive, with one contribution eliciting fast comments from other scholars.

7.0 TUTOR-MARKED ASSIGNMENT

- Trace the evolution of E- Publishing
- Discuss digital publishing in Nigeria
- Identify the challenge of Digital Publishing in Nigeria

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UNIT 6 DIGITAL SECURITY

CONTENTS

1.0 INTRODUCTION

We live in an era where much of our personal and professional lives are conducted online. In the digital age, we handle our banking, music purchasing, bill payments, social planning, and even aspects of our jobs. This growing reliance on the Internet and digital networks come with hazards in addition to benefits. Online crooks, hackers, and even bored miscreants lurk in the shadows, ready to loot, defraud, steal your identity, or simply embarrass you. As a result, digital information security is of the utmost importance. Therefore, this unit discusses the concept of information security, meaning of computer security, types of cybercrimes in developing countries, cybercrime prevention tips and challenges of information security in developing countries.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define information security
- give meaning of computer security
- types of cybercrimes in developing countries
- discuss cyber-crime prevention tips
- identify challenges of information security in developing countries.

3.0 MAIN CONTENT

3.1 Concept of Information Security

In this digital era, information security is becoming increasingly important for all sectors in developing nations, including government parastatals, financial institutions, companies, and corporate organizations, as well as libraries and information centres. According to Mellado and Rosado (2012), the "permanent and global character of security threats, as well as the rising complexity of IT infrastructures, are now forcing companies worldwide to update their approaches to information security." Most businesses fully realize the need to continually enhance their internal security culture by developing and maintaining effective security governance processes"

Information security is the safeguarding of intellectual property, data or information from illegal access. In this line, information security can be seen as "the activity of preventing unwanted access, use, disclosure, disruption, alteration, inspection, recording, or destruction of information, frequently abbreviated to InfoSec." Therefore, information security can be defined as "the set of technology, standards, policies, and management practices that are applied to information to keep it secure." According to Fakeh, Zulhemay, Shahibi, Ali, and Zaini (2012), "the expansion of computers and multi-processing computer systems has resulted in numerous additional security mechanisms". Furthermore, "the majority of information about security concerns is based on physical devices." The gadgets are used to ensure the three primary components of information security. They are confidentiality, honesty, and accessibility.

3.2 The meaning of computer security

In recent years, the definition of computer security has changed. Prior to the widespread media coverage of the subject of data security, most people's understanding of computer security was limited to physical equipment. Computer facilities have traditionally been physically secured for three reasons:

- To keep hardware from being stolen or damaged
- To keep information from being stolen or damaged
- To avoid service disruption.

Computer security refers to the protection of computing equipment like computers and smartphones, as well as computer networks like private and public networks, which include the entire Internet. The field encompasses all of the procedures and methods that secure digital equipment, information, and services against illegal access, alteration, or destruction, and is becoming increasingly important. It embraces unintentional or illegal access, alteration, or destruction, and is becoming increasingly important in response to most societies' increasing reliance on computer systems. Physical security is used to prevent equipment theft, while information security is used to safeguard the data stored on that equipment. It is sometimes known as "cyber security" or "IT security," however these phrases do not always apply to physical security (locks and such). The following are some key terminologies in computer security:

Vulnerability

A vulnerability is a flaw in a system that allows an adversary to compromise its information assurance. A system's susceptibility or weakness, an attacker's access to the fault, and an attacker's ability to exploit the flaw are all aspects of vulnerability. An attacker must have at least one suitable tool or method that could connect to a system flaw to exploit the vulnerability. In this context, vulnerability is mostly referred to as the attack surface. Vulnerability management is the iterative process of detecting, categorizing, remediating, and managing vulnerabilities. In general, this technique pertains to software vulnerabilities in computer systems.

Backdoors

A backdoor in a computer system is a way to avoid detection while circumventing conventional authentication, securing remote access to a computer, acquiring plain text, and so on. The backdoor might be a pre-installed software (such as Back Orifice) or a modification to an existing program or hardware device. It is also possible that it will falsify facts concerning disk and memory use.

Denial-of-service attack

Denial of service attacks, unlike other exploits, do not attempt to obtain unauthorized access or control of a system. Instead, they are made to render it useless. Attackers can restrict service to specific victims, such as by repeatedly inputting incorrect passwords until the victim's account is locked, or they can over burden a machine's or network's capacity and cause it to block the user account. These sorts of attacks are extremely

difficult to avoid since it affect the entire networks, rather than just tiny parts of code. DDoS assaults are widespread, in which a significant number of compromised hosts (often referred to as "zombie computers") are utilized as a part of a botnet with, for example, a worm, Trojan horse, or backdoor exploited.

Direct-access attacks

Any unauthorized person who gains physical access to a computer (or a portion of one) can conduct a variety of tasks and install various sorts of security devices, such as operating system changes, software worms, key loggers, and covert listening devices. Large amounts of data may also be readily downloaded onto backup media such as CD-R/DVD-R, tape, or portable devices. The attacker may also quickly transfer huge amounts of data onto backup media, such as CD-R/DVD-R, tape, or portable devices like key drives, digital cameras, or digital audio players. Another typical method is to use a CD-ROM or other bootable media to boot an operating system and read data from the hard drive(s). Only by encrypting the storage media and keeping the key separate from the system can this be avoided. In most situations, direct-access assaults are the sole threat to stand-alone computers (those that are never connected to the internet).

Eavesdropping

Eavesdropping is the act of listening to a private communication, usually between hosts on a network, without being detected. The FBI and NSA, for example, have utilized technologies like Carnivore and NarusInsight to spy on internet service provider networks.

Spoofing

Spoofing of user identity refers to a scenario in which one person or software effectively impersonates another by misrepresenting data and getting an unfair advantage.

Tampering

Tampering is defined as the deliberate alteration of items in such a manner that they become hazardous to consumers.

Repudiation

The term "repudiation" refers to a scenario in which the validity of a signature is called into question.

Information disclosure

The term "information disclosure" (also known as "privacy breach" or "data leak") refers to a circumstance in which information that was previously considered to be safe is disclosed in an untrustworthy environment.

Elevation of privilege

The term "repudiation" refers to a scenario in which the validity of a signature is called into question.

Exploits

An exploit is a piece of software, a chunk of data, or a series of commands that exploita software "bug" or "glitch" to induce unwanted or unexpected behaviour on computer software, hardware, or other electronic devices (usually computerized). This usually entails obtaining control of a computer system, allowing privilege escalation, or launching a denial of service attack. The word "exploit" typically refers to tiny programs designed to exploit a found software weakness, whether remote or local. The exploited program's code is commonly reused in Trojan horses and computer viruses.

Indirect attacks

A third-party computer is used to launch an indirect assault. It is far more difficult to track down the real attacker when they use someone else's computer to start an assault. There have also been instances when attackers used public anonymizing tools like the Tor onion router system.
Computer crime: Computer crime refers to any crime that involves a computer and a network.

3.3 Types of cybercrimes in developing countries

Cybercrimes that are frequently practised in developing countries include:

E-mail scam: This type of fraud is becoming common in Nigeria. Individuals from all around the world are the target. These fraudsters ask for money using the names of well-known pastors, individuals,

institutions, or organizations in the country. In order to lure their victims, they also utilize GSM to send misleading text messages.

Cyber hacking: This relates to gaining illegal access to online accounts, computers, or technology such as websites or networks by the manipulation of a code to crack. This is an egregious violation of privacy. Hackers get access to sensitive information by breaking into and defacing websites (personal, institutional, or corporate). In some instances, they create fake websites and utilize them to scam others while impersonating the hacked individual.

Cyber stalking: Cyber stalkers stalk or harass their victims by using the Internet, e-mail, and other forms of electronic contact. Cyber stalking is a type of threat or harassment in which the perpetrator uses communication equipment to track down, harass, or threaten their targets.

Computer vandalism: Computer vandalism is the act of an intruder deleting vital information from a computer system, depriving the owner of access to the information. The victim may suffer financial losses as a result of this.

ATM fraud: An automated teller machine (ATM) is a cash dispensing machine that allows customers to withdraw cash, buy airtime, transfer cash, deposit money, or check account balances inside or outside of a bank. ATM fraud is on the rise. According to Muhammad (2009), as quoted by Jegede (2014), "the degree of ATM fraud tends to have eclipsed the advances which it has brought into the service delivery systems of Nigerian financial institutions."

3.4 Cyber Crime Prevention Tips

1. **Make Use of Strong Passwords:** Use distinct user IDs and passwords for each account and avoid writing them down. Make passwords more difficult to remember by mixing letters, numbers, and special characters (minimum of 10 characters overall) and changing them on a regular basis.

2. **Secure your computer**

- **Turn on your firewall.** Firewalls are the first line of cyber defense; they prevent connections to unfamiliar or fraudulent sites and keep some viruses and hackers out.

- **Use anti-virus and anti-malware software.** Install and frequently update anti-virus software to keep viruses from invading your computer.
- **Stop spyware assaults.** Install and update anti-spyware software to keep malware from infecting your computer.

3. **Be Socially Astute:** Check that your social networking profiles (e.g., Facebook, Twitter, YouTube, MSN, and so on) are set to private. Examine your security settings. Be cautious with the information you share on the internet. Once it is on the Internet, it is there to stay!
4. **Secure your Mobile Devices** You should be aware that your mobile device is susceptible to viruses and hackers. Download programs only from reputable sources.
5. **Install the most recent operating-system updates.** Keep your apps and operating system (e.g., Windows, Mac, and Linux) up-to-date by installing the most recent system updates. To protect against potential attacks on outdated software, enable automatic upgrades.

6. **Protect your Data:** Use encryption for your most sensitive files such as tax returns or financial records, make regular back-ups of all your important data, and store it in another location.
7. **Secure your wireless network:** Unsecured Wi-Fi (wireless) networks at home are vulnerable to infiltration. Examine and change the default settings. Public Wi-Fi, commonly known as "Hot Spots," is equally susceptible. Avoid using these networks for financial or business operations.

8. **Protect your e-identity:** When providing personal information such as your name, address, phone number, or financial information via the Internet, use caution. Check that websites are safe (for example, while making online transactions) or that privacy settings are enabled (for example, when accessing/using social networking sites).
9. **Avoid being scammed:** Always think twice before clicking on a link or file from an unknown source. When in doubt, double-check the source. Never respond to emails asking you to validate your information or your user ID or password.
10. **Call the right person for help:** Do not be upset! If you are a victim, come across unlawful Internet content (such as child exploitation), or suspect a computer crime, identity theft, or a commercial fraud, contact your local authorities. If you require assistance with computer maintenance or software installation, contact your service provider or a qualified computer technician.

3.5 Challenges of information security in developing countries

Personnel, cost, and infrastructure are some of the issues that poor nations face when it comes to information security. In addition, a lack of understanding of fundamental sensitive information, which leads to improper management of papers, identification cards, ATM usage, and social gadgets, are threats to information security. Africa's information security issues, according to Awe (2013), are as follows:

1. **A significant challenge is a lack of understanding of what information security entails.**

The majority of individuals online are ignorant of the associated risks. It is strange, that people continue to fall victim to recharge card and "Bill Gates is giving away all his money" hoaxes.

2. **A lack of enthusiasm for study and training.**

Lack of comprehension is exacerbated by a lack of enthusiasm in security education. Security is a major concern, yet there is a low demand for security education.... reflects the environment's low degree of security awareness.

3. Governments' priorities are uncertain.

Despite the fact that numerous African countries have created security and ICT strategies, execution remains a significant problem. What do you mean, “Paper policies”? A clearer policy direction is required. And how tenable are such policies? How much has been spent in terms of time, education, staff, and so on?

4. **In Africa's e-business frameworks, there is a lack of confidence.**

The lack of emphasis on information security has stifled the growth of e-business in Africa

4.0 CONCLUSION

The expansion of computers and multi-processing computer systems have resulted in numerous additional security mechanism. In recent years, the definition of computer security has changed. Prior to the widespread media coverage of the subject of data security, most people's understanding of computer security was limited to physical equipment.

However, Physical security is used to prevent equipment theft, while information security is used to safeguard the data stored on that equipment. "Cyber security" sometime called "IT security," these phrases however do not always apply to physical security (locks and such). Computer facilities have traditionally been secured physically for three reasons; to keep the hardware from being stolen or damaged, to keep information from being stolen or damaged, to avoid service disruption. In this unit, type of cybercrimes in developing countries, challenges affecting information security, in African's e-business frameworks were discussed. Besides, agencies in charge of law enforcement, security, and intelligence have serious systemic gap. It is all about crime when it comes to information security. However, one key problem in the digital world is strengthening law enforcement. Information security necessitates not just ICT expertise, but also ICT-enabled intelligence.

5.0 SUMMARY

The unit is summarized as follows:

- Information security is “the set of technology, standards, policies, and management practices that are applied to information to keep it secure.”
- Computer security refers to the protection of computing equipment like computers and smartphones, as well as computer networks like private and public networks, which include the entire Internet. The field encompasses all of the procedures and methods that secure digital equipment, information, and services against illegal access, alteration, or destruction, and is becoming increasingly important. It embraces all of the procedures and methods that safeguard digital equipment, information, and services against unintentional or illegal access, alteration, or destruction, and is becoming increasingly important in response to most societies' increasing reliance on computer systems.
- The types of cybercrimes that are frequently practiced in developing countries they include: **E-mail scam,** where individuals from all around the world are targeted. These fraudsters ask for money using the names of well-known pastors, individuals, institutions, or organizations in the country. In order to lure their victims, they also utilize GSM to send misleading text messages. Also, there is **cyber hacking,** this relates to gaining illegal access to online accounts, computers, or technology such as websites or networks by the manipulation of a code to crack. This is an egregious violation of privacy. Hackers get access to sensitive information by breaking into and defacing websites

(personal, institutional, or corporate). In some instances, they create fake websites and utilize them to scam others while impersonating the hacked individual. Also, there are issues of cyber stalking, computer vandalism, ATM fraud.

- In order to prevent our system from attacks the use of distinct user IDs and passwords for each account, and most importantly avoid writing them down, also use of firewalls to prevent connections to unfamiliar or fraudulent sites and keep some viruses and hackers out, u**se** anti-virus and anti-malware software and installing the most recent operating-system updates among other.
- Personnel, cost, and infrastructure are some of the issues that poor nations face when it comes to information security. In addition, a lack of understanding of fundamental sensitive information, which leads to improper management of papers, identification cards, ATM usage, and social gadgets, is a threat to information security.

SELF-ASSESSMENT

a) Define Information Security

Information security can be define as "the set of technology, standards, policies, and management practices that are applied to information to keep it secure."

b) List any 5 types of cybercrimes in developing countries

i) Cyber hacking:
ii) Computer vandalism
ii) Cyber stalking
iii) ATM fraud:
iv) E-mail scam:

6.0 TUTOR-MARKED ASSIGNMENT

1- Define the concept of computer security
2- Discuss cyber-crime prevention tips
3- Identify challenges of information security in developing countries

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