ZARIA JOURNAL OF LIBRARIANSHIP

VOL. 5 NOS. 1 & 2 JANUARY/DECEMBER 2002

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JOURNAL OF AHMADU BELLO UNIVERSITY LIBRARY COMPLEX

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DIGITALIZED LIBRARY AND INFORMATION SYSTEMS AND SERVICES: AN OVERVIEW

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Abstract

The paper traces the historical development of library and information systems; from manual to automation, then to digitalization. The paper posits that, today, the convergence of Information and Technological revolutions has in effect turned libraries from "real" to "virtual" reality.

Having highlighted the characteristics, advantages and disadvantages of digitalized library and information systems, the paper concludes that, because digital information systems and services are not limited by size of resources, content, users, time and ownership, Nigerian libraries should embrace a digitalization policy

Introduction

The idea of digitalized library or electronic library which for many years ago sounded futuristic and utopian; something out of science fiction comics, is no longer a mere concept. It is now a reality not only in the developed world but in the developing countries as well.

Many scholars have stylistically defined the term in different ways, Muhammed (2003:2) has however summarized the various definitions and states that the term is conceived as an organized collection of documented information resources (text, numeric, images, statistics, sound, software, etc.) not limited by physical structure and printed format but also including electronically stored information and information resources accessed physically and remotely irrespective of the time and the location of the user and/or the information resources with the assistance of information and communication technologies.

Historical Development

The journey so far to this present stage of digitalized library and information system has been very eventful. The journey has spanned more than

three centuries. There was first, as noted by Getz (1997:81), the printed materials, then audio visual and the mechanization of the retrieval process, after which came the Information Technology (IT), Information and Communication Technologies (ICTs) and subsequent automation process, which has now resulted in the digitalization.

To provide a comprehensive survey of digitalized library and information systems and services, the topic is critically looked at from two broad perspectives. The first is the technology breakthrough and subsequent technological development. The second is the information revolution. It is evidently clear that it is the convergence of the above two developments that has given rise to the library of the future – the digitalized library.

The discovery of writing and paper, and the subsequent inventions of printing press and the rise of publishing in the 15th century brought radical changes to the world, especially, in terms of information, learning and knowledge. But the 17th century, printing shops and publishing houses had become numerous and the number of published books increased immeasurably. By this period formal schools had also taken firm root. People became much more conscious and aware. They also became anxious and eager to find out and learn. In fact this period witnessed the rise of very prosperous and literate societies.

The Industrial revolution that occurred in the early part of the 19th century brought along with it other revolutions, prominent among them were Agricultural revolution and Information revolution. Thus, the establishment of numerous printing presses/publishing houses, the establishment of different types of formal schools and the emergence of very prosperous and literate societies, served as very important ingredient for the already existing libraries to flourish.

Libraries began to collect and store monographs, manuscripts, books and other forms of publication. It was not until when libraries saw the tremendous annual increase of these forms of publication that they began to devise systematic ways of organizing and retrieving them. Consequently, many systems of organizing and retrieving library materials were put in place. The most important was of course the card catalogue and the classification systems. Other forms of organizing and retrieving systems were the clippings and the scrap books, and of recent the Indexing and Abstracting, and compilation of bibliographies. All these activities were done manually prior to the advent of mechanization/automation.

The growth in world population, the diversity of human needs and the developments brought about by the Industrial Revolution, especially in the area of technology and division of labour necessitated the need to come up with technological devices that would further simplify and ease human activities. This notion gave birth to mechanization of society. Oruma (1978:16) notes that

Mechanization of various sections of society began in the early part of the 20th century. The process afforded machine-readable services to be provided in almost all sphere of life. During this period mechanized retrieval systems were developed for technological record officers, statisticians, meteorologists, sales officers and military science specialists.

The literature explosion, the increase in the number of people using libraries, coupled with the high demand of library and information services rendered the manual system of organizing and retrieving information less effective. Libraries had no choice but to embrace mechanized information retrieval system. Consequently, various mechanized information retrieval systems, such as the centre-punched card system and the edge-punched card system were developed. However, one of the most important mechanized information aids that have found increasing application since the upsurge in information retrieval services was the feature card system, popularly known in America as the "peek-a-boo" or in Britain the "Optical Coincidence System".

Before this system could be used, data must be input into the system. The imputing required first and foremost analyzing subject content of a document with the view to developing the words that best describe the subject or topic of the document. Feature cards were then assigned to each keyword. The feature cards had numbers on them. Therefore, the numbers on the feature cards were drilled or punched in order to signify a document. The whole process called for indexing of library materials which in turn saw the development of thesaurus and other control vocabularies.

To retrieve data from the system, the enquirer's information need must be expressed in the language of the controlled vocabulary. The feature cards that corresponded to the question terms were then picked out of the tub and read on the reading units. The system output was in the form of references to documents on 10.1 cm by 15.1 cm document cards which contained all the bibliographic details including, in some cases, an informative abstract.

Although this mechanized information retrieval system was an improvement over the manual system, only input and retrieval processes were mechanized as against other processes, such as acquisition, circulation, cataloguing, etc, and because of the high demand for information and the number of people wanting to use the system, the system was not able to cope with the challenges of the time, hence the system was short lived.

Computer age

However, the mechanization soon became a prelude to computerization. Large frame computers were developed and used in inputting, processing and

retrieving information. Steig (1990:46) rightly noted that never had human kind devised a more powerful or versatile machine than the computer. Computers permeate all aspects of life from accounting to zoos, not to mention crime and education.

According to Adams (1986:1), computer application in library activities first emanated from the USA in 1950. By 1960 computerization of libraries had gone very far especially when mainframe computer in large organisations were used to facilitate database development, management and information retrieval. The advent of micro and later personal computer (PC) further facilitated and simplified the computerization process.

The above developments soon enable quick change from traditional and mechanized system of processing and retrieval of information into computer compatible systems. Automated searching of files, coordinated indexing, and control vocabularies were introduced in response to the urgent need to create easy access to the contents of scientific journals. Automatic abstracts, or summary of documents were then developed to further simplify access to research findings.

In the late 1960 and early 1970 massive collection of documents were transferred to databases or converted to non-print forms; various searches could then be done by computer. It was also in the late 1970s that library application software made its debut. The software were developed to further provide effective and efficient automation process and also to provide enabling conditions for resource sharing and networking among divisions or departments/units of libraries, and/or branch libraries as Local Area Network (LAN), and among other libraries as Wide Area Network (WAN).

Computing and telecommunication use to be quite distinct industries, involving distinct technology. "Now", observed Tedd (1993:4), "they have converged around certain key activities. Prominent among these key activities is the processing, transforming various data into information and then transmitting such information to various place - Doctors without frontiers". This convergence of the most prominent component gave birth to what is now called Information and Communication Technologies (ICTs) – ICT simply refers to the Computer and telecommunication devices used for data and information gathering/acquisition, processing, storage, retrieval, dissemination and transfer to the relevant users. ICTs devices include: Telephone; Mobile Phone, Private Automatic Box Exchange (PABX), Photocopier, Scanners, Fax machines, Close circuit television sets, cameras; conventional digital camera; microwave link systems and very small aperture terminals (v-sat), Computers and Internet.

The very many varieties of ICT devices mentioned above, though not exhaustive have no doubt proved capable of coping with the exigencies of the 21st

century information expo no matter the size and complexity of data and information handling capacity is required. Therefore, the application of ICTs to library services has no doubt greatly transformed the nature and pattern of information handling, services and cooperation in libraries and information centers worldwide. No wonder Zaki (2000:113) remarks that ICT is revolutionalising librarians at a high speed. The ICTs have undoubtedly provided opportunities for the provision of variety of information services. The most prominent of the information service offered by ICTs are the internet oriented services.

The Internet is the networking of various computers already networked and scatted all over the world. The net workings of these computers have effectively been described as information super highway. The ICTs device provides rapidly growing collection of information on topics ranging from medicine to science and technology. If features extensive materials on the arts, recreation and entertainment, shopping, travelling, research materials, and virtually everything one can think of. Mohammed (2000:75) noted that the Internet is today a global network currently linking over 100,000 networks and spanning over 150 countries.

The Internet provides an opportunity for libraries to acquire/generate tremendous information resources quickly and faster. On the spot orders to publishers and producers of audiovisuals, databases, etc. can be done easily. Libraries using appropriate commercial databases can locate, select materials and send out orders by e-mail. Processing of information, as well as storing and transmitting, are achieved much faster than any ICT device. Service provisions in the Internet also become much easier and faster. Reference and information services through access to current dictionary, encyclopedia, maps, databases, etc. are provided.

And so now, as noted by Otim (2000:68), a new period had dawned – the age of digitalization; the age of instant communication; and the world of the global village. There is a new sense of magic in the air at least for those aliens from the old industrial past making their first encounters with this brave cyber world. The process of translating a piece of information be it in text, numeric, picture or video, statistics, sound and software into bits and transmitting such to every corner of the world instantly has no doubt brought end users to vast and variety of information resources, rather than delivering the end users to a physical set of resources.

Chooming (2002:26) notes that with the availability of a myriad of digital materials on the Internet, more libraries are jumping on the bandwagon, with the aspiration of becoming digital libraries. Digitalization projects in many big libraries all over the world are stimulated by recent advances in digitalization and scanning technologies. Initially all documents were manually re-keyed. This

slow, tedious and painful process was however enhanced by the high-speed *Optical Character Recognition (OCR) systems.*

Nancy Schiller, according to Daniel (2002:56) was one of the first writers to use the expression "virtual library" in 1992, which has today assumed some many other name such as digital library, electronic library, community network, and sometimes simply called library without walls.

It is called 'virtual' because a traditional library is simply a place, i.e. building or room where information resources are kept and used for knowledge acquisition and learning. The place can be 'real' as in the case of building or room (non-virtual) or 'Virtual'. The concepts of 'real' and 'virtual' are used more in a scientific rather than in the literary sense. Real means tangible and capable of being felt while virtual denotes a representation of reality. This has given rise to the concept of Virtual reality to which the 'Virtual Library' idea subscribes. Thus, the real word of the library is perceived in virtual space.

Therefore, in a good electronic wide area networked library, the user enjoys the euphoria of being in distant libraries, and yet he has not physically moved. Oketunji (2001:32) has graphically demonstrated this when he said then a Library user in Nigeria can 'fly' through the internet supper highway, to the Library of Congress in Washington Dc, transact business with the library staff there and at the end 'return' to his seat in Nigeria without in reality physically leaving it! Indeed it is an experience of virtual reality!!

From the foregoing, the following characteristics could be attributed to Digitalized Information System (DIS).

Characteristics of digital information system and services

A typical Digital Information System and Services is characterized by the *fact that it is not limited by*

(i) size of resources
(ii) content
(iii) the nature of physical (tangible) and/or electronic information resources (intangible)
(iv) the type of users
(v) time of access, and
(vi) the need for and nature of use
(vii) ownership

From the above discussion and listed characteristics of a Digitalized Information System (DIS), the following advantages could be derived.

Advantages of digital information system and services

1. While the conventional library system allows the removal of the information resources from the shelves for use whenever and later returned, the contemporary digital information system and services allows for the copying of the information resources to the user's desire destinations; diskette, C.D., or stored in the user's personal computer.
2. Apart from providing access to information resources, the digital information system and services also allows the users to perform and enjoy other services such as e-publishing, e-mail, e-journals, e-books, -e-commerce, etc.
3. Electronic information resources can be sorted, transmitted and retrieved easily and quickly.
4. It is a two-way system of information delivery and transfer.
5. Electronic information resources can be linked and made interactive with cheaper access.
6. The ideal library cooperation is much more realizable with Electronic Information resources (EIR). Typical examples of this trend are the applications of the Internet and World Wide Web (WWW) to electronic publishing and access to online information.
7. Digital information systems and services reduce cost significantly especially in term of building/extension of libraries, space, personnel and redundancy of collection.
8. The digital information systems and services also offer fees-based as well as free services. Example of free services enjoyed in digital information systems and services is the distribution of some journals electronically. Hurd and Waller (1997).

Disadvantages of digital information system and services

1. Contains so much information resources that are poorly organized, due to poor and incorrect cross-references and links, hence accessibility, navigation and retrieval become difficult and thus produce unsatisfactory results. It should be stated here that the creation of search enquiries is greatly inhibiting accessibility and retrieval.
2. Lack of comprehensive, easy and quick retrieval device. Furner (1998:28) notes that search tools are inadequate to facilitate speedy information retrieval.
3. Although there is so much information in Digital Information Systems and services, much of the desired information may not be available on the Internet or in public domains due to copyright problems. Valausuas

(1995:133) notes that because of this; less than 1% of all information that exists in paper is available electronically.

4. Although Digital Information Systems and Services reduce cost significantly in terms of building, speed, etc., digitalization is still not a simple task. Mackie Mason and Jankovich (1997:281) observe that every step that leads to conversion and digitalization is still very expensive not to talk of the equipments.

Conclusion

The old ways of processing, disseminating and sharing of Information resources have today been replaced with global resource sharing, the principle of one product for one user at one time has been replaced by networked products that support multiple users simultaneously and allowing multiple access to multiple resources from any workstation. The Internet has now become the *de facto* virtual library with as many as 10,000 search engines offering Information that can be downloaded from some 320 million web sites. Therefore, as we try to adjust to the new world of cyber space, it is very important to remember the journey so far. The ICT revolution is no doubt offering us the opportunity to, from living thousands of miles apart, come much closer together in a shrinking global village. The new revolution now has within it the capability to connect every one every where instantly.

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