LIBRARIANS' CHALLENGE TO CREATING AN EFFECTIVE DIGITAL LIBRARY

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Abstract

The advent of ICT is revolutionalizing every facet of society including information provision and dissemination. Traditional libraries are therefore undergoing fundamental changes to cope with this new trend. It is in this vein that digital libraries come into play.

Digital libraries offer such benefits as: equitable access; reduced barriers of distance; timeliness; shared resources; and enhanced content delivery. Even though digital information services appear easy to provide, it poses its own challenges which include cost, preservation, digital collection development, copyright, etc. The challenges, therefore for taking positive steps to promote modern information management in the new millennium is not only for African libraries but for the world at large. This paper provides a high-level overview of digital libraries, potential benefits of digital libraries to society, the challenges encountered in creating an effective digital library and what information professionals could do in meeting these challenges.

KEYWORDS: VIRTUAL LIBRARY, DIGITIZATION, METADATA, INTELLECTUAL PROPERTY, ELECTRONIC LIBRARY

Introduction

Information is at present believed to be a fifth factor of production which is by no means inferior to land, labour, capital and the entrepreneur. According to Brandin and Harrison (1987) "information wealth is now a new type of capital described as knowledge capital". In the view of Drucker (1969), the systematic and purposeful acquisition of information rather than science and technology is emerging as the new foundation for work, productivity and effort throughout the

world. Berghahl (1989) supports Drucker by saying that information has become such a precious resource that the fate of modern nations in all essentials is connected with their capacity to develop and exploit it. He also predicts that in future, countries that do not develop this capacity will be left behind in the cultural, scientific and economic development. He further goes on to stress that apart from suffering from dependence on others, such countries will neither be partners in the global production of information nor will they contribute meaningfully to the common future of civilization.

In the past, libraries and information centres had to manually manage their information resources. The difficulties associated with such a practice with its attendant delay in information processing and delivery and the general ineffectiveness of information services have called for a better means of information management. The traditional ways of managing information include providing services based on print materials, classification and cataloguing of information resources which are relevant to the potential users, application of techniques for evaluation of information resources directed towards the target users and cost-effective storage and preservation of such resources. It is also time-bound, with more duplication being done, and the difficulty of personalization and usage monitoring.

The provision of the right information to the right user at the right time has been the motto of information professionals. The functions of a digital library mainly depend upon computers, communication facilities and the knowledge and skills of information professionals in respect to handling modern technology. A digital library facilitates time- and place-independent services for users especially if active learning styles become more commonplace. The digital library has several features in addition to the computerization of traditional and routine work. These advancements have enabled information professionals to provide quick and accurate digital information services to their clients.

The information technologies found in libraries at present can be divided into three categories: computers, storage media and telecommunications. These three aspects, working together have brought about great improvement in the quantity and quality of library services to users and an amazing reduction in the delivery time. Furthermore, the fusion between computers and telecommunications; telematics has enhanced the development of information networks around the world, the highpoint of which is the Internet.

With the emergence of the Internet, the world has been truly reduced to a global information village. This world-wide network, though designed to serve the information needs and interests of all facets of the society, has provided a great boost to library services worldwide. It is now a well-known fact that Internet connectivity fosters an unparalleled degree of communication, collaboration, resource sharing and information access. The electronic publishing of some important journals and other materials on the Internet has removed the need for libraries to physically acquire such materials. While this is a big boost to libraries that have Internet access, most others, especially in Africa and the Third World, lose the benefit of making such electronically published works available to their users. The implication of this development to a majority of Africa's libraries can be very grave.

With the numerous advantages of information technology as discussed above, libraries are computerizing their services all over the world so that they would take advantage of the immense benefits in information management offered by information and communication technology (ICT). Despite this naked reality, the pace of library automation in developing countries is still very slow and this should be a cause for serious concern. This paper therefore focuses on the challenges faced by libraries in developing countries in building an effective digital library.

The major objectives of this paper are as follows:

- To explain the digital library as a concept;
- To list the major characteristics of a digital library;
- To highlight the potential benefits of a digital library;
- To identify challenges associated with creating a digital library; and
- To make recommendation to enhance the creation of an effective digital library.

What is a Digital Library?

There is much confusion surrounding this phrase (digital library), stemming from three factors. Firstly, the library community has used several different phrases such as electronic library, virtual library, library without walls over the years to denote this concept and it never was quite clear what each of these different phrases meant. "Digital library" is simply the most current and most widely accepted term now used almost exclusively at conferences, online, and in the literature.

The second factor adding to the confusion is that digital libraries are at the focal point of many different areas of research, and what constitutes a digital library differs depending upon the research community that is describing it (Nurnberg, et al, 1995). For example:

- from an information retrieval point of view, it is a large database;
- for people who work on hypertext technology, it is one particular application of hypertext methods;
- for those working in wide-area information delivery, it is an application of the Web; and
- for library science, it is another step in the continuing automation of libraries that began over 25 years ago.

Thirdly confusion arises from the fact that there are many things on the Internet that are referred to as “digital libraries” which, from a librarian's point of view are not. For example:

- for computer scientists and software developers, collections of computer algorithms or software programs are digital libraries;
- for database vendors or commercial document suppliers, their databases and electronic document delivery services are digital libraries;
- for large corporations, a digital library is the document management systems that control their business documents in electronic form;
- for a publisher, it may be an online version of a catalogue; and for at least one very large software company, a digital library is the collection of whatever it can buy the rights to, and then charge people for using (Cleveland, 1998).

According to *Macmillan English Dictionary for Advanced Learners* (2002), a fairly spectacular example of what many people consider to be a digital library today is the World Wide Web which is “a very large collection of documents, pictures, sounds etc. stored on computers in many different places and connected through the Internet”. Many would call this huge collection a digital library because they can find information, just as they can do banking in a "digital bank" or buy compact discs in a "digital record store." Yet, is the Web a digital library?

Lynch (1997), one of the leading scholars in the area of digital library research, states:

> "One sometimes hears the Internet characterized as the world's library for the digital age. This description does not stand up under even casual examination. The Internet and particularly its collection of multimedia resources known as the World Wide Web was not designed to support the organized publication and retrieval of information as libraries are. It has evolved into what might be thought of as a chaotic repository for the collective output of the world's digital "printing presses". In short, the Net is not a digital library".

Thus, in examining the various examples of what are called digital libraries, it appears that librarians have been confused about what a digital library is. The word "library" has been appropriated by many different groups to describe either their areas of research or signify a simple collection of digital objects.

So what is a working definition of a "digital library" that makes sense to librarians? As a starting point, we should assume that digital libraries are libraries with the same purposes, functions, and goals as traditional libraries—collection, development and management, subject analysis, index creation, provision of access, reference work, and preservation. A narrow focus on digital formats alone hides the extensive behind-the-scenes work that libraries do to develop and organize collections and to help users find information (Cleveland, 1998).

According to Borgman (1999), the term digital library is used in at least two senses:

- In the computer science research community digital libraries are viewed as content collected on behalf of users; and
- In the library practitioner community digital libraries are seen as institutions providing a range of services in a digital environment.

While most digital library projects fall into the first category, the speculation about future developments concentrates on versions of the second.

According to Gladney et al. (1994) " a digital library service is an assemblage of digital computing, storage, and communication 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". This statement is in direct contradiction to Lynch's view. Both Gladney et al (1994) and Borgman (1999) see a digital library as a machine-readable representation of materials, which might be found in a conventional library.

The Association of Research Libraries (1995) has identified the following five elements in various definitions of the digital library:

- The digital library is not a single entity;
- The digital library requires technology to link the resources of many;
- The linkages between the many digital libraries and information services are transparent to the end users;
- Universal access to digital libraries and information services is a goal; and
- Digital library collections are not limited to document surrogates: they extend to digital artifacts that cannot be represented or distributed in printed formats.

This definition introduces the concept of distributed and linked resources. The digital resources are the collections and information services. The digital collections are digital surrogates, non-printable objects and digital artifacts that cannot be distributed in print form.

The concept of a "digital library" is not merely equivalent to a digital collection with information management tools. It is rather an environment to bring together collections, services, and people in support of the full life cycle of creation, use, and preservation of data, information, and knowledge (Duguid, 1997).

According to Waters (1998), the American Digital Library Federation defined digital libraries as "organizations 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".

A more recent definition is the one given by Deegan and Tanner (2002). They have given a set of defining principles that seem unarguable:

- A digital library is a managed collection of digital objects;
- The digital objects are created or collected according to the principles of collection development;
- The digital objects are made available in a cohesive manner, supported by services necessary to allow users to retrieve and exploit the resources just as they would in any other library materials; and
- The digital objects are treated as long-term stable resources and appropriate processes are applied to them to ensure their quality and survival.

Major Characteristics of a Digital Library

A number of scholars such as Arms (1995); Chepesuik (1997); Lynch and Garcia-Molina (1995) have identified the major characteristics of digital libraries. These include the following:

- digital libraries are the digital face of traditional libraries that include both digital and traditional collections, fixed media collections encompassing both electronic and paper materials;
- digital libraries include digital materials that exist outside the physical and administrative bounds of any library;
- digital libraries include all the processes and services that are the backbone and "nervous system" of traditional libraries. However, such traditional processes, though forming the basis of digital library work, will have to be revised and enhanced to accommodate the differences between new digital media and traditional fixed media;
- digital libraries ideally provide a coherent view of all the information contained within a library, no matter its form or format;
- digital libraries will serve particular communities or constituencies, as traditional libraries do now, though those communities may be widely dispersed throughout the network; and
- digital libraries will require both the skills of librarians as well as those of computer scientists to be viable.

Potential Benefits of a Digital Library

Bringing the library to the user

The use of a library requires access and traditional library practices require that the user goes to the library. In a university, the walk to the library takes a few minutes, but not many people are members of university libraries. Many researchers, faculty members and students therefore, carry out their work with depressingly poor access to the latest information.

A digital library brings the information to the user's desk, either at work or at home, making it easier to use and hence increasing its usage. With a digital library on the desktop, a user may not need to visit a library building. The library is wherever there is a personal computer and a network connection.

Computer is Used for Searching and Browsing

Computing power can be used to find information. Paper documents are convenient to read, but finding information stored on paper can be difficult. Despite the myriad of secondary tools and the skill of reference librarians, using a large library can be a tough challenge. A claim that used to be made for traditional libraries is that they stimulate serendipity, because readers stumble across unexpected items of value. The truth is that libraries are full of useful materials that readers discover only by accident.

In most aspects, computer systems are better than manual methods for finding information although they are not as good as everybody would like. Computers are particularly useful for reference work that involves repeated leaps from one source of information to another.

Sharing of Information

Libraries and archives contain much information that is unique. Placing digital information on a network makes it available to everybody. Many digital libraries or electronic publications are maintained at a single central site, perhaps with a few duplicate copies strategically placed around the world. This is a vast improvement over expensive physical duplication of little used material, or the inconvenience of unique material that is inaccessible without travelling to the location where it is stored.

Keeping Information Current

Often, much of the information that is considered important needs to be updated continually. Printed materials are awkward to update, since the entire document must be reprinted; all copies of the old version must be tracked down and replaced. Keeping information current is much less of a problem when the definitive version is in digital format and stored on a central computer.

Many libraries provide the text of reference works, such as directories or encyclopedias online and whenever revisions are received from the publisher, they are installed on the library's computer and the new versions are available immediately.

Information is Always Available

The doors of the digital library never close. For example, accessing the electronic resources of the Kwame Nkrumah University of Science and Technology Library has always been at hours when the library buildings were closed. This is because the Internet works best in the night when traffic is less. Materials are not checked out to most readers, misshelved or stolen. They are never in an off-campus warehouse. The scope of the collections expands beyond the walls of the library. Private papers in an office or the collections of a library on the other side of the world are as easy to use as materials in the local library.

The Cost of Digital Libraries

The final potential benefit of digital libraries is cost. Conventional libraries are expensive and they occupy expensive buildings on prime sites. Libraries are under-funded and therefore never have enough money to acquire and process all the materials they desire. Publishing is also expensive and converting to electronic publishing comes along with additional expenses. In order to recover the costs of developing new products, publishers sometimes even charge more for a digital version than the printed equivalent. Establishing digital libraries is also expensive, initially more expensive.

However, digital libraries are made from components that are declining rapidly in price. As the cost of the underlying technology continues to fall, digital libraries become steadily less expensive. In particular, the costs of distribution and storage of digital information declines even though the reduction in cost will not be uniform.

Challenges in Creating a Digital Library

The creation of effective digital libraries poses serious challenges. Digital libraries are not perfect, computer systems can fail and networks may be slow or unreliable, but compared with a traditional library, information is much more readily available when and where the user wants it. The integration of digital media into traditional collections will not be straightforward, like previous new media (e.g., video and audio tapes), because of the unique nature of digital information. It is less fixed, easily copied, and remotely accessible by multiple users simultaneously. Some of the more serious issues facing the development of digital libraries are outlined below.

Technical Architecture

According to Cleveland (1998), the first issue is that of the technical architecture that underlies any digital library system. Libraries from his point of view will need to enhance and upgrade current technical architectures to accommodate digital materials. He then goes on to state that the architecture will include components such as:

- high-speed local networks and fast connections to the Internet;
- relational databases that support a variety of digital formats;
- full text search engines to index and provide access to resources;
- a variety of servers, such as Web servers and FTP servers; and
- electronic document management functions that will aid in the overall management of digital resources.

One important thing to point out about the technical architectures for digital libraries is that they will not be monolithic systems. Instead, they will be a collection of different systems and resources connected through a network, and integrated within one interface, most likely a Web interface. The resources supported by the architecture could include:

- bibliographic databases that point to both print and digital materials;
- indexes and searching tools;
- collections of pointers to Internet resources;
- directories;
- primary materials in various digital formats;
- photographs;

- numerical data sets; and
- electronic journals.

Though these resources may reside on different systems and in different databases, they would appear as though they were one single system to the users of a particular community.

Within a coordinated digital library scheme, some common standards will be needed to allow digital libraries to interoperate and share resources. The problem, however, is that across multiple digital libraries, there is a wide diversity of different data structures, search engines, interfaces, controlled vocabularies, document formats, and so on. It would therefore be an arduous task collating all digital libraries nationally or internationally because of this diversity. Thus, the first challenge to overcome would be to find sound reasons for federating particular digital libraries into one system. Narrowing the field in such a manner would reduce the technical and political hurdles required to establish common established practices.

Cost

Cost is another challenging aspect in providing information services for the library community. Collecting electronic information is more problematic than collecting printed texts. There is often a lack of financial resources to cover the additional expense of managing an electronic collection alongside a paper collection. Costs are incurred for production, for on-going provision of access, and for preservation of the digital information. The cost to develop and operate a distributed architecture for long-term archiving, migration, and backup of digital materials will be high.

Building Digital Collections

One of the biggest challenges in creating digital libraries is the building of digital collections. Obviously, for any digital library to be viable, it must eventually have a digital collection with the aim of making it truly useful. There are essentially three methods of building digital collections. These are:

- digitization - In order to build a comprehensive resource, historical materials now in analog form (e.g., books, journals, laboratory records, sound recordings, manuscripts, and photographs) must be converted;
- acquisition of original digital works created by publishers and scholars; and
- access to external materials not held in-house by providing pointers to Web sites, other library collections, or publishers' servers.

One of the main issues here is the degree to which libraries will digitize existing materials and acquire original digital works, as opposed to simply pointing to them externally.

Metadata

Metadata is another issue central to the development of digital libraries. According to Cleveland (1998) metadata is the data that describes the content and attributes of any particular item in a digital library. It is a concept familiar to librarians whose primary activity is creating cataloguing records that describe documents. Metadata is important in digital libraries because it is the key to resource discovery and use of any document. While there are formal library standards for metadata, namely Anglo-American Cataloguing Rules (AACR), such records are very time-consuming to create and require specially trained personnel. Human cataloguing, though superior, is just too labour-intensive for the already large and rapidly expanding information environment. Providing access to library collections is labour-intensive. In order to apply scarce resources to the digitization of significant quantities of content, it is often necessary to reduce the level of detail offered in accompanying catalogues or indexes. The lack of common metadata standards ideally, defined for use in some specified context is yet another barrier to information access and use in a digital library, or in a coordinated digital library scheme.

Naming, Identifiers, and Persistence

Another challenging issue related to metadata is the problem of naming in a digital library. Names are strings that uniquely identify digital objects and are part of any document's metadata. Names are as important in a digital library as an ISBN number is in a traditional library. They are needed to uniquely identify digital objects for purposes such as citations, information retrieval, links among objects and managing copyright.

A global scheme of unique identifiers is required; one that has persistence beyond the life of the originating organization and that is not tied to specific locations or processes. These names must remain valid whenever documents are moved from one location to another, or are migrated from one storage medium to another (Cleveland, 1998).

Copyright / Rights Management

Copyright has been called the "single most vexing barrier to digital library development" (Chepesuik, 1997). The current paper-based concept of copyright breaks down in the digital environment because the control of copies is lost. Digital objects are less fixed, easily copied, and remotely accessible by multiple users simultaneously. Unlike private business entities or publishers that own their information, libraries are most often caretakers of information. Since they do not own the copyright of the materials they hold, it is unlikely that libraries will ever be able to freely digitize and provide access to the copyrighted materials in their collections. They will, instead, have to develop mechanisms for managing copyright, mechanisms that allow them to provide information without violating copyright laws, called rights management.

Effective Access

A user looking for an item in a library catalogue should be able to identify it without regard to whether it is available in its original physical form or as a digital or microfilm reproduction. Intellectual descriptions of originals and reproductions should be presented in a fully integrated way. During the period, however, many digitization efforts are disconnected from traditional library services. Even when appropriate catalogue records exist, digital content may fail to connect to potential users because individual items in digital collections cannot be retrieved directly or are not identified appropriately to support links from traditional catalogues or bibliographic indexes.

Preservation

Another important issue is preservation. Keeping digital information in perpetuity is a great challenge hence the need for preservation. The *Macmillan English Dictionary for Advanced Learners* (2002), defines preservation as," the process of working to protect something valuable so that it is not damaged or destroyed." In the preservation of digital material, the real issue is technical obsolescence (Cleveland, 1998). Technical obsolescence in the digital age is like the deterioration of paper in the paper age. Libraries in the pre-digital era had to worry about climate control and the de-acidification of books, but the

preservation of digital information will mean constantly coming up with new technical solutions.

Tapes, hard drives and floppy discs have a very short life span when considered in terms of obsolescence. These media, used to store digital material become obsolete between two to five years before they are replaced by better technology. Over the long term, material stored on older media could be lost because there will no longer be the hardware or software to read them. Thus, libraries will have to keep moving digital information from one storage medium to the next.

While files can be moved from one physical storage medium to another, what happens when the formats (e.g. Adobe Acrobat PDF) containing the information become obsolete? This is a problem perhaps bigger than that of obsolete storage technologies. One solution is to carry out data migration, that is, translate data from one format to another preserving the ability of users to retrieve and display the information content.

Meeting the Challenges

The under-mentioned recommendations are made for librarians in order to provide adequate basis to face the challenges more comfortably.

- **Libraries coming together as a consortium:** Building digital collections demand coordinated activity. Acquisition of technology for digitizing analogue materials, acquiring digital works and doing in-house digitization are expensive activities and therefore cannot be done by a single library. However, by working together as a consortium, institutions with common goals can gain greater efficiencies and reduce the overall costs involved in these activities. Secondly, it also reduces the redundancy and waste of acquiring or converting materials more than once. Thirdly, coordinated digital collection building enhances resource sharing and increases the richness of collections to which users have access.
- **Formulation of policies on preservation**: No matter how a collection is built, either through in-house digitization, or through the collection of original digital works, or by providing access to materials by pointing to other external resources, libraries must ensure it is preserved and made available in perpetuity. Ensuring long-term preservation and access will require policies and schemes by which redundant permanent copies are stored at designated institutions. Digital preservation standards will be

required to consistently store and share material preserved digitally (Chepesuik, 1997).

- **Up-to-date with copyright laws and issues:** Librarians must become knowledgeable about the copyright law and stay current on developments providing the copyright status of each digital object, restrictions on use of copyrighted material or charging the fees associated with it, and handling transactions with users by allowing only so many copies to be accessed, or by charging them for a copy.
- **Continuous self updating**: The human element involves staff in libraries. The increasing use of electronic journals and document delivery will mean less time spent on the physical management of journals, i.e. checking them in, tagging, shelving, boxing, binding, etc. Staff activities will be more to do with indexing and accessing material on the networks. Inevitably there will be the need for regular training and updating in respect of:
- Development of metadata standards;
- Development of a strong professional team in respective libraries;
- Organization of continuous education and training programs for users and staff; and
- Organization of in-house training on particular processes and on new aspects of the profession.

Conclusion

Information is an essential ingredient for the development of any nation be it developing or developed. According to Nwalo (2000), for African countries to harness information from local and overseas sources, the application of modern information management techniques is a sine qua non. The librarianship profession in Africa has been battling with a very unfavourable climate of information provision and management, a climate that must improve to give way to progress in the New Millennium.

The advent of information technology has added a new dimension to the roles and responsibilities of the librarians. Librarians are not only the custodians of their collections in this new information age, but also content analyzers for documentary as well as electronic information resources for satisfying the increased information needs of the users.

Digital libraries now offer new challenges to an emerging breed of digital librarians as new opportunities combine the practice of information management, with rapidly evolving technological developments to create new information products and services. The digital library is the most important and reliable resort in this information age and therefore knowledge discovery in this type of library becomes a predominant factor. To be able to attend to the information needs of users with speed, relative accuracy and reliability, librarians/ information professionals have to keep constant watch for newer developments and noticeable changes in the field of their concern.

References

Arms, W.Y. (1995) Key concepts in the architecture of the digital library. **D-lib Magazine.** Available online: http://www.dlib.org/dlib/July95/07arms.html (Accessed 30th November, 2009).

Association of Research Libraries (1995) **Definition and purpose of digital libraries.** Available online: http://www.ifla.org/docu/libs/net/arl-dlib.txt (Accessed 24th June, 2009).

Berghahl B. (1989) **IFLA's Programme Advancement of Librarianship in the Third World ALP: A proposal for the future**. Stockholm: Swedish Library Association.

Borgman, C. L. (1999) What are digital libraries? : Competing visions, **Information Processing and Management,** Vol**.** 35, No.3, pp. 227-243.

Brandin, D. H. and Harrison, M. A. (1987*)* **The technology war: A case of Competitiveness.** New York: John Wiley and Sons Inc.

Challenges to building an effective digital library. Available online: http://memory.loc.gov/ammem/dli2/html/cbedl.html (Accessed 30th November, 2009).

Cleveland, Gary (1998) Digital libraries: Definitions, issues and challenges **IFLANET**, UDT Occasional Paper 8.

Chepesuik, R. (1997) The future is here: America's libraries go digital. **American Libraries,** Vol**.** 2, No.1, pp. 47-49.

Deegan, M. and Tanner, S. (2002*)* **Digital futures: Strategies for the information age**, London: Library Association Publishing.

Drucker, P. P. (1969) **The knowledge economy in the age of discontinuity**. London: Heinemann.

Duguid, Paul (1997) **Report of the Santa Fe Planning Workshop on Distributed Knowledge Work Environment** Available online: http://www.si.umich.edu/SantaFe/. (Accessed 24th June, 2009).

Gladney, H. M., Ahmed, Z., Ashany, R., Belkin, N. J., Fox, E. A. and Zemankova, M. (1994) Digital library: Gross structure and requirements: Report from a workshop. **IBM Research Report,** RJ9840, May, 1994.

Lynch, C. A. (1997) Searching the Internet. **Scientific American,** March, 1997, pp.52-56 Available online: http://www.sciam.com/0397issue/0397lynch.html (Accessed 30th November, 2009).

Lynch, C. A. and Garcia-Molina, H. (1995) **Interoperability, scaling, and the digital libraries research agenda: a report on the May 18-19, 1995 IITA Digital Libraries: A workshop**. Available online: http://wwwdiglib.stanford.edu/diglib/pub/reports/iitadlw/main.html (Accessed 30th November, 2009).

Macmillan English Dictionary for Advanced Learners (2002) International Student Edition. Oxford: Macmillan Publishers, p 1692.

Nurnberg, P.J., Furuta, R., Leggett, J.J., Marshall, C., and Shipman, F.M. (1995) **Digital libraries: issues and architectures**. **In** Proceedings of the Second Annual Conference on the Theory and Practice of Digital Libraries. Austin, Texas, June 11-13, 1995, pp. 147-153.

Nwalo, K. I.N. (2000) Managing information for development in the 21st Century: Prospects for African libraries, challenges to the World. 66th IFLA Council and General Conference. Jerusalem, Israel, August 13-18, **IFLANET**. Available online: http://archive.ifla.org (Accessed 11th February, 2010).

Waters, D.J. (1998) **What are digital libraries?** Available online: http://www.clir.org/pubs/issues/issues04.html (Accessed 30th November, 2009).