Digitizing Resources in Nigeria: An Overview

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Introduction

Institutional Repositories (IRs) have in the last couple of years gained relevance worldwide. Repositories are often mentioned in connection with the Open Access movement. Among other organizations, institutions of higher learning and research institutes appear to be the most that are creating and deploying IRs, the availability of which is increasingly tied to their global visibility, especially in Nigeria. Repositories ordinarily, stock resources of an institution. Digital repositories store digital contents of these resources. It has also been discovered that quality researches that are self-archived in an open access platform ó whether in an open access journal or archived in an institutional repository, have increased citation impacts (Gargouri *et al,* 2010).

According to eHow Institutional Repository started with the advent of the World Wide Web (WWW). In 1991 the e-print service arXiv was developed by Los Alamos physicist Paul Ginsparg. It eventually led to the Open Archive Initiative in which it enables institutional repositories to operate together. In 2001 Eprints was developed, while 2002 Dspace and HP and in that same year FEDORA (Flexible Extensible Digital Object Repository Architecture) was developed. These software are used as platform to deploy IRs. They are the programmes that provide structured data-entry points for digital resources leading to semantic relationships. Sematic relationships are further enhanced by the introduction of metadata, i.e. data about data, which increases the direct *findability* of resources, rather than mere accessibility. Findability of

resources is used to denote the aggregation of relevant materials in their order of importance, with synonyms, and with options for different media or format, such as texts, sound, motion, graphics, or any combinations of these.

In Nigeria, the idea of an IR is a current theme in tertiary institutions that have seen it as a necessity for making available their institutional resources, thereby increasing their visibility and better performance in the ongoing web ranking of world universities in particular. In the last three years, Nigerian universities have, more or less, competed among themselves to have higher ranking in the webometrics ranking of world universities. This has been a healthy competition because more and more of the institutions have been devising creative means of increasing their digital contents in the public domain, resulting in more Nigerian content on the Internet, and, particularly, more openness and sharability of institutional resources.

However, quality of the content, organizational structure of the content, management, and other such issues may need to be addressed in a policy document in order to have a virile and sustainable open access platform. Several Nigerian institutions that have been posting digital contents on the web do not appear to follow any standards and use diverse output platforms. Whereas some attempt to use open source software such as Eprints and dspace, others simply post into their institutional web content management systems that are not necessarily open source. It is imperative therefore, to look into digitization efforts and open access movements in Nigeria. This is done by briefly describing the path of the University of Jos in both open access initiatives and digitization, periscoping Nigeria, digitization as an activity, Institutional Repository as an example of digitization process, challenges, and prospects, before arriving at a conclusion.

University of Jos
The University of Jos library, in June 2009 became the first institution in Nigeria to establish an Institutional Repository (IR) (Akintunde, 2010), and the second in West Africa after the University of Science & Technology, Ghana. The library uses dspace, an open source self-archiving software. This was not the university's first experience in the use of open source solutions. The university uses *Moodle* (www.unijos.edu.ng/moodle) to deliver electronic learning. The website of the university is managed using *Drupal*, an open source content management system. In 2003, the University of Jos, along with seven other universities in Africa, was one of the founding members of African Virtual Open Initiatives & Resources (AVOIR) which was a novel network for capacity building in network engineering developing

free and open source software to facilitate electronic learning and business transactions across Africa as a first step (Keats, 2006, 2010). AVOIR developed and deployed Knowledge Environment for Web based Learning (KEWL) which was used to deliver the Postgraduate programme in Telecommunications Policy and Regulation, sponsored by the Network of Telecommunications Policy and Regulation in Africa (NetTel@Africa), based in Tanzania. It is obvious therefore that the University of Jos was already getting familiar with open source software when the library adopted and deployed dspace for its IR.

In the Beginning

Digitization in the University Library actually commenced in the mid-eighties when the library hosted the Nigerian Periodicals Index (NPI), with the then University Librarian ó Late Mr. B. Nwafor serving as editor of NPI. The process of indexing required the use of computers as entries were sent in from different university libraries all over the nation, in addition to the generation of the index entries for the university. The Library was also facing the challenge of managing the increasing order slips for books and journals that had piled up over years of austerity started converting bibliographic details of books and journals purchased through the World Bank Loan facility for Nigerian Universities. Computers were acquired to enhance the input of orders records.

So, gradually, digitization had begun and, by the late 90s, it became clear that the library could only make further advances in its efforts to digitize records of other resources even as the library automation project had gathered sufficient momentum for final take-off. Hardware and infrastructural issues began to be considered more seriously. Computers with brand names such as ‑Compaqø were preferred. Electric power backup was provided for through solar panels with battery inverters. This served the computer systems in the library ó at the staff work stations and in the patronsø area. At the turn of the new millennium, attempt was made to digitize bibliographic records of the Documents and Special Collections in the Library (Akintunde, 2002).

More advances

It was perhaps this modest progress in digitization that caught the attention of the Carnegie Corporation of New York to include the library in its capacity building funding for the University of Jos in 2003. Thereafter, the library identified the retrospective conversion of its card catalogue as well as collection of theses and dissertations as priorities. The library was introduced by Carnegie to the Database of African Theses and Dissertations (DATAD) based at the headquarters of the Association of African Universities in Accra, Ghana to be a contributing

member. Since 2006, the library had been contributing digital copies of theses and dissertations submitted in the university to the network. It started with abstracts, but now, full texts are encouraged. With the deployment of the University of Jos Institutional Repository (http://dspace.unijos.edu.ng), full text of theses and dissertations are now uploaded in the university's site.

The retrospective conversion of the catalogue is being done using the Bibliofile Integrated Technical Services for Windows (ITS). It is a proprietary software which license was purchased in 2001. However, with the intervention of the Jos-Carnegie capacity building project, another software ó Virtua was purchased as a total library solution. The same was deployed in all the six grantee Nigerian University Libraries beneficiaries of the United States Partnership of Higher Education fund ó Ahmadu Bello University, Bayero University Kano, Obafemi Awolowo University, University of Ibadan, University of Jos, and University of Port Harcourt, who were able to purchase the software as a consortium. This has facilitated the creation of Online Public Access Catalogue (OPAC) in these libraries. That of the University of Jos can be viewed at cactus.unijos.edu.ng:8000/cgi-bin/gw/chameleon.

Nigerian Periscope

The experience of the six libraries in the digitization of their catalogue records is a common theme among Nigerian libraries, especially university and research libraries. Most of the university libraries in the country started by applying The Information Navigator in Libraries (TINLIB) to commence the digitization of their catalogue card records in early 90s. The use of the software was not sustainable because of an apparent unreliable support as most libraries at that time, did not have the required skilled human resources as is obtainable in many libraries today; and the high cost of the license renewal, and not so perfect technical support. Moreover, there were not as many other vendors or products available in the Nigerian market at the time.

The situation has changed today. Since the 90s, many libraries apparently ±dumpedø TINLIB and sought for more appropriate and affordable software for their institutions and libraries. Whereas the challenge of cost and skilled human resources have continued to be defining the acquisition and deployment of software for digitization in Nigerian libraries, most of the early attempts at digitization have been proprietary-based.

However, since the new millennium, and with the real challenge of funding in the public sector in the country, many more libraries have been researching into possibilities of adopting free and open source software (FOSS) both for their catalogue records and the full texts of documents.

õFree and open source software (FOSS), also known as free/libre open source software (FLOSS) and free/open source software (F/OSS), is software developed by informal collaborative networks of programmers. The [source code](#) is licensed free of charge, encouraging modifications and improvementsö (SearchEnterpriseLinux, 2008). Examples of such include; Linux based operating systems such as Ubuntu, content management systems such as Drupal, Institutional repositories such as Eprints, DSpace, BEPress, Fedora, OPUS, Electronic Theses and Dissertations (ETD), etc. In Nigeria, FOSS became a rallying point for young and enterprising developers who participated at the First African Conference on the Digital Commons held at the University of Western Cape, January 2004 (Keats, 2004). They returned to the country and created a network of FOSS advocates using the platform: www.ngfossf.org. Idlelo, coupled with interactions at the biennial Committee on Development Information (CODI) in Addis Ababa, Ethiopia, was a common ground to share experiences with other developers in Africa, particularly Kenyan and South African friends. But most of the FOSS initiatives focused on business and organizational solutions, not necessarily library.

The main constraint in adopting FOSS, by Nigerian libraries has been the availability of technical support in respective libraries. Some of the software used include UNESCOøs CDS/ISIS, Greenstone and Koha. Koha is used by a few academic institutions including Bowen University, Iwo and Osun State University, Osogbo. Other universities use varied software ó from open to proprietary. *A full census of these software will need to be done in order to be able to harness resources and provide synergy in the libraries*. So much training was carried out by UNESCO for CDS/ISIS in late 90s and for Greenstone in the first few years of the new millennium.

The Nigerian Information Technology Development Agency (NITDA) attempted to lead in the implementation of Greenstone in particular. However, looking back, it is not clear how much success it has had in this. More importantly, it is still not clear whether respective stakeholders in Nigeria ó librarians, software vendors, Government agencies, and developers know that the essence of introducing and adopting any software is for the purpose of digitizing resources. If there had been a clear objective, there would, probably by now have been a greater accomplishment in the digitization project in Nigeria. This would have significantly increased Nigerian ─localø content on the World Wide Web.

However, there are quite a handful of libraries that have tried out Greenstone. They include the National Library of Nigeria ó in the digitization of newspapers, Federal Ministry of Health, Ladoke Akintola University Ogbomoso, Federal Polytechnic Ado-Ekiti, Nigerian Educational

Research Development Council (NERDC), and Media Trust (publishers of ₌Daily Trustø newspaper). The National Centre for Digitization, affiliated with African Digital Library Support Network (ADLSN) has now taking up the challenge of ensuring that there is sufficient advocacy and understanding of the possibilities of Greenstone and to provide technical support too. The end objective is to ensure systematic digitization of local resources in Nigeria.

As mentioned earlier, the University of Jos library in May 2009, adopted Dspace for her Institutional repository. Dspace is a Free and Open Source Software that was developed by MIT (*Massachusetts Institute of Technology*) and HP (*Hewlett-Packard*) in 2002. One of the major advantages of DSpace is its flexibility and ease of usage. Repositories of three other universities have been captured by the Directory of Open Access Repositories (DOAR) (2012). They are: Covenant University ó Eprints, Federal University of Technology Akure ó DSpace, and University of Nigeria Nsukka ó (unidentified). The four repositories were registered with DOAR on the following dates: University of Jos ó June 2009, University of Nigeria ó 2010(?), Covenant University ó December 2010, Federal University of Technology Akure, 2011.

Digitization

According to Wikipedia (2012), õdigitizing or digitization is the representation of an [object], [image], [sound], [document] or a [signal] (usually an [analog signal]) by a discrete set of its points or [samples]. The result is called *digital representation* or, more specifically, a *digital image*, for the object, and *digital form*, for the signalö. This means the transformation of an object from analog to digital. In simple language it means the conversion of hard texts into soft copies that can be manipulated. This may involve text, sound, image, or voice which are converted into a single binary code (VanDeCarr, n.d.).

In Nigeria, digitization is currently on the table and will be for some time to come until perhaps another technology overtakes it. However, the rate at which institutions and organizations see this as a priority will depend upon the exposure of institutional heads and the urgency that librarians and other stakeholders see it, even in the midst of infrastructural challenges.

Digitization holds the advantage of providing a platform for sharability and duplicity of data, and networking because of the digital form of content. It also enhances the life-span of records as well as securing data and records that would have been obliterated due to their age. Digital content can easily be sieved, isolated, and used without distorting the data structure. So, the old practice of librarians in ₌selective dissemination of informationø can be done more conveniently in a digital environment by merely touching computer keys and icons, because automatic

indexing and semantic relationships are carried out in the design of different software for managing digitized content. Every effort should therefore be made to digitize and promote digitization, particularly in libraries where information is essentially harnessed for sharing to communities of users, with different information needs.

Institutional Repository: an example of a Digitization process

Digitization, no doubt, is a process. It is the process of preserving, liberalizing and internationalizing access to documents with the ultimate aim of improving their usability by converting them into digital form. From the University of Jos experience, there are several issues to consider, several stages to go through. Key considerations include when to embark on digitization, what to digitize, selection issues, how to go about it, who can be involved, where to do the digitization, copyright issues, the target audience, and software.

When do we digitize?

There needs to be a consideration of the level of collection to digitize, an understanding of the physical state of library collections, and the status of materials ó are they commonly available or rare materials? Obviously, rare materials should receive prior attention. The question of availability of staff to carry out digitization is also there: Does the library have sufficiently skilled staff to carry out digitization and content management? Is the library ready to become more globally visible? And, will digitization enhance the use of library resources?

What to digitize

There needs to be criteria for the selection of what to digitize. Is there a Collection Development Policy? Is there a Digitization Policy ó either in the Library or the organization? What format of materials are to be digitized ó only texts, audio, video, etc.? Would it be vulnerable materials or just any material?

Selection issues

Key considerations in the selection of materials to digitize include the intellectual value of the collections, number and location of existing and potential users of library collections, pattern of use of library materials, intellectual property issues, and cost (The University of Southern Mississippi Libraries Digital Program (2009).

How do we go about digitizing?

Considerations here include what method to adopt? What type of equipment? Will it be a special project or it will be considered as a routine work in the library? Would digitization be done in-house or out-sourced? All these questions need to be answered concretely before embarking on

digitization. The approach to digitization may best be determined by the library or institutional management who may also decide on the format of material to be digitized and the available funding.

Where to carry out digitization

This has to do with whether it is in-house or as a special project. They all have implications for the outcome of the project. Where a decision is taken to make digitization a ‑project' there must necessarily be a Project Management Team who are given a specific task, in a specific time-frame, designated staff for the project, special budgetary allocation, and must be result ‑oriented. Where a library or organization decides to classify digitization as a ‑normal' routine duty, for whatever reasons, it is possible that digitization may not necessarily be time-bound, it may and may not have designated staff, may not have special budgetary allocation, and the result may be tied to bureaucracy and the disposition of staff in charge or the head of library or institution.

Copyright issues

This is critical because all intellectual property materials must be duly acknowledged at every stage of use, and permissions secured. Violation of intellectual property rights must be avoided at every instance. So, where possible, permission must be secured before conversion of any item is done from analogue to digital.

Target audience

The target audience should equally be determined because this may instruct the structure, organization, and quality of content. The design of the interface between the library staff and users will need to reflect the type of audience in view ‑ local, national, or international. It is advisable that international standards be observed when embarking on digitization.

Software

The decision on the software to use can be done when issues raised above have been resolved and decisions taken. The software may not be the first consideration. The software chosen must be supported by appropriate hardware and peripherals, and necessary infrastructure such as electric power back-up, and network facilities.

The digitization process also includes:

i. **Software installation:** There are a number of repository softwares available. They are Fedora, Eprints, Dspace etc. these software are mostly free and open source softwares. They can be installed on any server and operating system. They are easy to use and are customizable.

ii.   **Prioritizing of materials to be digitized:** This may be for reasons of visibility, accessibility, or state of the material.

iii.   **Sensitizations:** the library community needs sensitization on what the library is about embarking upon, what digitization involves and implies for them, and should be invited to the launch of the digitization ₌projectø The sensitization should not be limited to the patron community. Even library staff had to be sensitized before we launched out in order for them to be duly knowledgeable about library initiatives.

iv.   Self – archiving: An Institutional repository is an online database that encourages self ó archiving. Self-archiving is a process whereby creators of records or authors of documents are able to upload their works into the repository by themselves, and make their work available free in the public domain.

v.   **Uploading:** Born digital copies of materials are preferred for digitizing because all that is needed is formatting and tagging of metadata. For contents that are not in soft copies scanners are available to convert then to soft copies so that they can be uploaded. File formats that can be uploaded are pdf, doc, ppt, cdr, jpg etc.

vi.   **Review:** An administrator is needed to review each upload or submission metadata, otherwise, when queries are made, errors may accumulate.

vii.   **Policy:** It is critical to develop a digitization policy. However, this should not slow down the process, as policy can also be developed and reviewed and updated from time to time. The policy, preferably written policy, sets the boundary of operation, in terms of content, priorities, and intellectual property rights.

Challenges

Some of the identifiable challenges to digitization in Nigeria are:

a. **Human resources:** skilled human resources are needed to carry out digitization ó to identify resources, submit, into the workflow, and administer. Teachable staff of any library or institution can be trained to do this. However, it is imperative to have at least one technical staff ó preferably a computer scientist, who can easily trouble shoot and fix bugs. These staff should be library staff. For now, many libraries do not seem to have this staff profile. In the University of Jos, the Systems Unit has six Computer Science graduates who are working on the various digitization fronts of the library. One of them administers the Institutional Repository.

b. **Support from the community**: In terms of usage and uploading of content, the response from the academic community so far has yet to meet with our expectations, even after several rounds of sensitization. However, it is evident that more responses have been received after each sensitization programme. So, the library will have to keep going after the user community and content providers.

c. **Lack of adequate power:** The electricity power sector Nigerian is poor and it really affects the servers that house the repository. Power back ó ups, as they are, are not a permanent solution; they are a temporary solution for power exchange. We have had to experiment with three sources of power supply ó a 60KVA generator for the library, a 100KVA generator for the Universityøs Datacenter, and the Power Holding Company of Nigeria. In the past, we had solar panels with inverters as back-ups, but the batteries ran down because the wrong life-span was supplied. Librarians will have to determine the type and life-span of batteries before investing in them.

Prospects

Digitization holds great promise for preservation of materials, sharability of resources, and visibility of Nigerian libraries and institutions. The increase in Nigerian content on the Web will enable more meaningful and fruitful researches to be conducted through access to relevant data and literature. Nigerian libraries will also be able to communicate more professionally with colleagues in other parts of the globe. The choice and deployment of appropriate software will particularly bring contents together and provide a common platform for the exchange of knowledge in todayøs knowledge society.

According to Bashiru (2010), today, õthe global village is being described on the basis of ICT as information rich northern hemisphere and information poor southern hemisphere of which Nigeria is one. A major characteristic of an information poor society is Low-level ICT with minimum local content on the web for local and global consumptionö. Nigeria can only be part of this global movement by using ICT to bridge the gap and cross over.

Conclusion

Digitization and open access initiatives go hand-in-hand. Institutional repositories can bring about the transformation that is needed in the delivery of library services today. The use of free and open source software requires technical support which Nigerian librarians and developers

must rise up to. It is imperative that if Nigerian libraries must overcome the perennial budget costs, then, digitization must be seen as a ‒smartø solution that brings about the possibilities of sharing resources with other institutions that are richer and will easily put their resources in the public domain. But we have to first digitize our content and share the resources. This is the paradigm shift. It is a challenge of openness and visibility. It is a possibility. We have started. We cannot afford to look back. We have crossed the Rubicon, and cannot turn back.

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