Institutional Repository: the University of Jos Experience

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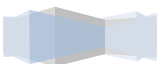
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Introduction

The University of Jos launched its Institutional Repository - http://dspace.unijos.edu.ng - in June 2009. It is open access. This was a realization of three years' dream. Between 2006 and 2009, there was a very high demand by both library staff and patrons to promote access to the University's resources. Automation in the library had started in the early 80s (Jos-Carnegie Project, 2006), and it soon became obvious that it was a journey that had a beginning, but knew no end. From 2006, the library benefitted from the university-wide capacity building intervention by the Carnegie Corporation of New York to develop human resources and automate, with the ultimate objective of making librarians and the library respond adequately to the dynamics of emerging Information and Communications Technology (ICT) moderated teaching and learning environment. Meanwhile, new approaches to library services, including a paradigm shift from librarian – centred service to client-centred were taking place globally. There was a global increase in the use of the Internet as a platform to offer library services. Institutional and library resources were increasingly displayed and accessed in real-time on-line over the Internet. It became attractive to librarians and clients alike as the most appropriate medium to offer library services. Moreover, many academic staff had carried out researches that were never published, or, published in a local journal that were inaccessible by other scholars outside of Jos.

The University of Jos was established in 1971 as a campus of the University of Ibadan. In 1975, it became an autonomous institution through an Act of Parliament. Academic curricular runs along 8 Faculties and four Centers (www.unijos.edu.ng). Undergraduate and post-graduate degree programmes are offered, with a few non-degree courses to meet the need of the socio-economic environment. Teaching and research are done using a mixture of traditional and electronic learning systems.

Electronic and collaborative learning was initiated in 1998 when the university joined the University of Iowa, Iowa City, United States of America, to register students in a one semester course – Internetworks in International Development. Instructors from both Iowa and Jos taught the students

using Internet facilities. The course enabled the students to learn how Internet works, the sociological imperatives and, the technology behind it. It also fostered collaboration as students communicated with each other across two continents – North America and Africa. The first set of students were staff of the university who learnt to digitize their thoughts, upload data and documents, through asynchronous communication with their Instructors and fellow students across the continents. The media used were the electronic mail and compact disk read-only-memory (CD-ROM).

During the same period, the University of Jos became a fertile ground to plant and grow the idea of an off-line digital library – the eGranary (http://www.widernet.org/eGranary/). The eGranary digital library, which has become resourceful in library practice today, was conceived to be a creative solution to a seemingly unending frustrating experience of prospective Internet users in the developing world in accessing the Internet. The identifiable problems include low bandwidth, poor infrastructure, especially power, and cost of access to resources on the World Wide Web. The eGranary solution was therefore 'Internet in a box' – 'plug and play'. Library resources, in some cases, web sites, were harvested from the web, with copyright permissions, and put together in a server which can be hosted at any institution that acquired it. eGranary currently has over 6million full texts and websites of academic resources. Attempts are now made to make it possible for respective institutions to upload local materials in digital format into eGranary so that academic communities across the globe can be adequately represented.

These were little beginnings that made the digital preservation and universal availability of institutional materials, especially research works of the University of Jos inevitable. The global emergence of software to manage institutional resources digitally only increased the desire. The creation of an Institutional Repository for the University by Library staff using free and open source software was therefore both experimental and logical.

What is Institutional Repository?

An Institutional Repository can be defined simply as the digital preservation of the intellectual output of scholars in an institution that is accessible to enquirers and researchers world-wide. It is online, interactive, and has capacity for growth. Clifford Lynch (2010) defines Institutional Repository as:

> ...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.

In a more elaborate definition, Wikipedia (April 2010) states that an Institutional Repository is: "an online locus for collecting, preserving, and disseminating -- in digital form -- the intellectual output of an institution, particularly a research institution." It goes on to explain that:

> For a university, this would include materials such as research journal articles, before (preprints) and after (postprints) undergoing peer review, and digital versions of theses and dissertations, but it might also include other digital assets generated by normal academic life, such as administrative documents, course notes, or learning objects.

The four main objectives for having an institutional repository are:

- to create global visibility for an institution's scholarly research;
- to collect content in a single location;
- to provide <u>open access</u> to institutional research output by <u>self-archiving</u> it;
- to store and preserve other institutional digital assets, including unpublished or otherwise easily lost ("grey") literature (e.g., theses or technical reports). "

Institutional Repositories can therefore be referred to as open access digital initiative of what was previously referred to as 'University Archives' - a manual collection of hard copies/texts of all works emanating from an institution. It is a growing concept. Institutions and nations all over the world are embracing the concept and translating this to an interactive global research collection. As of April 14, 2010, a total of 57 countries with 1525 IRs have been registered with Repository Maps and are visible globally. Nigeria is one of the countries listed. It is represented by the University of Jos. See <u>http://maps.repository66.org/</u>.

An IR immediately makes an institution and authors who deposit their work(s) visible because the repository usually follows some international standards and refined internet protocols with search engines. The content is, in most cases, open and access is unrestricted. However, there are different categories of works that researchers and authors can deposit. They include pure researches – self funded or other funded, researches leading to the award of degrees and diplomas, pre-prints and reprints of peer-reviewed articles. They also include lectures, full-length technical papers as well as presentations in all formats.

Harnad (2010) sees IR as an infrastructure for maximizing university research impact, and that universities need to adopt self-archiving policies, while libraries help with the "first wave of self-archiving". He also encourages funding agencies to make self-archiving as part of the research cycle, and that some form of scientometric performance indicators be developed to "monitor, and reward maximization of research impact through open access". An earlier research has discovered that self-archiving greatly increases citation impact (Lawrence, 2001) – "an average of 336% more citations to online articles compared to offline articles published in the same venue".

It is therefore obvious that an IR offers opportunities for self-archiving, preservation, open access, and research impact. The benefits include visibility and citation impacts for both the institution and authors(s). But, beyond this, the sharing of knowledge at every conceivable stage in the production process appears to be a great attribute of Open Access IRs.

Open Access

'Open Access' has increasingly assumed parallelism with 'Institutional Repository'. According to Ghosh and Das (2007, p.3), "The concept of open access evolved during 1991 due to the realization of the need to facilitate scholarly scientific communication". It was first embraced at a global level in December 2001 during the Budapest Open Access Initiative conference where the need to use the emergent Internet technology to freely share traditional scholarship of research was crystallized.

For IRs, Open Access therefore becomes a useful means of circulating knowledge. In other words, the authors, or creators of knowledge grant permission for unrestricted use of their content with due acknowledgement and, essentially, not for commercial purposes.

According to the Berlin Declaration (2003) the following conditions must be met to declare a work "open access":

1. 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.

2. 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.

Statement of the Problem

The introduction of search engines seemed to have signaled the end of any manual approach to searching and retrieving resources. Also, in the last few years, universities world-wide had been ranked based essentially, on their presence on the World Wide Web. This presence includes the visibility of the institution in terms of research output through publications and papers/monographs that are made available on their institutional web sites.

Since then, no Nigerian university has been able to make it to the first 4000 in the ranking of world universities. The highest ranking that any university in Nigeria got was . . . in the February 2010 ranking, where four of the country's over 100 universities were captured in the first 7000 universities world-wide out of over 18,000 universities ranked. Yet, scholars in the various Nigerian universities had been conducting research and publishing their results. However, it is apparent that majority of the publications could not gain international recognition because they had been published locally and most of the country's tertiary educational institutions had not been able to accommodate such publications in their web sites. Moreover, it is plausible to state that many scholars could not publish in foreign academic journals because of the inability to access foreign publication outlets, due to constraints bothering probably on inability to pay publication fees, rejection due to inadequate knowledge of previously published work in the disciplines, etc .

Meanwhile, more publishers were bringing out electronic and online versions of their journals. In all these, scholarly attention on campus turned to the library as the most competent and empowered unit of the university to bring appropriate solution to the intellectual conundrum. The challenge for the library became very clear – be part of the revolution, play a leading role or lose relevance. It was this definition of the situation that provoked the response of the library to finding a digital solution for the demand on hand.

The Institutional Repository of the University of Jos was therefore a necessary response to a real situation that was fast becoming uncontrollable.

Methodology

The methodology adopted in establishing the Institutional Repository is both scientific and historical. Scientific, in the sense that a haphazard sample of Open Institutional Repositories on the World Wide Web were evaluated for security, interoperability (ability to integrate with other open source archives), ease of deployment, ease of administration, platform of archiving (open source or proprietary), and community (how many users in the community, and what categories of users?). Those evaluated were BE Prints, DSpace, Fedora, and Electronic Theses and Dissertations (ETD). Historical, because documentation on DSpace was read, analysed, and applied.

Previous efforts at digitization in the University of Jos were also evaluated in order to determine the factors that had accelerated or decelerated the process. This is so as the creation of an Institutional Repository is apparently a digitization process. *Digitisation* can be defined as "the process of preserving, liberalizing and internationalizing access to documents with the ultimate aim of improving their usability by converting them into digital form".

We opted for DSpace because we discovered it had an over-all edge over the other software for Institutional Repositories. It could be mounted on any web server, is java-enabled, and compatible with PostgreSQL database which we use for Management Information System and the web server. Moreover, customization was possible, enabling us to provide links to some of our other collections such as the eGranary Digital Library on the site. Since the University of Jos operates a central clustered server system in a data centre with UNIX operating system and PostgreSQL database, it was therefore natural for us to opt for DSpace.

However, before migrating into the main server, we had successfully mounted the software on a stand-alone configured server using Internet Explorer as browser. We preferred to host the server in the library based on our previous unpleasant experience of having library servers based in the Computer Centre, but had to defer to the new University's Information and Communication Technology policy statement that all servers on campus be hosted centrally. The new network architecture on campus was favourable to clustering, especially Internet Protocol addressing.

Our previous experience was that whenever there were challenges of power supply to servers, the library servers were easily the victim. Many times we had to remind the server administrators in the Centre that library servers were down. Then, we acquired solar powered battery inverters and a 60KVA generator through the Educational Trust Fund, to supply uninterruptible electric power to the library, because of the erratic power supply on campus. These served the library very well.

One of the questions we had to answer initially was whether to source out digitization. This was a particularly critical question when we were about embarking on digitizing our library catalogue. Then, we opted to do it in-house, with the support of consultants from outside. We considered that we would build capacity through acquisition of skills and infrastructure in the process. However, it was taken as a 'special project' within the library. We therefore have a Project Team with a senior member of staff as Project Manager and members drawn from the Systems Unit, Cataloguing Section, and the Dissertations

and Theses Digitisation project – Database of African Theses and Dissertations [DATAD] (another 'special digitization project' of the library which began in 2004 with support from Carnegie Corporation of New York, coordinated by the Association of African Universities (AAU) Headquarters in Accra, Ghana). The IR has been taken as a 'routine' library task for now.

Result

Having made a decision on the software, it was time to implement. However, the Systems Unit of the library, up till September 2008, had only one Librarian, one Systems Analyst/Programmer – who was away on Study Leave, a Technical Assistant, and a Data Entry Staff who were overseeing three Computer Laboratories spread across three campuses of the university. In addition, they responded to troubleshooting needs of staff and patron systems. So, they were overwhelmed.

However, in September 2009, four additional staff were recruited for the library and posted to the Systems Unit because of the impending deployment of the Library Management System. We also had a Corper on National Service posted to the Systems Unit. All five (including the Corper), were Computer Science graduates. None of them had any prior experience with any library software.

While the infrastructure for the Library Management System server was being put in place in the university's data centre, it became imperative to engage the new staff by challenging their creativity. The concept of an Institutional Repository was introduced to them. They were requested to read literature on Institutional Repositories. They were specifically given documentation on DSpace to read and assess. They were mobilized into a Team to download, install, and deploy DSpace as the University of Jos Institutional Repository, within one month. The Systems Librarian gave the guidelines and provided them with necessary reading resources as well as links.

The team of five shared out aspects of the DSpace documentation to study. Their first challenge was to find systems to install the demos and practice with. Up till that point in time, none of them had an official system to work with. However, we were able to mobile two desktops for them to dump and practice with. Most of them had their personal computers which they used for the assignment. Another new system was provided which they configured as a server, since we had no server in the library. Within the month, they were able to finish reading the documentation, install DSpace, and write and set the necessary parameters through testing.

Just after the Team was constituted, the Systems Librarian intimated members of the University Web Team and the network staff that the library was embarking on an Institutional Repository which might require their involvement at some point. This was to prepare the ground for their eventual involvement. The Web Team would be required to provide directories for the Institutional Repository and point to it on the university's home page. The Web Team would also effect the search engine on the main university's site to search the IR. The network staff were critical in making the repository come live both on the Intranet and Internet.

Thus, precisely after one month, the team delivered. It was a very memorable and exciting day for the Systems Unit. DSpace had been successfully installed, tested, the handle obtained, and we came live on the Internet! The university network team was very critical at this stage as they provided the

assigned public Internet Protocol address and created space for the server to be recognized in the university's gateway.

Meanwhile, while the Systems' IR team was working, decision on what type of material would be made available on the Institutional Repository was also being made: Would it be born digital or converted materials? What would be the selection criteria for items to be digitized - since up till then, there was no digitization policy in place? It was decided that born digital materials would easily be captured, and shall receive priority. Other materials could be converted using available flatbed scanners, until we were able to put in place a policy and acquire and set up appropriate equipment for digitization.

Features

Perhaps the most significant feature of our IR is the self-archiving facility, whereby individual authors are able to upload their research, presentations, and published works into the repository. This is done by meeting the metadata requirements in the workflow. The workflow is a systematic process – covering the stages for submission of a work - from . . . to . . . Initially, this appears cumbersome; but as the fields are being filled, the 'archivist' begins to feel a sense of fulfillment until the submission is approved for publishing and the archivist is able to see his/her work on the world wide web resulting in a sense of accomplishment.

One other significant feature of DSpace as adapted by the University of Jos is its customizable capability. It is such that the front page can be customized to meet the appropriate need of particular users and audiences, both in terms of skin and structure of data. There is also the freedom to adopt appropriate name for the site, all of which we took advantage of. For instance, we were able to utilize the right column of the front page to provide links to other useful resources of the university, such as the eGranary digital library, the Database of African Theses and Dissertations (DATAD) project of the Association of African Universities (AAU) for which the university is a project partner and has contributed over 2,000 records of Masters and Doctoral theses and dissertations.

Collections in IRs are organized into areas that would most likely be accessible by clients. Therefore different institutions organize their collections depending on their perceived understanding of need of their clients. The collections in the University of Jos IR are organized into Faculties and special areas. Thus, we have works of individual staff within the collections of their academic departments under their corresponding faculties, while University Lectures stand as a separate collection. The lectures include Convocation Lectures, Distinguished Annual Lectures, Inaugural Lectures, and Postgraduate Open Lectures. Journal publications of the respective departments and faculties are placed accordingly, in their respective units. However, it is expected that feedback from use of the IR and the need of clients will continue to guide the organization of the collections since the IR is, essentially, client-centred.

Yet another feature of the IR is the search facility which offers general and Advanced Search capabilities. Similarly, browsing can be carried out in the site by Communities and Collections, Issue Date, Author, Title, or Subject. One unique feature of the Unijos IR is the ability to search the repository through the University's Home page.

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Post-Installation

Having come alive, the next assignment was to draw out a policy for digitization. The library had in the last two years been working on its Collection Development Policy with some consultants to include electronic resources, and had already produced a draft. Now, there is need for a complimentary policy on digitization. This was drafted and is presently being reviewed in the library before involving other stakeholders such as the academic faculty, and the university administration. Issues considered in the digitization policy include: selection of materials for digitization, data management and preservation (workflow), equipment for digitization, metadata, standards, risk management, evaluation, marketing and promotion, collaboration, training and research, ownership and intellectual rights, access, submission and uploading (also an issue of workflow), and policy review.

Moving along with policy drafting is *marketing and promotion*. The objective here was to sensitize the university community sufficiently that they would embrace the newly created IR and actively contribute to populating it. Immediately after coming live, the Systems staff called a meeting of all library staff to report to them the new significant development in the library and challenge them on the expectations that come along with such innovations. The site was demonstrated, navigating through all the links and answering questions raised. It was quite appreciated.

The next group invited to the library for the demonstration of the new facility was the Principal Officers of the University. The team was led by the Vice Chancellor who commended the library's effort and encouraged further user-friendly innovations. The Vice Chancellor invited the IR team to come and do a demo at the Senate.

The interaction with Senators was particularly productive. The Library's effort was greatly commended. The Vice Chancellor challenged lecturers to add content to the site. Many lecturers promised to do so. Since then, we have had many lecturers' works as well as Faculty and Departmental Journals submitted for uploading. Many lecturers have come up to express appreciation that they had hoped one day to be published online, and now, their dream might soon be realised. Others remarked that they would want to know how they could upload by themselves.

The next step in marketing and promotion was to take it to the Faculties and Departments. The first presentation was done in March 2010. Topics covered during the interactive session with the respective Faculties and Departments included: Introduction to Unijos Institutional Repository, Selection of materials to upload, the Workflow, and Intellectual Property Rights. The presentation to the Faculties and Departments generated so much interest among the academic staff. There was a general acceptance of the IR as well as readiness to learn more about the IR and, especially, interest in the process of submission of publications/research works for archiving. It was agreed that, since most of the lecturers were just getting to learn about the IR, those that would not be able to self-archive their work immediately could submit them to the Desk Officer for IR for uploading. Follow-up demonstrations would also be done in order to give more opportunities for lecturers to properly understand the workings of IR and be fully involved in taking full advantage of the facilities offered through the service – including archiving, searching, and Internet browsing through Google Scholar, etc.

Discussion

Having successfully installed and launched an Institutional Repository is only the beginning. Great work lies ahead. Good institutional Information and Communications Technology infrastructure (– uninterruptible electricity supply, effective networking and Internet connectivity) is critical. It is imperative that international standards be followed in the selection of software, uploading, and metadata. The acquisition of appropriate equipment is necessary for an effective digitization effort. Adequate funding is critical. Marketing and promotion is essential if there would be quality, steady, and good growth in the content of the repository and use of deposited materials.

From our experience so far, it is obvious that staffing is a critical issue. For a successful installation and hosting of an Institutional Repository, committed library staff are needed. Librarians must necessarily work with Information Technology staff in the library and on campus in order to accomplish an institutional objective of promoting research and publication. Staff that would scan content may be tenure or ad-hoc. The ad-hoc staff could be Student Interns or Assistants.

Institutional Repositories are seen as contributing local content to the World Wide Web, and not necessarily only to gain visibility. Africa, and in particular Nigeria, are, in terms of content, presently under-represented in the World Wide Web. According to Internet World Statistics (2010), as at June 2009, Africa constituted only 3.9% of world users; while Nigeria, with 11.0%, is second to Egypt – 12.6% as Africa's leading Internet users. Repositories which guarantee easy access to local content may well be a strategic way of increasing the country's and continent's presence on the web.

This is in line with results from Ithaka's longitudinal study of Key Stakeholders in the Digital Transformation in Higher Education, where it was discovered that library goals for repositories are mainly for "building and preserving an organized collection of an institution's intellectual assets"(Housewright and Schonfeld, 2008, p.25). When such assets are organized and made available through an open access initiative such as IR, the resources of the institution becomes more easily available to the global community, with the likely result in a higher citation impact of research works of the institution.

Librarians must decide on the most appropriate way to approach digitization – either as a special project or as a routine duty. The most effective approach would take into consideration, among other things, the availability of skilled staff, equipment for digitising, office space, and budget. Special Project approach requires a Project Management Team with specific task(s) to accomplish in a specific time-frame, by designated staff, with special budgetary allocation, and is result-oriented. 'Routine' approach is not necessarily time-bound, may or may not have designated staff, special budgetary allocation, and result is often tied to bureaucracy and disposition of the staff in charge or head of library or institution.

Conclusion

The deployment of Institutional Repository using DSpace has brought the University of Jos to prominence among universities in the world. Since the creation of the university's IR, the University, for the first time, became one of the highest ranked in the world webometric ranking. In the January 2010 world webometric ranking, the university was ranked as the 4th in Nigeria (out of 106), the 74th in Africa,

and the 7000th, in the world. This achievement is largely attributable to the content of the IR with its metadata facilities. Presently, any work deposited in the Institutional Repository is captured immediately by Google and can be searched through the search engine. Respect as well as support has come to the library. Librarians are challenged to lead faculty in the new migration to the digital world. It has been a journey well thought of, a path well taken, a result most fulfilling, an excitement worth celebrating, and a project worth sharing. The concept of an Institutional Repository as self-archiving and enhancing access to scholarly research is most desirable and practicable. This is the story of the University of Jos Institutional Repository.

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