

***Managing Digital Information Resources in Africa:
preserving the integrity of scholarship***

by

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Introduction

Today scholarly information is increasingly being produced in digital formats. Almost everyone involved in the knowledge production process, prefers the electronic form. These actors could be the creators of knowledge, the publishers of knowledge and the people that are finally responsible for permanently storing the resulting knowledge. It is attractive to the author, publisher, vendor and libraries for the simple reason that the electronic form has revolutionized the way knowledge is produced and disseminated to the end user, usually in a fast, timely and efficient way. Although the creators of knowledge, publishers and librarians alike are all motivated by various factors, they are agreed on the potential the electronic medium brings to the knowledge production process. For libraries, it is changing the way the librarian acquires, processes, stores and delivers information to users.

Permanent access and storage of recorded knowledge resources have been the cornerstone of libraries for centuries. Libraries have prided themselves with having the privilege of being entrusted with the permanent storage of the results of scholarship. Preserving the integrity of scholarship is one of the greatest challenges facing librarians and information professionals the world over today. In Africa the issue comes very much to the fore because of the prevailing conditions and the state of the continents knowledge resources. What should libraries and interested institutions in Africa be doing to ensure not only the permanent storage and management of effective sustainable digital collections but most importantly on preserving Africa knowledge base? How do we ensure that digitally available knowledge resources will not be altered? How will integrity be maintained? Who and how do we archive these knowledge resources? This paper seeks to understand the effects of the increasing production of digital information resources on the task that libraries are faced with in preserving the integrity of scholarship in Africa. These are tasks that libraries are faced with in the digital environment on a daily basis. The study will tackle the issues of permanency, accuracy, and integrity of stored digital knowledge resources.

Five Rules of Librarianship

Librarians have been adapting to the digital environment to make meaning of Ranganathan's five rules of librarianship. These five rules are as relevant today as when he wrote them years ago:

Books are for use.

Every reader has his or her book.

Every book has its reader.

Save the time of the reader.

The library is a growing organism¹

Noruzi (2004) revised these laws in the context of what they would mean for information provision in today's digital environment:

Web resources are for use.

Every user has his or her web resource.

Every web resource has its user.

Save the time of the user.

The web resource is a growing organism

¹ (SR) Ranganathan in his classic *The Five Laws of Library Science* (Bombay: Asia Pub. House, 1963).

In an article arguing the relevance of these laws in today's digital age, Cloonan & Dove (2005) also came up with a comparison of the Ranganathan's five laws of librarianship and what they would mean in today's environment. Their comparisons are summarized in Table 1

Table 1. IMPERATIVES MOTIVATED BY THE 5 LAWS: THEN AND NOW		
The Law	In Ranganathan's Day	In Today's World
Books are for use	Put books in circulation—not just on the shelf	Make sure online resources are available where and when they're needed
Every reader, his book	Break down barriers to the principle of education (and books) for all	Eliminate the obstacles that prevent users from making effective use of electronic resources
Every book, its reader	Open the stacks; provide a well-cross-referenced catalog	Integrate electronic resources into virtual learning environments and other web pages of the institution
Save the time of the reader	Create effective catalogs for speeding the readers' search for particular books	Provide metasearching capabilities so that users can search entire sets of electronic resources. And link resolvers so that readers get access to the best source
A library is a growing organism	See libraries as part of the larger community	Offer 24/7 anytime, anywhere, access to libraries; the Information Commons; the Invisible Web

Source: Michèle V. Cloonan & John G. Dove — April 1, 2005

The American Library Association Bill of Rights² goes further to assert that:

Books and other library resources should be provided for the interest, information, and enlightenment of all people of the community the library serves. Materials should not be excluded because of the origin, background, or views of those contributing to their creation.

Libraries should provide materials and information presenting all points of view on current and historical issues. Materials should not be proscribed or removed because of partisan or doctrinal disapproval.

Libraries should challenge censorship in the fulfillment of their responsibility to provide information and enlightenment.

Libraries should cooperate with all persons and groups concerned with resisting abridgment of free expression and free access to ideas.

² American Librarian Association. Library Bill of Rights. Accessed on 9/12/2006 1:04:44 PM <http://www.ala.org/ala/oif/statementspols/statementsif/librarybillrights.htm>

A person's right to use a library should not be denied or abridged because of origin, age, background, or views.

Libraries which make exhibit spaces and meeting rooms available to the public they serve should make such facilities available on an equitable basis, regardless of the beliefs or affiliations of individuals or groups requesting their use.

If the mainstay of Ranganathan's five laws of librarianship and the American Library Association Bill of Rights is the issue of "making information accessible to everyone", then the duties and responsibilities of libraries should be focused on meeting this challenge regardless of the era and the format in which the scholarly information is packaged in.

Today, it is not unreasonable to envisage a situation where in future all scholarly communication will be entirely in electronic format. Fenton & Schonfeld (2005) argue that "for most scholarly journals, the transition away from the print format and to an exclusive reliance on the electronic version seems all but inevitable, driven by user preferences for electronic journals and concerns about collecting the same information in two formats. But this shift away from print, in the absence of strategic planning by a higher proportion of libraries and publishers, may endanger the viability of certain journals and even the journal literature more broadly — while not even reducing costs in the ways that have long been assumed".

However, African countries are clearly not preparing for such eventualities. Whilst the whole world is striving to stay and keep ahead of the digital environment, the continent has still not moved any further in preparing for Africa's knowledge resources in the digital era. Most of the higher institutions of learning are still largely dependent on print resources in accessing knowledge resources. At the University of Zambia, there are yet no strategic plans on how to interact with the digital information resources. The situation is similar in other African countries. This trend is likely to continue to the extent that countries and institutions that are not taking preparatory measures today in handling the situation will be left out in accessing knowledge resources that are in electronic form, whenever the print form is no longer available to them.

State of the Africa's Knowledge Resources

Africa's knowledge resources can be characterized into three broad categories: knowledge printed and published on the African continent, and knowledge printed and published in the northern countries, and knowledge resources produced and not printed in Africa, commonly referred to as 'grey literature'. This knowledge resource (grey literature) is not only huge but not well organized and not easily accessible. As it is often unorganized, it is usually scattered and found in people's homes and offices, and recently on the internet through self-publishing. The huge number of papers presented at conferences and workshops if they were to go through a peer review process and then strengthened so that they find their way in different publication outputs, could be an enormous contribution to Africa's scholarship. If this knowledge resource is well organized and made accessible it could become a potential source of knowledge upon which to base future generations of knowledge production.

Studies done on publishing in Africa show a steady increase in research output in the continent's own periodicals and books published on the African continent. However what is lacking is the diversity and plurality of the periodicals in many of the countries. In some of the African countries, for instance, there might be one journal for medicine, history, literature etc. Yet in some of the countries, the journals simply do not exist. Diversity and plurality will encourage and strengthen the research output so that knowledge resources are professionally produced in journals that are indexed worldwide in order to allow for wider access to the knowledge.

In a study by Hofman et al (2005), it was observed that Sub-Saharan Medical and Health Researchers were publishing more of their research output in northern countries as compared to their own countries. They also concluded that when publishing in the Sub-Saharan African region, researchers tended to publish predominantly in their own country's journals. (See Table 2.)

**Table 2. Where are SSA African Authors Publishing?
1995-2004**

Country	SSA	Europe	USA	Canada	Other	Total
South Africa	2469	5638	3549	67	470	12193
Nigeria	1981	2120	402	9	215	4727
Kenya	570	852	431	1	73	1927
Zimbabwe	409	406	155	1	20	991
Senegal	366	498	107	2	8	981
Ethiopia	406	350	107	2	20	885
Tanzania	138	462	105	2	12	719
Uganda	162	352	120	3	33	670
Cameroon	37	445	153	8	21	664
Ghana	149	361	111	5	34	660
Total	6687	11484	5085	100	1061	24417

The arrival of electronic journal publishing is posing several challenges to African institutions' access to knowledge resources. Electronic journal publishing encourages policies where access will be allowed to electronic information for instance but not that institutions in Africa or anywhere in the world should electronically archive this information within these institutions once access has been granted³. One would argue that such a process would guarantee African Institution's permanent access to those resources that they subscribe to via online. However, the issue of permanence in electronic journals is currently under debate and commercial publishers are generally not willing to let go of, the control of the information that will enable them to earn massive profits for years to come. According to Adebowale⁴, a deal by a group of Ohio University and college libraries struck with Elsevier for \$6.3 million for 1000 electronic journals. It is difficult to imagine that there are universities in sub-Saharan Africa that can afford \$6.3 million for

³ Warner, Dorothy. Why Do We Need to Keep This in Print? It's on the Web ...': a Review of Electronic Archiving Issues and Problems". Progressive Librarian. Issue number 19-20, Spring 2002. http://www.libr.org/PL/19-20_Warner.html [09/01/2005].

⁴ Adebowale, Sulaiman A. 2001. The scholarly journal in the production and dissemination of knowledge on Africa: exploring some issues for the future. African Sociological Review. 5(1).

1000 journals. And yet in the print era, most universities were subscribing to well over 1000 journals.

The issue for African libraries is whether electronic journals are going to be less expensive as compared to print subscriptions in the long term. However the trend shows that publishers are hoping to reap massive profits and there is no sign yet that the electronic subscriptions are going to be cheaper. The choices however might not be so simple for African libraries, because if the market trend is that electronic journals is the way forward for commercial publishers in terms of profits and user base, then there might be no print journals to talk about in the future.

Specificity of Preservation Issues in Africa

Preservation of information resources although in general follow the various agreed standardized formats; these are highly impacted upon by the local realities of the implementing organizations. In African institutions these factors are attributable:

Information Policies

Most African countries have no policies on handling information be they in print; let alone in electronic format. In Zambia, years after independence they are still struggling with enacting a libraries act and as a result most institutions operate within a no policy framework. An enabling policy framework would allow institutions to implement various preservation strategies that are inline with their own parent institutions but operate within the overall country policy framework. These policy frameworks are essential especially if they can feed into broader continental policies such as the NEPAD initiative (The New Partnership for Africa's Development which is a VISION and STRATEGIC Framework for Africa's renewal⁵). The NEPAD initiative itself is very silent on the preservation of Africa's knowledge resources although it places prominence on the improvement of information and communication infrastructure (ICT). The improvement of ICT infrastructure will do well if there are policy frameworks at the country level that support

⁵ What is NEPAD?.

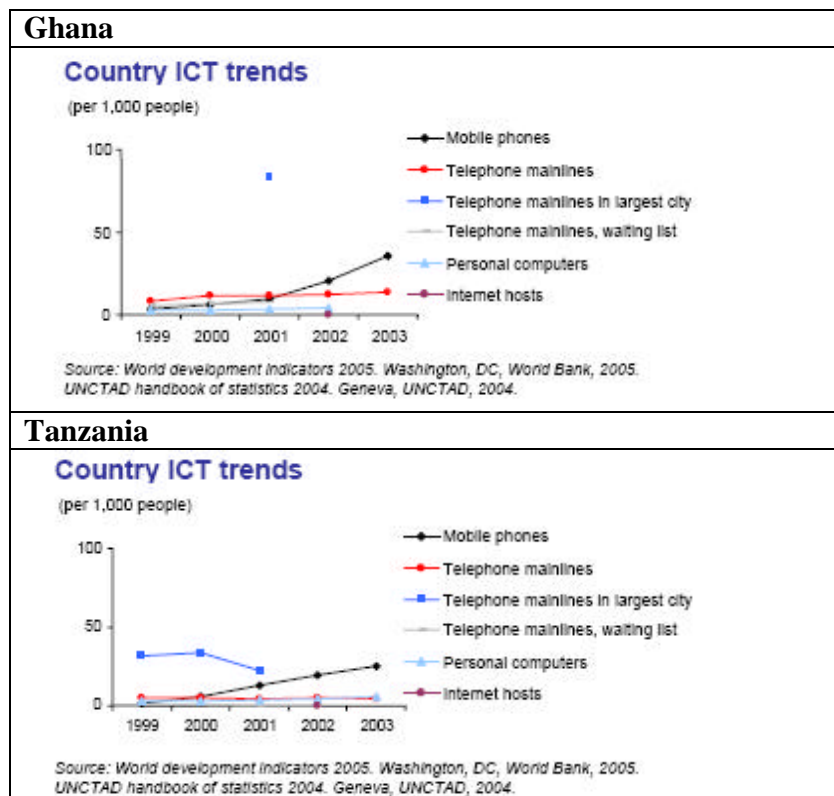
<http://www.nepad.org/2005/files/home.php> Accessed on September 1, 2006

the preservation and permanent storage of African knowledge resources wherever they might be found and in whatever format they might in.

Infrastructure

Africa’s infrastructure is still lacking in handling large preservation of knowledge resources, especially resources that are in electronic form. Access to ICT facilities are a daily struggle for most institutions, that are just barely managing to maintain access to print resources to be able to meet the daily requirement for academic learning in higher educational institutions. Surveys done by the World Bank and UNCTAD indicate low levels of IT diffusion throughout sub-Saharan Africa. Table 3. gives the country ICT trends for Ghana and Tanzania.

Table 3: COUNTRY ICT TRENDS FOR GHANA AND TANZANIA



In sub-Saharan Africa, government agencies are still operating in a paper based environment. Most countries are still struggling to even make the policy decision to move to an electronic environment in daily government operations. In a study by Kaaya (2004) “conducted to determine the pattern of e-government adoption from 1998 to 2003 using the three East African countries of Kenya, Tanzania and Uganda”, it was determined that there was slow adoption of e-government services. This slow pace was attributable to “resource constraints, lack of pressure from governments, and lack of demand from potential users”, Kaaya (2004). This was also compounded by unreliable facilities such as electricity and telephones.

However the real issue is that the citizenry has not yet realized the power of the digital media to demand that most government services and polices be made available to them via the internet for faster and broader dissemination. It certainly seems that the government officials are not so worried about this state of affair because it is a convenient excuse as an uninformed populace is easier to manipulate and govern.

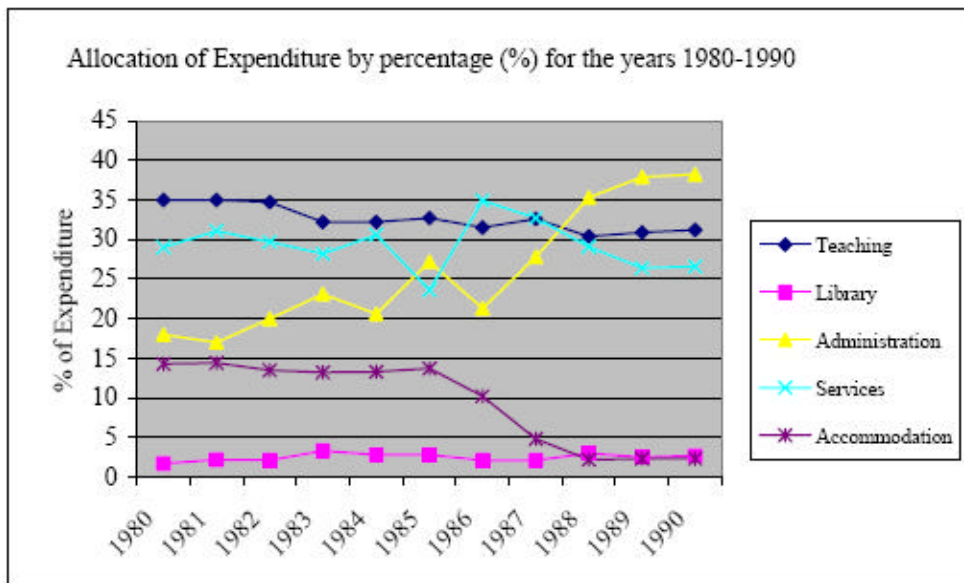
Financial Constraints

Preservation of knowledge resources is a continuous process not just a one off issue. To implement an effective and efficient preservation policy, there is need for commitment at both the institutional and national levels that preservation of the knowledge resources will be an incremental process that will be carried on from one generation to another. This effort entails that financial resources be committed to such a venture over long periods of time.

Higher education libraries in Africa have been cutting down on book and periodical subscriptions. In a study on funding for university libraries in Zambia, Simui & Kanyengo (2003) concluded that over the years the funding to the University of Zambia library from the University central administration had been dwindling. (see Table 4). This trend in funding has affected all areas of library operations including money that could be allocated for preservation of scholarly information materials. It would therefore, require

commitments of substantial financial resources in terms of training personnel to keep abreast of the technological developments in the information technology industry. Financial commitments would also be needed to purchase and preserve the digital knowledge resources to permanently make them accessible to users, now and in the future.

Table 4: Allocation of Expenditure by percentage (%) for the years 1980 -1990



Source: Simui & Kanyengo (2003)

Technical Knowledge

Technical knowledge on the digital elements of electronic documents is largely lacking among staff that are in preservation departments. The presence of preservation departments in most of the higher educational institutions is really in name only as most of them concentrate on book and journal binding. This is coupled with the lack of preservation training. This lack of knowledge extends to deficient know-how on the equipment and software that is required for the preservation of digital information resources. Amongst the library and information science schools that do offer training in preservation, they only do so at a theoretical level.

Digital electronic resources change formats frequently. This is unlike the paper format which has relatively changed very little since it was discovered as papyrus in Egypt 3000 BC. The electronic document is fairly new and has changed forms since then. If it is not the document changing from MS Word, PDF, html XML etc; it is the software requirement to be able to open and read the document. For example, if the document is in PDF you will need a PDF reader; JPEG would require a JPEG; just as a TIFF formatted document would require a Tiff reader. This means that institutions are always forced to change the facilities so they can meet various requirements such as software and hardware. Digital preservation presumes that there should be constant and continuous learning on the part of preservation staff both in software knowledge as well as hardware. This is because digital preservation methods are always changing depending on the nature of the hardware and software applied.

Legal Barriers

Digitization of information requires obtaining copyright permission from various publishers to be able to duplicate anything in large quantities. However, most licensing agreements for journals or books produced by major publishers prohibit duplication of electronic documents or local storage of the document. What is allowed when one has a subscription is usually the online access to the particular journal for instance, without the subscribing institution having permanent access to content of the journal. Once subscription ends, access to the electronic content of journal is not possible. It is unlike in the print subscription model where once one has subscribed to the journal, the institution will have permanent access to the journal because the journal will be physically present in the libraries own space.

Copyright is another complex process that libraries should study and teach to their particular constituencies so that it could be used to their own benefit. In the book form it was always clear how the library would use the material through photocopying. In the electronic form, the copyright law is interpreted on various agreed terms with the publisher or vendor. Typically licensing agreements would include: "What format will the information be provided to you? (i.e. CD-ROM, diskette, online?); Will you need to

access the information from the owner's server?; If you are receiving a CD-ROM, will it be in working order and free of defects?; If you are accessing the owner's server, what about server problems? Will there be back-up servers?; Will the owner provide technical support? ; How often will the content be updated? Monthly? Weekly?; or Will you be notified of changes to content? (Harris, nd⁶)". These licensing agreements are not standardized and may vary from negotiating library to another depending on who has the best legal knowledge of copyright laws and licensing agreements. There are daily disputes in settling the issues of creator, ownership and user of the knowledge and people that would like to reap benefits from that knowledge resource. There in lies the dilemma – how to balance the rights of the creator of knowledge and also be able to apply the principle of 'fair use' of knowledge resources for all people. Therefore protection is needed to ensure that everyone benefits from the knowledge resources.

The digital environment envisages, self publishing so anyone with access can publish their on the Internet, without having to subject the work to a peer review process. Firstly, peer review process is important especially in scholarly publishing so that knowledge produced and presented to the outside world is based on sound empirical evidence. Self-publishing poses several dilemmas for libraries and librarians in evaluating and choosing what to collect and preserve for their user base. Secondly, self publishing would mean that libraries will have to get permission from individual authors if they are interested in the document. This increases the work load as opposed to dealing with a single publisher who publishes several works in different fields. Thirdly, because libraries have to maintain high standards in collecting works that should be used for future scholarship, even if a knowledge resource might appear to be of interest, one cannot always be sure that it can stand up to peer review scrutiny. Fourthly, there is no guarantee on the permanent availability of anything found on the internet. The fact that a library has made a link to that particular resource; and it is a popular link amongst students and faculty of an institution; does not guarantee that one would have access to it in perpetuity. If one does not have the electronic document in their institution, then you do not own it and you might not have access to the digital resource the next minute you access the internet.

⁶ Not Dated

Digital Technology Challenges

Digital technology poses several challenges in the preservation of digital information resources. These are among others; technology comes in different formats, the cost of maintaining international standards of digital formats is expensive as it is often based on paying for upgrades to match the technology both the hardware and software. These come with subscriptions costs; so in essence a library would have to subscribe to hardware; software and then to the electronic journal. This is as opposed to print-based journals where once a journal is bought there are no other costs to be incurred from the publisher. Webb (2003) argues that these challenges are “intrinsic to the problem, such as the rate of technological change, the widespread use of proprietary software, and the rapid increase in the quantity and complexity of digital objects; including poor access to existing technical knowledge which may only be available on the Internet; the high cost of obtaining international standards”.

Strategies for Permanent Access to Digital Scholarly Resources

The electronic environment is complex. Information is constantly changing all the time. At the moment it should be imperative that institutions especially universities and research institutions in Africa should be providing leadership in looking for solutions that will ensure preservation and permanent access to the Africa’s digital information resources. This leadership should of course be operating within the framework of an enabling governance policy framework. These solutions should encompass both technological, scientific, research as well as documentation and archival skills.

These solutions require an enabling policy framework both at institutional level; governmental level as well as at the continental level. The solutions should be spearheaded by research and higher educational institutions at country level. At the continental level, regional organizations such as the Council for Social Science Research in Africa (CODESRIA), Association of African Universities (AAU), African Capacity Foundation and others should be leading the process of encouraging universities and

research institutions to come up with policies of ensuring permanent preservation and access to Africa's knowledge resources. As the popular saying goes "we do not own this world, we have only borrowed it from our children", today's knowledge resources should therefore be preserved for future generations. It will be tragic if today's Africa's knowledge resource is not preserved because the current generation fails to preserve Africa's digital knowledge resources. There are several strategies that could help libraries in making permanent, preservation of digital information scholarly resources. However focus will be on the following: enabling policy environment, standardized archiving policies, training in modern methods of preservation, and funding. These strategies are discussed in detail:

Policy Framework

The challenges posed by digital environment have led to the "interdependence between the stages of creation, use and preservation of digital resources and the legal and economic environments in which they operate (Joint Information Systems Committee, 2001). An enabling policy framework will provide guidance on where the continent is coming from and where it is headed to. This policy framework should begin at the institutional level before it is incorporated at the national level and then this would lead to the regional level. Lastly, all these efforts should feed into the continental framework preservation policy framework. Such a policy framework should consist of components that would ensure that there will be permanency in Africa's knowledge resources whether they are in print or in digital form. These components should include among others: Collections - what subjects should libraries collect information resources on – it should follow the collection development policies of their parent institutions; Objects – what are the digital information resources that should be collected. The format here is important especially if there will be sharing of information resources with other libraries; Metadata –what are "structured data which describes the characteristics of a resource. It shares many similar characteristics to the cataloguing that takes place in libraries, museums and archives"⁷ and Projects – what needs to be done in order to preserve that information.

⁷ Taylor, Chris (2003). What is Metadata
<http://www.library.uq.edu.au/iad/ctmeta4.html>

Standardized Archiving Policies

Standardized digital archiving policies are crucial towards achieving the goals of having permanent access to Africa's knowledge resources for universities and research institutions. Although it is too early to talk of standardization because the digital technology itself is just evolving, prudence calls for institutions to start thinking and strategizing about standards. A uniform standardized preservation policy that can be initially done through consortia via universities and research institutions will reduce costs on several levels; one on the costs of each archived document as one institution will work on it but eventually be made available to all members of the consortia or network as opposed to each member of the network working on the same document. This also means that the institutions can coordinate their collection development policies so that in a networked electronic environment; they allocate themselves subject areas in which to collect and archive information which will be eventually shared by everyone. Of course there are those institutions whose mandate is to preserve national resources such as national libraries and they should be allowed and encouraged to continue with their mission which is really to preserve the memory of their own countries.

Deliberate efforts should also be made towards the sustainability of the digital collections. There is no point in coming up with a digital collection that will have a limited life span. It is important that whatever digital collections are acquired, they should be inline with the overall collection development policy of that particular institution. The collection development policy should therefore fit within the overall objectives of the mission of the parent organization otherwise it will be rendered irrelevant. Digital collections that are made with the use of outside funding should also fall within the mandate of the implementing organization and plans should be worked out so that the digital collection project does not die after the outside funding organization has stopped. A digital collection is like any other collection of information resources that needs to be periodically monitored and evaluated for consistency and relevance to the mission of the organization.

Training in modern preservation methods

Introduction of preservation courses in various training programmes that deal with the digital archiving should be encouraged. These should cut across all disciplines so that institutional repositories of members of staff of particular universities and research institutions do their own archiving within the laid down procedure and standards of their institutions. If the training is coordinated amongst the African institutions, it would ensure that repositories that each institution is building follow similar procedures and guidelines that should be ideally agreed upon by various institutions across the continent. This will make it easier for them to share their institutional repositories, should they need to in future.

Mainstreaming the curricula in library and information science is especially important because digitization is a specialized discipline in itself. Efforts should be made within the library schools of working together to be able to integrate this increasing important element across all school curricula even though some school can specialize in certain aspects of preservation.

Funding

Digital Preservation is a costly process especially for countries in Africa that are coping with various problems, of disease, poverty and general low levels of economic development. However it is essential that funding be made available at all levels, institutional, country, regional and the continent for any continental preservation strategy to be effective. This funding should be all encompassing, i.e., it should be for training, infrastructure and software needed for the preservation process.

Conclusion

There are several policy implications that need to be addressed to promote permanent access to digital scholarly resources on the continent. Institutions should be thinking of strengthening the local publishing environment so that the African continent has access to its own knowledge resources; develop local capacity in digital preservation in all fields and at all levels; develop regional collaboration between African universities and

institutions to ensure systematic development in digital preservation; encourage the leadership of regional research institutions and trust them with taking the process forward; and fostering partnerships between developed countries and African countries. Most importantly there is need for the development and improvement of the policy framework that will deal with permanent access and availability of digital information resources both at institution, country, regional and continental levels. Any strategies employed should take cognizance of Africa's knowledge resources held in publishing houses outside the continent, and therefore ensure that future generations in Africa have guaranteed permanent access to that digital content.

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