

# CODESRIA CONFERENCE ON ELECTRONIC PUBLISHING AND DISSEMINATION

1-2 September 2004, Dakar, Senegal

## Scientific content creation and dissemination: opportunities for African universities in electronic publishing

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### Abstract

*Africa has made some strides in accessing the Internet over the last decade or so and it has managed to upload considerable information on to the Internet in the areas of business, information technology, connectivity and politics but there is a missing link in scientific and technological information content creation and dissemination. Several proposals have been made to narrow the gap between developed countries and Africa in terms of uploading information on to the Internet. Besides the growing public information and commercial web presence, content generated from African universities is expanding. Internet connectivity in Africa and most of the developing world initially took root mainly in academic institutions and among academics. In some parts of Africa, universities were pioneers in e-mail and Internet access and there is very little evidence that their interest in ICTs has waned, rather it is growing. Most African universities with full Internet connectivity have the potential of playing a critical role in content creation and dissemination in electronic publishing because of their research interest. This paper will address the problems that Africa currently faces in developing content for the Internet and in disseminating that information. The paper will look at institutions that have the potential of creating content for the Internet. It will focus mainly on universities and research institutions' capacities to take on this role. The paper also addresses other issues of access like limited bandwidth, unreliable electricity and communication transmission services, lack of technical expertise, high costs etc.*

### Background

The creation of scientific and technological content and its dissemination has been one of the greatest challenges in the strides that African countries have made in accessing the Internet. Research generated from African universities and research institutions has the potential to lead in electronic publishing opportunities currently being made possible by the existence of the Internet and other forms of electronic information dissemination. The Internet has provided opportunities and infrastructure for publishing and distribution of all types of information in various formats and in the shortest possible time and the lowest cost (Chisenga 1999). The number of African Internet web sites is growing and almost all African countries have local or internationally hosted web servers (Jensen 1998).

While the Internet is abounding with current news on Africa, business information, tourism, etc, the African scientific and technological information is still missing. African countries and in particular their research communities still face a number of challenges in using the internet, generating relevant research, retention of experienced academics and many other problems in creating and disseminating scientific or any other related research content. Currently a number of initiatives in the area of electronic information dissemination are currently underway and will see an increase of African research being disseminated through the Internet. Although questions are still being asked about the number of people who are able to access electronic resources on the African continent, it is important that these efforts continue.

### **Status of African scholarly information on the Internet.**

The opportunities and obstacles for producing scholarly journals vary considerably in Africa due to the diverse and complex conditions within different African countries (Hussein and Priestly, 2002). A growing number of African journals including scientific and technological ones are now online through a number of collaborative international as well as national projects.

Scientists and publishers in many countries face problems both in accessing the world's research information and in gaining high visibility for their publications and national research output. The cost of printing and distributing journals leads to low circulation levels which in turn leads to a reluctance by scientists to publish. The outcome is the loss of much important scientific information which either remains unavailable to the international scientific community or suffers long delays in publication. The transfer of e-publishing technology and online distribution of such journals can greatly increase visibility and enrich the global knowledge base. (<http://dspace.dial.pipex.com/bioline>)

The following are some of the collaborative efforts in electronic publishing and dissemination in Africa.

**1. The Electronic Publishing Trust** pioneered access to full-text articles in African journals in 1996 for Development (EPT-<http://www.epublishing.org>) in collaboration with Bioline to facilitate open access to the world's scholarly literature and to support the electronic publication of reviewed bioscience journals from countries experiencing difficulties with traditional publication.

**2. The Program for the Enhancement of Research Information (PERI)** coordinated by INSAP is another effort of activities in twenty countries (mainly in Africa) that strengthens research capacities by reinforcing local efforts to produce, disseminate and gain access to scholarly information and knowledge. It does this by bringing affordable global information to researchers in developing countries, by stimulating and supporting the publication and dissemination of in country research findings, and by providing information and communication skills training for researchers, practitioners, librarians and publishers (Ballantyne2004).

INASP's PERI program includes the following components:

- Delivery research and scholarly information- Libraries participating in PERI have access to more than 11000, full-text journals plus several bibliographic databases. Libraries in participating countries can access journals from 19 publishers – INASP pays for the subscriptions and the primary targets are researchers, university libraries and information managers within development research institutes and universities. Access is also available to other non-profit organizations because of the countrywide nature of the licences that INASP pays for.
- Disseminating national research – activities in this program aim to increase the visibility and accessibility of research carried out in developing countries. The main activity being the African Journals Online – which provides a web platform of tables of contents and abstracts from more than 180 African published peer-reviewed journals with links to the full text if available.
- Enhancing ICT skills – activities in this area aim to enhance the skills of information professionals, researchers and academics in developing countries to make effective use of electronic information resources and tools (Ballantyne 2004)

The challenge that INASP's program of African Journals online is to extend the contents from being an African journals indexing tool to becoming an African journals publishing platform. The challenge is to encourage as many journal editors as possible to move their production to an electronic platform (Ballantyne, 2004). African universities and research institutions are home a good number of scholarly journals and could play a leading role in this challenge.

**3. Database of African Theses and Dissertations (DATAD) -** The Association of African Universities (AAU) found it necessary to initiate and support efforts towards putting Africa's research output onto the mainstream of world knowledge. The initiative was born out of a project in 2000 following a positive recommendation of a feasibility study carried out in for a pilot project to index, abstract, and distribute theses and dissertations completed in African universities.

The Database of African Theses and Dissertations is a program to improve management and access to African scholarly work. Theses and dissertations represent a significant proportion of Africa's research activity. However, access to this research output is not easy, even within the institutions where they are submitted. Months, years and in many cases longer periods may elapse before papers or other forms of publications describing aspects of the research in these documents can be published. In Africa particularly, they are an under-utilised information resource. By the very nature, their production is very limited and the only copy available for public access is usually in print and can only be consulted physically in a university library.

The program's long-term objectives include:

- Working with participating institutions to build a regional database of theses and dissertations
- Contributing towards the creation of an environment conducive for research and publication in African universities and the region as a whole
- Creating capacity in African universities for the collection, management and dissemination of theses and dissertations electronically
- Providing visibility and improving accessibility to the work of African scholars both within and outside of the continent
- Facilitating the development of relevant copyright procedures and regulations which will promote the protection of the intellectual property rights of African University researchers and scholars
- Providing support for AAU programs which aim at capacity building in the area of research, promotion of cooperation among member universities and networking of institutions.

#### **4. The American Association for the Advancement of Science (AAAS) Africa project**

The AAAS Africa Program was inaugurated in 1987, representing a concerned response on the part of US scientists and educators to the institutional crisis that their African colleagues were facing, and a commitment on the part of US scientific societies and donors to work with African institutions in order to address that crisis. To date activities, developed and implemented in partnership with African institutions, have centered on improving access for African researchers to scientific and technical information, on encouraging other aspects of scientific capacity-building, on articulating research and policy agendas for critical issues facing African science and society, and on promoting productive collaborative ties between US and African scientists and their institutions. has long been involved in projects to improve information access for scientists in Africa.

Many other collaborative efforts are underway and will certainly see the increase of African content on the Internet in the next five years.

#### **The role of African universities and research institutions**

Africa has large number of universities both private and public research institutions, national agricultural research systems (NARS) that could play a leading role in scientific content development and dissemination. African universities are pioneers in the use of the Internet in most countries and still can take this pioneering role a step further in content development. The Internet offers possibilities never before seen in publishing since the advent of the Guttenberg printing press and desktop publishing combined (Adebowale). Research generated from these institutions can be the basis for content creation on the Internet. While a limited amount of this research is published in African scientific journals, most which are now accessible through African Journals Online, there is still a lot more that could be peer reviewed and be made available through the global information highways.

A visit to a number of African universities web site will reveal that a lot of information has been made available through the Internet. Some common examples are examination

papers, conference papers and workshop proceedings and many other guides that would not be easy available to the outside world if the Internet was not in existence.

Globalization represents a significant threat as well as a substantial opportunity to the economies and educational systems of Africa and other areas of the developing world. If used wisely information technology has the power to help create powerful and synergistic educational partnerships at local, regional and global scale. Such new and large scale partnerships, only possible because of the existence of the Internet, have the potential to allow educational institutions to respond positively to globalization and help promote development if enough partnerships can be created and sustained (Keats, 2003).

Another emerging area for African universities is that collaborative development of open content. Given the cost of content, under-resourcing of universities and the scattered nature of expertise in Africa, the collaborative development of open content seems like a useful way to get high quality, locally relevant content for using to enhance teaching and learning. However, while there are currently no published operational models to guide institutions or individuals in creating collaborative open content projects many models are now being suggested and experience from open software development being used as lessons to build the foundations of a process model for African universities (Keats, 2003).

According to Keats (2003) and Keats and Shuttleworth (2003), the economic benefits of collaborative model of open content development stem from two inter-related processes, collaboration and reuse. When people with a common interest in different institutions collaborate in the creation of content, it stands to reason that as more people collaborate the costs per institution will be reduced.

For African editors willing to provide open access to their content, INASP has been encouraging them to use a new indexing and publishing system that has been put in place using the open source Open Journals System software developed by the Public Knowledge Project in Canada. INASP reports however that some editors in Africa are not yet convinced of the open access publishing revenue model and they assist them to explore how they can also publish in full-text using commercial services such as Ingenta or Extenza (Ballantanye, 2004). More training and publicity is still required to make sure that African editors are fully aware of the economic and legal implications on the revenues if they choose publishing electronically.

The African Education Research network (AERN) is working on a project to determine and develop the conditions under which the uses of computer networking will greatly enhance communication between educational researchers (professors and graduate students) in “northern” universities and their counterparts in African universities in a manner, and to a degree that will strengthen research capacities in African universities. Further purposes include determining the conditions necessary for sustainability of the electronic network. The development of appropriate strategies for extending network access to increasing numbers of African educational researchers so as to contribute to the increase in trans African communication.

These various collaborative efforts will certainly yield more African scientific content being disseminated through the Internet. The challenges remain in the area of sustainability i.e. whether they can continue beyond the collaborative relationship and stand on their own. The experience in African development over the last four or five decades with donor funding is that such projects stop to exist once the northern donor supporters have pulled out.

### **Problems and Constraints/ Challenges facing content development**

There are several challenges that African universities and research institutions are facing in their quest to create content for the Internet. They vary from problems of access, government policy, and limited research capacities to limited resources.

The major challenge that African universities face is that of funding. The great part of ICT projects in African universities has been through donor funding and when this funding ceases so do the sponsored projects. Until the question of funding in African universities and research institutions is clearly addressed their capacity in publishing both in print and electronically will remain very limited. In other regions, though like southern Africa universities are building IT infrastructures from their own funding which largely comes from government. Universities in countries like, South Africa, Botswana, Namibia, Zimbabwe, Lesotho and Swaziland have achieved a certain level of IT developed that compares well with other international universities.

The second challenge facing African universities is their Internet capacity i.e. bandwidth. Bandwidth is the scarcest resource in African ICT development. Most universities still connect to the Internet through national telecommunications authorities through systems of lease payments. These leases are often very expensive and do not deliver reliable services. For long-term development that will allow the creation of sustainable content development, national telecommunications authorities need to lower the cost of bandwidth for universities. The long-term national development benefits of expanded in-cooperation into the global information network and production of highly skilled young people far outweigh the short-term benefits of monthly lease payments. There is need for better management of ICT resources and infrastructure in order to maximize the limited bandwidth in Africa.

The third challenge facing African scientific and technological community in electronic publishing is the question of the crisis in African universities' research capacities. African education authorities, and scholars in the north who specialize in African educational development that there is a continuing crisis in African universities regarding their capacity to create and sustain the levels and quality of educational research that are essential to national development and autonomy generally accept it. The factors that contribute to this crisis either include isolation of aspiring researchers whose institutions lack the means to support their research interests or participate on in regional and international conferences and seminars where studies in progress and studies completed are considered.

It is, estimated that research capacities of African universities have declined by as much as 50% in the past decade. The emergence of a community of African scholars is essential to the future of African universities' capacity to create, develop and disseminate scientific and technological information through the Internet.

A fourth challenge is that the regulatory environment for African universities to freely publish on the Internet. Many governments are still to come up with ICT policies that guide their countries in the development of IT. Where there is creativity there are delays in obtaining licensing to link to the Internet for example, the existing laws are also in conflict with those of the development of the Internet. Countries in Africa generally lack the legal and intellectual property rights laws for local innovation and cultural development. There are also inadequate policies to balance between public and private ownership, local resources and foreign direct investment, monopoly and competition in communication and value added services (ECA, 1999).

### **Conclusions**

While opportunities exist for Africa to develop and disseminate scientific and technological information through the Internet, challenges must be addressed adequately. More studies should be carried out to determine the current technical constraints and come up with suitable solutions that fit in within what is currently affordable in Africa. While Africans may want to duplicate the developments of the west in ICTs in reality, this is not achievable in the short term given all the problems that the continent currently faces and has to address. Africa needs solutions that it can handle and the capacity to find those solutions is there.

Producers of African scholarly journals face many challenges in the coming years particularly with ever expanding digital technology. Africans need to show commitment to their goals, share experiences and resources, work closely with partner organizations and develop appropriate models that suit each country. Appropriate digital technology should be used to enhance efforts in reducing printing costs and in disseminating journals. Continuous efforts must be made to improve the quality of journals, research reports and related information that is of academic value. Furthermore for scientific content creation to be a reality on the African continent and universities and research institutions, governments must create the enabling environments through legal and policy frameworks to protect intellectual work, security and copyright ownership, and must encourage accessibility and competition at affordable prices (ECA, 1999). Pricing mechanism should be developed to reward contributors to ensure that they continue publishing not just professional growth.

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