Promoting Visibility of African Scholarship through Access to Appropriate Technology

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Abstract

Funding turnover to African Universities and research institutes suggests a fairly rigorous social research effort by African scholars. However, the findings of that research are hardly visible and their impact on the continent hardly felt. Two interrelated problems—costs and technologies—have been advanced to explain this phenomenon. The costs of research, production, distribution, and access on the one hand, and of the media and/or technology to support these functions on the other have combined to pose a formidable challenge to African publishing. Owing to the ultimate limitation in the benefits of scholarship, there has been a protracted debate on who should own and control scientific research and ideas—the proprietary publisher, the scholar or the public? The paper makes argument for online publishing, which will erode publisher monopoly, increase both monetary benefits and visibility of the scholars, and enhance public access. This however will only be realized through access to an affordable and appropriate publishing technology, which the free/open source software (F/OSS) paradigm offers. The paper dwells on the benefits of online publishing generally, and the bottlenecks of proprietary software-enabled publishing that make F/OSS a viable and obvious alternative for African journal publishers. It is argued, however, that these benefits will be optimized only if they are sought in an Open Access publishing strategy. A range of F/OSS is outlined that could be adopted by different journals to hand different chores.
Introduction

Peer-reviewed, digitally constructed monographs, available within open scholarship institutional frameworks, will increasingly be the … models for scholarly publishing (Fisher 2007:5).

As both an organ of and a partner with the state, the University has traditionally pursued a two-fold mission: teaching and research. In more developed states, the University has indeed played a pivotal role in the economy—partnering with industry, civil society and state organs to inquire into new and emerging social and economic problems, innovate in scientific and technological fields, and provide a platform for debate of all forms of issues of politics and governance (Aligaweesa 1987; Lazinn, Aroni & Gradus 1992; Mathews & Hu 2006). The two missions of teaching and research have posed one historic imperative: publishing. Thus, a University and a state it represented came to be known by its research output and inventions through documentation, publication and protection of innovation through patenting and copyrighting. Research and publication therefore were driven by very pervading interests—the need for the individual scholars to be visible and to own and protect their innovativeness; the need for the University to be visible, promote its faculty, attract the best brains and partners, and provide leadership in innovativeness and development; and the need for the state to direct research in line with its development needs and to fund it.

In an attempt to raise the international profile of African research, African Universities and research institutes have traditionally tended to focus on publishing their findings in overseas indexed journals (Ondari-Okemwa 2007; Gray 2007). Increasingly, however, owing to such a publication policy, African Universities have found themselves at a disadvantage within the global “publish or perish” tradition. The inequalities between the rich and poor nations have meant imbalances in research funding, in protecting innovation, in disseminating information, and in fostering development. Indeed, Africa is currently increasingly characterized by dwindling state funding to public Universities and research institutes (Afolayan 2008; Africa Watch 2005; Dickson 2006; Fatunde 2007), and its corollary dwindling journal subscription by libraries (Oladele 2008). But African Universities have nevertheless established their own journals, however limited they are in number and discipline scope.

Scholarly publishing in Africa has indeed been much below par (UIS 2005). Besides poor government funding, causal factors have ranged from limited capacity and motivation for editorial, peer review, and marketing chores to other “expert” tasks of publishing. Gray (2007) has succinctly summed up the problems of the African print-based journal as leading a hand-to-mouth existence, using voluntary editorial labour, and having low subscription levels. These problems are of course interwoven: poor government funding and low levels of subscription for journals and monographs mean that the journal cannot financially sustain itself. If certain functions are not voluntary or secured much below their market worth, journal production has to be late, irregular or cease altogether.

The problem of poor visibility of African scholarship, however, is not merely one of production; it is equally one of dissemination and access. While the “publish or perish” tradition may have served to fairly motivate and keep research and journal publication in the Universities going, the dissemination has not received its due attention. The under-funding of Universities in Africa has
meant that the University libraries cannot afford subscription to many regional journals, let alone international ones. In the same vein, the African journal publishers cannot distribute all of the few copies they produce—which constrains the sustainability of the journal and visibility of its content. For example, Makerere University’s *East African Journal of Peace and Human Rights*—Africa’s leading journal on the subject—produces 500 copies biannually, distributes about 280 to American and European libraries, about 60 to African, Asian and Latin American libraries, and donates a few of the remaining to local and regional organizations. The trend of scholarly publishing in Africa is thus typical: small and dwindling national budgets; diminishing public university funding; reduction in research output; reduction in journal subscription; limited publication and dissemination; poor research visibility; limited impact on development.

The revolution in Information Communication Technologies (ICTs) and the emergence of the Open Systems movement (Open Source and Open Access) have presented opportunities for African Universities to change the publishing landscape to one that suits their needs and affords them a competitive edge in the scholarly world. Thus, the various activities and functions of publishing generally consisting in registration, certification, dissemination, and preservation (Velterop n.d.; Crow 2005) can be revolutionalized by the power of the Internet and its attendant advantages of online publishing. The most challenging dilemma, however, has remained one of cost—the cost of acquisition and regular updating of hardware and software, the cost of Internet connectivity, the cost associated with the building of capacity to operationalize online publishing and dissemination, and the cost associated with maintenance of the technology (Oyelaran-Oyeyinka & Adeya 2004; Edgecliffe-Johnson 2008). But these are only system costs. There are also costs pertaining to traditional chores, to wit, the costs associated with the research that enables the production of the articles and monographs—drafting, submission and revision, and editorial and peer review activities; and the costs associated with research funding, research management and the evaluation of research activities.

Nevertheless, while online journals and open access seem an ideal means of enabling African researchers to publish their works and libraries to access a wealth of information, the disparity of the digital divide that is evident in the African context poses significant challenges (Castells 1998; 2001). Access to computers and reliable Internet connections are far too low, but worse is the question of the enabling technological platforms. This is the reality that calls for a search for affordable, appropriate publishing technologies, which is the thrust of this paper. The paper is divided into seven sections. Section II provides a conceptual overview of scholarship and publishing, which leads to a discussion of scholarly publishing in the African context in Section III. Section IV focuses on the need for and dynamics of online publication of the African journal. Section V explores the online publishing technologies available, and argues for the adoption of Open Source technologies and Open Access strategy for African journal publishing. Section VI delves into the alternative options of FOSS for African journal publishers, and Section VII gives the conclusion of the paper.

**Conceptualizing Scholarship and Publishing**

The essence of the University press has traditionally been in the need for the University and its faculty to produce and communicate scholarship through publication; and the University press has indeed traditionally enabled this function. Communication of scholarship entails four main...
functions: registration, certification, dissemination, and preservation (Velterop n.d.; Crow 2005). As a publishing house, the University press’ function of registration is concerned with the documentation of research, i.e., which research has been conducted, where and by whom; and to ensure compliance with the intellectual tradition of acknowledgment and citation. Its certification function is to assure validity and the quality control of the research, which entails a rigorous editorial and peer review process and ensuring conformity with the standards of diligence to a particular discipline. The third function is dissemination, which consists foremost in raising awareness as to the availability of new scholarly findings and then in ensuring that those findings are accessible. The preservation function, which involves archiving in an institutional repository, has mostly been performed by librarians, who are themselves part and parcel of the University press.

As a scholarly function, publishing is an encapsulation of differing legitimate interests, which I briefly discuss in three categories—individual, institutional, and public interests—and argue that for the greater good, these interests must be balanced and the ultimate placed in another category—the wider interest. Scholars spend a great deal of time researching, writing, revising and rewriting. The immediate individual interest is that their works, ideas and findings be communicated to and recognized by a vast readership. But this is only a gateway to achievement of other, more intrinsic interests. A scholar has economic interests in his or her work, which are realized as financial rewards through royalties. A scholar also seeks the legal protection of these economic and other interests, which is realized through copyright. Finally, a scholar has moral interests in his or her work—the confidence that the work reflects his or her integrity, convictions and values, and must not be adopted without due acknowledgment (www.copyright.org.au).

The institutional interests of publishing are multifold—the University, the University press (publishing house) and the funding agency have multiple but often convergent interests. These include on the one hand those that are direct and immediate such as sound business (income), appearance in citation indexes and international catalogs. On the other hand are the more indirect and long-term interests, focusing mainly on the international image of these institutions and the confidence of the readership. The third category is the public interest, which is about public access to innovation, knowledge and development as a collective right. Research and innovation cannot achieve their noble drive of betterment of society unless they are widely communicated and widely accessed. It has been argued, in fact, that research is a public good—its cost having been subsidized or entirely met by resources from the public purse, be it the donor, the state, or the University through student contributions (Odlyzko 1997; Jeffery 2006). It thus cannot—and should not—remain a monopoly of those funded to conduct it.

My view of “the wider interest” in scholarship and publication is that the foregoing vested interests are so legitimate and should be pursued, but such pursuit in each category should neither preclude nor diminish the interests in other categories. The wider interest should be the outcome that reflects efficiency in the balance of interests, which is the widest dissemination of, and access to scholarship at the maximum convenience and lowest cost possible. In the traditional world of the print journal, the question of cost has been inimical to the wider interest of publishing. However, the digital age has demonstrated that online publishing can significantly cut costs and increase returns to the author and publisher, thereby enhancing the achievement of the wider interest (Galliford 2007; Karp 2007; Preece n.d.).
The University press is the flag-bearer of its mother institution on the road toward the wider interest of publishing: the wider its publications are disseminated, the wider the institution—and its individual scholars—are recognized, and *ipso facto* the greater the visibility of their scholarship. But this logic is theoretically presumptive: it can only be sustainable in the presence of four overarching conditions. First of all, there must be an enabling policy environment that favours and encourages rigorous research, especially through funding and facilitation of dissemination. It has been observed that both governmental and institutional policies governing scholarly publication and dissemination have largely not been critically scrutinized (Gray 2007; Houghton, Steele & Sheehan 2006). Indeed, a government study elsewhere found that governments spend billions on R&D every year, yet relatively little policy attention is paid to the dissemination of that research (Suber 2006; Houghton, Steele & Sheehan 2006).

The second condition is that there must be readily available technical expertise to handle the expert chores involved in editorial, peer review, design and production. Traditionally, journal publishing has tended to rely on a few, largely volunteering faculty. The third condition is the appropriate and affordable technology platform to facilitate efficient production and easy, fast and wide dissemination of the research. The fourth condition relates to the cost of production and dissemination on the one hand, and of retrieval and access to the research on the other, which must be affordable. Colin Steele has observed that the high prices of academic monographs are often an insurmountable access barrier for many scholars and students (Steele 2008).

**Scholarly Publishing in Africa: Exploring the Terrain**

Funding support for research from the state, private sector, and development partners to African Universities and research institutes would suggest that there is a fairly rigorous social science research effort by African scholars (Africa Watch 2005; Anonymous 2007; Fatunde 2007; Nyagitti-Chacha 2007). Yet, the volume of such finding does not match the research output. This can be exemplified by South Africa, a country that injects considerable sums in education and research, and which far exceeds any other African country in the ISI journal rankings. In 2002 alone, this country had a mere 0.5% of the articles in the combined ISI databases and 0.15% of the most cited papers (ASSAf 2006; Poynder 2007). This poor research output is typical of Africa. According to the United Nations Institute of Statistics (UIS, 2005), in 2000 the whole of Africa represented a mere 1.4% of the world scholarly publications. This invisibility is also evidenced by a dearth of African social science scholarly journals and monographs, let alone books. A careful analysis, however, would trace this mismatch not so much to the question of funding and commensurate output as to the system in which this research is published and communicated.

For a long time, a global system of scholarly publishing has been shaped and dominated by European and North American policies of publish-perish, citation indexes, etc and regulated by market economics. All this has meant that global scholarly publishing and visibility of scholarly output remained highly skewed in favour of the West. A recent estimate indeed showed that there are about 2,000 scientific publishing houses globally, of which about 40% are based in Europe alone, publishing about 50% of the world’s research articles (Poynder 2007; EUROPA, 2008). The U.S. share of world output of scholarly articles between 1992 and 2003 ranged between 30 and 37% (Hill et al 2007).
It is within this system, dominated by highly commercialized and increasingly expensive scholarly books, journals, and monographs that hapless African and other scholars from poor countries have had to communicate their research. Naturally, this restrictive global intellectual environment has had significant implications for African scholarship. First, it has meant that any African intellectual material, whether research or didactic, that does not compete favourably with that from the West (using the yardstick of the West) does not make it into that intellectual marketplace. Second, any social research findings on a problem considered too local, too African, or too uninteresting to readers in the West, are not given any priority. Third, because of the prohibitive cost of books and journals produced in the West, there is quite a limitation on individual African scholars and university libraries acquiring those materials. The chances of African material that is published in such works being accessed at home have thus remained minimal.

In the face of such challenges, one alternative has been to publish African scholarship locally—but this too has had its own realities. Eve Gray (2007) has pointed out that the current state of research publication in African countries smacks of a persistent marginalization of African knowledge and scholarship. She has succinctly observed:

the reality is that African research knowledge is either locked inside international publications that are too expensive for African university libraries and scholars, or is published in local journals that are relegated to the second-rank by a global system that does not value them, and that thus struggle to disseminate their publications effectively beyond a handful of subscribers (Gray 2007: 6).

Succinctly; because a publishing system in which African research is communicated through media that cannot be effectively accessed in Africa serves only to strip it of its ability to impact the development challenges of the continent.

But there has emerged another stark reality: that the African scholarly publication is in good measure a replica of the global publication system. It is largely a print book or journal, molded on the Western publishing tradition, where the publisher is the investor that commoditizes the research findings and then takes full control over their distribution to harness his or her commercial interests. The cost of the book or journal is largely determined by the cost of production—editing and peer-reviewing, typesetting, production materials, software and maintenance costs—and distribution—storage, packaging and mailing, marketing administration, etc. Considering the high cost of computers, software, equipment and materials that the African publisher has to acquire at global market rates, the cost of the book or rate of journal subscription has remained exorbitant (White & Creaser 2007). In typical business style, the investor-publisher reaps the profits as the individual authors continue earning royalties from their work averaged only at 10% (Edwin Mellen Press n.d.). If African scholars and libraries were prohibited by cost from accessing content in international publications, the situation with local publications is pretty as bad.

The issue of visibility of African scholarship raises a number of questions that must be resolved. First is the question of whether scholarly publication should be left to commercial publishing interests, or whether it should be an exclusive business of the universities and research institutes.
In a recent report on the economics of scholarly journal publishing, Carl Bergstrom and Theodore Bergstrom unearthed a startling difference between the prices that university libraries must pay for academic journals owned by commercial publishers and the prices for journals owned by professional societies and University presses. They observed as follows:

in the fields of economics and ecology, the average institutional subscription price per page charged by commercial journals is about 5 times that charged by non-profit journals. These price differences do not reflect differences in quality as measured by number of recorded citations to a journal. For commercial journals the average price per citation is about 15 times that for non-profit journals. Similar price differentials are found across a wide variety of scientific disciplines (Bergstrom & Bergstrom 2006a:1; see also Bergstrom & Bergstrom 2006b).

This observation was made in the American context. If we have already observed that the market economics dictating the global publishing system have marginalized African scholarship, then this issue is as well resolved.

The second question concerns the problem of ownership and control of scientific knowledge. This problem is brought clearly to the fore by the imbalance, both in print and online books and journals, of the interests of the scholar, the publisher, and the user. This imbalance has indeed sparked a protracted debate on whether the ownership and control of archival records of scientific research and ideas should be with the publisher, the scholar or for the public to access freely (Elliott 2005; Petsko 2005; Cryan 2007). On the conflict between the desires of academic authors and the policies of publishers, Charlie Lowe has observed:

Scholars object to the hold that the publishing industry has on the intellectual property produced by their scholarship, and they fear the ever-tightening restrictions created by corporate-sponsored extensions of US copyright law. They believe that scholarship can be copyrighted and published, but it should be given back to the public to promote a freer exchange of information for research and educational needs (Lowe 2001).

This position is agreeable. If research has to promote further research and have an impact on the African society, it must remain in the public realm. Otherwise, restricted access will severely demotivate further research, constrain dissemination and inhibit consumption and impact, and this will reinforce the current low visibility.

The third is the question of cost vis-à-vis the need to disseminate research as widely as possible. There are two schools that are disagreed on this question. The first school thinks that the publishing process has distinct functions that must be aggregated and the costs involved met—ultimately, of course, by the end-user (CESTMP 2004). The other school views publishing in a wider context, seeing it as part of a public system of knowledge creation and dissemination (CESTMP 2004). According to this latter school, there would be no point for African governments or public institutions to support the huge costs of scholarly research if the findings of such research are not going to be published, disseminated, and freely and widely accessed.
The foregoing questions, whether at the moment partially answered or not answered at all, beg a search for a comprehensive solution—a solution that is predicated on the equitable balance of all the interests at play vis-à-vis the realities, needs, and capabilities residing in the African context. This solution lies, as Fisher (2007: 3) observes, in the opportunities provided for scholarship development through the 21st Century digital revolution and the reworking of scholarly communication frameworks to ensure greater public accessibility to scholarship. It entails on the one hand the adoption of appropriate and affordable scholarly publishing technology platforms, and on the other hand, strategic dissemination models that put technological and strategic synergies toward realization of the greater interest.

**Online Publication of the African Journal**

*If the day has come when the scholarly publishing system impedes scholarship, teaching, and learning it should—and indeed must—be replaced by a new and more responsive system* (Lynch 2006: 7).

The traditional print journal has made its mark in propelling academia and scholarship to its present state of development. But in the face of the emergent ICT revolution, the African journal publisher risks descending into irrelevance in 21st Century publishing and being relegated to the backyard of publishing history, unless he/she creatively embraces and harnesses the power of ICTs. There is already considerable orientation of African scholarship towards digitally enabled management. This has taken various forms ranging from online publication of abstracts (African Journals Online), to online publication of a directory of journals and journal publishers in Africa (Board of Trustees n.d.), to creating hyperlinks to research departments and repositories of Universities.

While this development merits acclaim for its potential role in enabling location of African research, its impact in real terms is too far below the mark. It has been shown that the African continent generates only 0.4% of global online content, of which 0.38% is generated by South Africa alone, the rest of Africa accounting for a mere 0.02% (Czerniewicz & Brown 2005). This is of course easy to explain: the said links largely lead to catalogues of holdings within the repositories, but not the content, which itself may only be accessed through traditional means—or not be accessed at all.

Alois Mlambo (2006) has regretted that even when technological development has seen considerable progress in the publishing industry, there remain critical capacity challenges pertaining to editorial, marketing and distribution of the journal. He has thus lamented:

*[T]he limitations on scholarly writing and publishing are economic and political: universities are under-funded; scholarly publishers are inhibited by a lack of access to capital, and the competition and corporate power of the multinationals; and government policies remain at best non-committal (Mlambo 2006).*

Mlambo’s concerns are legitimate. In my view, however, these downs pose an historic opportunity for the African publisher to reinvent him or herself—to creatively harness the opportunities that the ICTs present and turn these structural impediments around. The way to go
is thus to publish online, embracing a model that is technologically and strategically blended to leapfrog the communication challenges of African scholarship today. I shall return shortly to the question of the appropriate models.

Publishing the African journal online has the undisputable potential to dismantle the monopoly that the print publisher has for a long time had over scholarly publication. It will also increase both monetary benefits and visibility of the scholars, and enhance public access to scholarship. Asamoah-Hassan (2007) has outlined in finer detail the merits of online scholarly publishing in Africa, which include virtual access to journals, the ease and speed with which the material is used, accessibility to multiple users at any one time, the embedded links that add value to article, the possibility of articles being available ahead of the complete issue, reduction of problems of space and labour costs at libraries, and the ability to access multi-media (sound, video, simulation, etc), which is not possible with the print journal.

It would be sheer naivety, of course, to imagine an easy ride to these niceties. On the contrary, online scholarly publishing must entail redistribution and redesign of publishing activities, with involvement of new players among the academe possessing additional skills, resources, and orientations (Pochoda 2008). Accordingly therefore, the University (through its press) has to take a more proactive role than ever before in facilitating research, and coordinating and directing scholarly publishing. The University press must continue to play the traditional role of registration, certification and dissemination of scholarship. A shift from print to online publishing will bring with it an acute need of technological capacity among the faculty as a clarion call to the repositioning that digital publication requires. Pochoda (2008) has again observed:

Online publishing will embed the digital text in an intricate web of dynamic linkages that permit references within the text and sources for the text to be instantly accessed; allow others to comment publicly and interactively on all or part of the text; facilitate querying, searching, and mining the text for data in many ways; and establish the text as a node within social networks of users and networks of other texts.

This is an integrative development—and as part of the integration of publishing within scholarly communication frameworks, faculty working variously as authors, editors and peer reviewers will need to be further educated in digital copyright issues. All this will require bold and deliberate rethinking of technology choices that are capable of enhancing capacity and sustainable online publication, dissemination and access to African scholarship.

**Online Publishing Technologies: Which Way Africa?**

The intricate mesh of challenges and limitations to publication and dissemination of African scholarship has served to project *access* to appropriate ICTs as the unmistakable panacea. As such, scholars and publishers need to take advantage of the electronic age and develop solutions that serve their needs—especially the need for collaborative work and mutual benefit in the scholarly enterprise. Such solutions will provide the pedestal that African research visibility badly needs. But Africa needs more than just a publishing technology: it needs an all-pervading strategy that integrates accessible technologies for publication, distribution and retrieval of research with an ideology of collaborative development and open access. Collaborativeness in
this sense is more than just a process—it is a paradigm; it is an ideology that informs Open Systems (Harnad 1999; Taylor & Riley nd: 1). It is predicated on the overarching idea of openness of the research and development process on the one hand, and common ownership and use of the product on the other.

Access to publishing technology: software issues

The question of access to online publishing technology is two-fold: it entails on the one hand the affordability of the technology and on the other its operability/interactability. Affordability is an economic question. If African Universities, presses and libraries have on account of cost been too constrained to publish or acquire scholarly journals, then the cost of technology/software needs to be low enough to enable their own publishing. Operability/interactability on the other hand is a technological question. If the Universities, presses and libraries cannot on account of cost regularly acquire updated versions of software, then they must engage in software development to come out with software that is operable and whose ownership they share. The discussion of these issues brings into sharp focus the dichotomous nature of software development and use—which is the discussion of proprietary versus F/OSS.

Proprietary software is one that follows from the traditional development paradigm that is based on the idea that software has to be fully developed and tested before it is commercially released. Under this tradition, users purchase the software, cannot access or change the source code or fix any bugs, and their licenses are much to that effect (Katebire 2006). Examples of such software include Windows, Microsoft Office suite, etc. F/OSS on the other hand enables public access to its source code, and allows users to study and modify the program, and to redistribute it either in original or modified versions without having to pay royalties to previous developers (Katebire 2006). Examples include Linux, OpenOffice suite, etc. It is on the basis of these defining differences that F/OSS is increasingly being viewed as the panacea for the ICT needs of developing countries (UNCTAD 2003; FOSSFA 2003; Bruggink 2003; www.bridges.org).

The United Nations Conference on Trade and Development (UNCTAD 2003) has advised that while proprietary software has its place and role, Governments should consider their policy position on FOSS in the context of their overall agenda and their ambitions of bridging the digital divide and using ICT for increased, and improved trade and development. This position is informed by a string of benefits as succinctly put:

Liberating the source code supports broad collaborative development in software production, better porting with other programs produced by independent programmers, and the customization of software to meet different commercial, regulatory, cultural and linguistic requirements. Most particularly, in developing countries, F/OSS allows today’s and tomorrow’s experts and information technology (IT) leaders to acquire skills and advance their knowledge rapidly (UNCTAD 2003: 95).

There is indeed a global trend towards F/OSS solutions, which have increasingly become viable, cost-effective and sustainable options for ICT development (FOSSFA 2003:3). In Africa, a number of countries have been motivated to develop a vision to adopt F/OSS as the driver to their ICTs by a combination of factors. These range from lower or no license fees, lower Total Cost of
Ownership (TCO), ease of adoption in local languages, support of open standards, avoidance of vendor lock-ins, availability of source code, non-obsolescence, to the ease with which the source code can be modified to respond to new demands and local challenges (Bruggink 2003b). Studies have also indicated that an F/OSS server, which may be an ordinary desktop computer, can serve 30-40 other desk computers and be able to facilitate e-mail, Internet, and e-fax alongside normal operations at 40% the cost of proprietary software (FOSSFA 2003:3).

A number of African countries have taken bold steps to adopt F/OSS because it “has the potential to empower people in ways that proprietary software simply does not allow” (www.bridges.org). Taking the lead, South Africa laid a strategy that integrates F/OSS policies with broader e-government policy and related strategies for the national IT and communications sectors—including scholarly publishing. It was envisaged that F/OSS would not only save South Africa hundreds of million dollars, but it would also boost the local software industry (NACI 2003; Yarney 2003). Nigeria has adopted Linux in the public education sector, and Burkina Faso, Uganda, Kenya, Tanzania, and Ethiopia are at different levels of adoption of F/OSS (Bruggink 2003). The rationale for taking to F/OSS is that instead of spending hefty sums on foreign commercial software, the money should be saved to promote local software companies and develop individual skills.

Proprietary software provides only short-term solutions to the software and ICT needs of developing countries. In the long run, its expensive acquisition—be it through purchase or donations—exacerbates these countries’ poverty and dependence, and cripples their scientific innovation and socioeconomic development. Participatory development and the strategic and effective use of software will thus be an important source of empowerment and skills development for disadvantaged African journal publishing. The adoption of F/OSS would present the following potential benefits:

- F/OSS is royalty and license free, which means that the cost of acquiring the software is lower than that of proprietary software;
- Because the source code is accessible, F/OSS can be modified to meet the needs of users in particular contexts and languages;
- Users are not trapped into ongoing dependency on a particular vendor for upgrades and support;
- The collaborative open source model of software development offers greater opportunities for local skills and economic development;
- Some free software is recognized as more stable and more secure than its proprietary counterparts; and
- F/OSS is often less demanding on hardware resources than proprietary software, and can help break the cycle of constantly needing to upgrade hardware to accommodate "software bloat".

Abbott (1999) has argued that the shift from proprietary to F/OSS by African users would bring a clear reduction in the profit margin of hardware, systems and software vendors. The customers now exposed to a wider scope of vendors and technologies to choose from—or to participate in developing—would be freed from the problem of vendor lock-in and non-interoperability of
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systems and faced with competitive price offers. These dimensions make F/OSS the more favorable option for African journal publishing.

Open source, open systems, and scholarship development

The Open Source tradition is molded on an older tradition of Open Systems, whose essence is collaborative development and peer review. Unfortunately, the Open Systems ideology has for a long time remained narrowly constructed to apply to the realm of computing rather than the wider realm of scholarship. Tom Wheeler defined Open Systems as “hardware and software implementations that conform to the body of standards that permit free and easy access to multiple vendor solutions” (Wheeler 1992: 3). While this definition is weakened by its restriction to computer systems, its strength derives from its reference to “standards” that should guide and benefit collaboration and peer review. It is such shared standards that everyone in the collaboration may use to develop interoperable programs. This is the power of peer review that the F/OSS development process should exploit in order to achieve what Feller and Fitzgerald (2002: 24) refer to as “rapid, incremental release schedules, in which limited extra functionality is added in each release.” Peer review and rapid release schedules indeed make Open Source a robust method for developing and maintaining F/OSS.

There is a need, however, to rethink the Open Systems ideology and reorient it to 21st Century African scholarship and publishing. A closer look at traditional scholarship and communication already reveals, after all, that the idea of collaboration and peer review is not new. The documentation methods (classification, cataloguing, indexing) and citation systems in use today, for instance, are shared systems that have long aided communication among scholars and enabled them to share information. Their collaborative developer base and emphasis on peer review have entrenched a community of development and innovation. As Tim O'Reilly has observed:

[T]he open-source process reflects a powerful global trend toward networked collaboration ... And what is open source then but open, public discourse that has always led to the advancement of human knowledge (O'Reilly 1999: 35).

Unfortunately, however, this collegial relationship among scholars has not had significant development impact in Africa. On account of structural and strategic constraints (policy, cost, technology, human capacity, etc) that torment the continent, scholarship and publication have only moved at cross-purposes. While the traditional research model produced knowledge under the Open Source ideology, the publication model remained highly proprietary, inaccessible and exclusive.

Fortunately, Open Systems present a logical starting point in modeling a publishing strategy that will put African research at centre-stage. Because their very existence thrives on shared standards, collaborative development and common use, Open Systems—and more particularly Open Source—provide a model by which African researchers can publish their scholarship online for unlimited public access and with unlimited visibility. Steven Harnad captured this single most important benefit of open publishing:
Every self-archived paper on the web is like a piece of skywriting, visible to one and all, today and forever more. Still more important, skywriting is there to have further skywriting appended to it (Harnad 1999).

This is the Open Access paradigm—a paradigm that seeks to make scholars and their works gain virtual visibility while retaining acknowledgement for their work.

Open access publishing: eating your cake and having it

Traditionally, scholarship and publishing have been predicated on an important access principle: that a commitment to scholarly work carries with it a responsibility to circulate that work as widely as possible. While this principle has been realized in the Western world, in Africa and the South generally, it has been impeded by insurmountable structural challenges. For Africa and the South therefore, in this digital age, the responsibility to circulate scholarship as widely as possible will only benefit—as already seen—from exploring new, affordable and customized publishing technologies. But appropriate technology alone will not optimize worldwide visibility of African scholarship if not blended with strategies to improve access to scholarly work. Open access publishing is thus the logical way to go, making the African online journal an open access journal.

The idea of open access was originated at the Open Society Institute Conference, held December 1-2 2001 under the auspices of the Budapest Open Access Initiative (BOAI 2001). The BOAI opening sentence states: “An old tradition and a new technology have converged to make possible an unprecedented **public good**” (BOAI 2001:1, emphasis mine). What public good? Scholars in Universities and research institutes have traditionally been funded to do research from the public purse, and their works have been certified in an open system of peer review. It has been argued that because such research has been funded by the public, it should be made freely accessible to the public (Odlyzko 1997; Petsko 2005; Jeffrey 2006; Cryan 2007), and many governments are increasingly moving to view it in this light. The Internet and the Open Source movement—the very engine of Open Access publishing—make scholarly content freely available to the academic community and the general public, and enhance worldwide retrievability, access and use of content, and the visibility of authors (BOAI 2001; Willinsky 2005).

There are generally two approaches to providing open access to scholarly information. The first is what is often referred to as the “gold road” to open access, which refers to providing unlimited access to online journals; and the second as the “green road.” which simply requires the author or publisher to deposit a free copy of a digital document in a repository uploaded on the World Wide Web in order to increase its accessibility (Gue`don 2004). Since Budapest, however, Open Access has been the subject of much discussion amongst the academe, librarians, university presses, and commercial publishers. The question of the economics of funding a free and open access scholarly communications enterprise has been paramount in the debate (Fluckinger 2003; Hood 2004; Preece n.d.; Esposito 2008). Open access journals are generally of two types: those where authors are required to pay publication fees and those where there is no such requirement. Those in the first category are normally financed through a public or private research grant; and those of the latter type are actually subsidized—by a University, government body, charity, etc—and are mostly completely freely accessible. This categorization suggests that Open Access may
not always mean unlimited access, although that is its overriding philosophy. There are among these categories two sub-types: the journals providing hybrid open access, in which only some of the articles are Open Access, and those providing delayed open access, where access is free but only after a given period of time. This is in instances where a journal runs both the print and online editions, and first priority is given to subscribers.

The African publishing terrain is already changing to align with the digital times—the strategic importance of open communications is being increasingly recognized, and the first major step in this direction has been in a number of research universities migrating to F/OSS (Yusof 2004). These Universities have strategically and technologically positioned themselves to exploit the opportunities that Open Source and the Internet present. The next bold step to take is, as Steele (2008) suggests, for the Universities and research institutes to reassess their scholarly communication frameworks so that their presses become an integral part of those frameworks. For Open Access publishing to have its mark as a viable scholarly publishing alternative for Africa, it must go beyond individual posting of works and be placed within institutional settings. As case studies elsewhere have shown (e.g., Karlsruhe University Press 2008), institutional Open Access publishing diminishes the costs to the scholarly publisher while elevating the image of the author and the institution, and at the same time increasing access to the reader at the local, national, and global levels.

Karlsruhe University Press (KUP), which now publishes through Open Access, demonstrates four major benefits of open publishing. The first is the speed with which publishing is accomplished: online publishing allows information to be spread quickly and makes it directly accessible to users. The second is the issue of quality control: scholarly works for publication should be of high quality, i.e. peer reviewed and prepared optimally for electronic publication. The third is about long term availability of content, which is guaranteed by archiving the documents in the University’s repository. Finally is the issue of free access: research results of the University are transferred by the University press to the scholarly community in accordance with Open Access, to help ensure the free access to scholarly information.

The KUP case study is instructive to the African scholar. The publication of research findings in an open access journal presents to the scholar opportunities for the highly coveted citation advantage and boosts visibility of both self and the research. It has indeed been observed that research articles published in an open access journal are cited much earlier and more frequently than non-Open Access articles (Suber 2007, 2008).

Available F/OSS Picks

African scholarship cannot be guaranteed a miraculous fast turn-around from its long marginalization within the global publishing system, but the current levels and trends in the technological landscape offer promise a new lease of life for African research and development. Castells (2000: 109) has reminded that Africa’s technological capacity, technological infrastructure, access to knowledge, and highly skilled human resources are still too low, yet they are the critical sources of competitiveness in the new global technological order and information society. Fortunately, it is the very levels and trends in the technological landscape that have the
potential to pull Africa out of the knowledge divide if only strategic policy actions can be directed to the appropriate ICT choices and capacities.

It is now incumbent on each African University (and its press) to renegotiate the normative infrastructure underlying basic publishing choices and orientations in order to redefine the basic mandates and values of its scholarly publishing program. This redefinition should be consistent with its own overall interests, objectives and capabilities. These capabilities reside in the faculty, who must be integrated in the entire publication and communication process. As Neave (2007: 191) has observed, there is a need to look to “a future in which … academics will not only be more informed about publishing but more active participants in the process.” This calls for deliberate and well considered technological choices that match current and long-term needs and available capacities of the University. There is a wide range of F/OSS, as I outline in the succeeding paragraphs, that different African Universities (and their presses) could pick from to support their online publishing programmes.

1. Web software

- **Apache.** This is an open source HTTP server designed for modern operating systems. It was developed to provide a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards. Apache has been the most popular web server on the Internet since 1996, and currently serves 49% of all websites.
- **Amaya.** This is a free open source Web browser that includes an HTML editor as well as a viewer and can be downloaded freely from the W3C website. Amaya is written in C and is available for Windows, MacOS X, and Linux. Its many interesting features include:
  - A what-you-see-is-what-you-get (WYSIWYG) authoring interface that is similar to that of popular proprietary applications such as Microsoft FrontPage,
  - The ability to upload pages to a server,
  - The ability to work on either the coded HTML view or the WYSIWYG source view of the page,
  - Interoperability with other tools,
  - Assistance in creating and viewing hypertext links,
  - Ability to display images in the Portable Network Graphics (PNG) format, which is a more capable graphic format than the Graphics Interchange Format (GIF),
  - An application program interface (API) in C for adding new functions or modifying existing ones.

- **Nvu.** Pronounced as N-view to suggest New View, this is a complete web authoring software that combines web file management and easy-to-use WYSIWYG web page editing. It is very user-friendly and is designed to be an alternative/competitor to Microsoft FrontPage and/or Macromedia’s Dreamweaver because it contains many of the same easy-to-use features that make these programs so popular. Unlike many other F/OSS web authoring programs, Nvu goes beyond the basic authoring functionality by adding integrated web site management, better form and table support, and better browser compatibility. Its many other features include:
  - Emphasis on ease-of-use for the non-technical user,
  - Robust WYSIWYG editing,
  - Integrated web file management,
• Enhanced handling of forms, templates, etc.
The latest version of Nvu is designed to run on Windows, Mac OS X and Linux.

**KompoZer.** This is also a freely distributed Open Source WYSIWYG web editor based on Nvu. KompoZer, which is designed to be extremely easy to use, combines web file management and its easy-to-use WYSIWYG web page editing. This makes it an ideal starting point for faculty members that are non-technical computer users. KompoZer runs on Windows, Macintosh and Linux.

2. Operating systems

**FreeBSD.** This is a Unix-like free operating system that is designed to run on several computers and support a variety of architectures. Free BSD works like UNIX, with UNIX-compliant internals and system APIs, but is not a clone of UNIX. It is developed as a complete operating system.

**Linux.** This is also a free Unix-type operating system developed under the GNU General Public License. Its source code is freely available, and its functionality, adaptability and robustness have made it the main alternative for proprietary Unix and Microsoft operating systems.

3. Desktop environments

**GNOME.** This is free software that is dedicated to giving users and developers the ultimate level of control over their desktops, their software, and their data. The GNOME is both a desktop environment and a development platform—it does not only provide an intuitive and attractive desktop for users, but also an extensive framework for building applications that integrate into the rest of the desktop. With this software, one can select from a variety of programming languages such as C, C++, Python, Perl, Java, etc to produce high-quality applications that integrate smoothly into the rest of the Linux desktop.

**K Desktop Environment (KDE).** The KDE is free software that provides basic desktop functions and applications for daily needs, but it also provides tools and documentation for developers to write stand-alone applications for the system. It provides an easy to use contemporary desktop environment available for UNIX and compatible systems. While there is always room for improvement, at its current level of development, KDE delivers a viable feature-packed alternative to the common commercial operating systems and desktop combinations.

4. Images and graphics

**GNU Image Manipulation Program (GIMP).** The GIMP is a freely distributed program used to process digital graphics and photographs. It works on many operating systems, and in many languages. This program offers many of the features of high priced proprietary raster applications such as Adobe Photoshop, the most widely used bitmap editor in the printing and graphics industries. Typical uses include creating graphics and logos, resizing and cropping photos, altering colors, combining multiple images, removing unwanted image features, and converting between different image formats. GIMP can also be used to create basic animated images in GIF
format. There are a number of variations and derivative programs, including ports to other operating systems and forks with task- or OS-specific modifications.

**Inkscape.** This is an open-source scalable vector graphics (SVG) drawing application, which can be freely downloaded and used on Linux, Windows and Mac OS X operating systems. This graphics editor has capabilities similar to Illustrator, Freehand, CorelDraw, or Xara X; and its SVG features include shapes, paths, text, markers, clones, alpha blending, gradients, patterns, etc. It also supports metadata, node editing, layers, complex path operations, bitmap tracing, text-on-path, flowed text, direct XML editing, etc. It can import formats such as JPEG, PNG, TIFF, etc and exports PNG as well as multiple vector-based formats. Although it uses SVG mostly as its format, Inkscape can export to bitmap and bitmap images can easily be imported into an Inkscape. Once imported, they become just like any other object, and can be traced, scaled and rotated.

**Krita.** Part of the KOffice package, Krita is a free painting and image editing as well as a photo retouching application. It enables the user to create original art on the computer, and supports many managed color spaces, and can import images in 8 and 16 bits per channel and load and save them in tiff, png, or jpeg formats. It has image layers, group layers, adjustment layers and the innovative part layers, which means that any KOffice document can be embedded as a layer in it. It also has a rich set of filters for image enhancement, color enhancement and artistic reinterpretation of images.

**Paint.NET.** This is another open source, free image editing and photo manipulation software designed for Windows, and developed on the .NET framework. Paint.NET supports layers, special effects, and a wide variety of useful and powerful editing tools. The program offers a clean and easy to understand interface that includes all common editing tools, as well as clone stamp and various image effects. Paint.NET also supports layers with transparency and layer adjustments, and its additional features include Red-Eye removal, image resizing, sharpening, multi-level undo, etc.

**Xara Xtreme.** This open source graphics software is designed for drawing and photo management, and is used for both print and the web. Users can use this software for creating web graphics for their website. Xara Xtreme comes in two versions, Xara Xtreme and Xara Xtreme Pro. The latter version includes additional features for professional designers, such as color separation and Pantone support, PDF/X and multi-page support.

5. Desktop publishing

**PDFCreator.** PDFCreator is a free application tool for converting documents into Portable Document Format (PDF) on nearly any Windows operating application. PDFCreator can create PDFs from any program that is able to print, encrypt PDFs and protect them from being opened or printed, send generated files through e-mail, create formats such as PNG, JPG, TIFF, BMP, PCX, etc, and merge multiple files into one PDF. PDF files can be viewed and printed using the free Adobe Acrobat Reader, and files will look the same no matter what Operating System, hardware or other software the reader has installed. The PDFCreator license grants the user the right to use PDFCreator and to pass it on to anyone without charge.
Scribus. Scribus is a free open source application that brings professional page layout to Linux/Unix, MacOS X, and Windows desktops with a combination of press-ready output and new approaches to page layout. Underneath the modern and user friendly interface, Scribus supports professional publishing features, such as CMYK color, separations, ICC color management and versatile PDF creation. Apart from the fact that it is published under the GNU General Public License, Scribus is similar to Adobe PageMaker, QuarkXPress, and Adobe InDesign.

6. Database management

MySQL. The MySQL database is the world’s most popular open source database because of its consistent fast performance, high reliability and ease of use. It is widely used by individual Web developers as well as the largest and fastest-growing corporate organizations. It is, however, not only the world’s most popular open source database, but also the database of choice for a new generation of applications built on the LAMP architecture (Linux, Apache, MySQL, PHP). MySQL runs on more than 20 platforms including Linux, Windows, OS/X, HP-UX, AIX, and Netware, thereby affording the user the necessary flexibility to keep them in operation. MySQL offers a comprehensive range of certified software, support, training and consulting to make its users successful.

7. Digital library software

DSpace. DSpace captures data in text, video, and audio formats, and distributes it over the web. It indexes your work, so users can search and retrieve your items. It also preserves your digital work over the long term. DSpace provides a way to manage your research materials and publications in a professionally maintained repository to give them greater visibility and accessibility over time. Its benefits

- Getting your research results out quickly, to a worldwide audience
- Reaching a worldwide audience through exposure to search engines such as Google
- Storing reusable teaching materials that you can use with course management systems
- Archiving and distributing material you would currently put on your personal website
- Storing examples of students’ projects (with the students’ permission)
- Showcasing students’ theses (again with permission)
- Keeping track of your own publications/bibliography
- Having a persistent network identifier for your work, that never changes or breaks

No more page charges for images. You can point to your images’ persistent identifiers in your published articles.

EPrints. EPrints is a Web and command-line application based on the LAMP architecture (but is written in Perl rather than PHP). It has been successfully run under Linux, Solaris and Mac OS X. EPrints is an open source software package for building open access repositories that are compliant with the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). It shares many of the features commonly found in Document Management systems, but is primarily used for institutional repositories and scientific journals. EPrints is currently released under the GPL license, but a version for Microsoft Windows will be released under a non-GPL license.
Greenstone. Greenstone is an open source, multilingual software for building and distributing digital library collections, which is issued under the terms of the GNU General Public License. This software was developed to empower users, particularly in universities, libraries, and other public service institutions, to build their own digital libraries. Greenstone thus promotes effective deployment of digital libraries to share information and place it in the public domain.

Conclusion

Universities and research institutes clearly need strategies, both individually and collectively, to establish more effective research distribution frameworks. Publishing and access to scholarship have been constrained in two general ways, both of them dictated by cost issues. At the research generation and publication level, Universities and individual faculty have spent hefty sums of money to conduct research, but the publication and dissemination of the findings has oftentimes fallen short. At the access and consumption level, libraries have injected lots of funds into their acquisition programmes, but their limited budgets and cost of books and journals have meant that the choices of works to collect are greatly limited. Worse still, as Steel (2008) discovered, much of the material acquired by libraries is either often not read or little read. From both research generation and consumption perspectives therefore, the cost has not matched the benefit.

We have argued that online publishing of African scholarship—which will be driven by open source technologies and the open access strategies—is the way to go. Africa’s potential to leapfrog its relegated position in the current global technology divide and adopt more radical transformation of scholarly dissemination could be realized in the face of the opportunities presented by the Open Systems of this age. In the words of Gray (2007), in a world in which the use of ICTs is drastically altering modes of knowledge dissemination, and in which scholarly publishing looks to be thoroughly shaken up, there is a paradoxical advantage in the marginalization of African scholarly publishing. If African scholarly publishing is suffocated by a teething lack of funds to invest in the traditional print-based medium, African policy-makers must take advantage of the digital times and engage with the new trends of digital publishing in ways that will bring their research in the limelight.

This paper has explored the benefits of online publishing generally, and the bottlenecks of proprietary software-enabled publishing that make F/OSS a viable and obvious alternative for African journal publishing. The various benefits of FOSS-enabled online publishing—low cost, higher financial gain, participation in developing the software and its ownership, increased citation and visibility, etc—have all been explored and discussed. Open Access publishing anchored on FOSS technological development paradigm is recommended as the way to go for African online journal publishing in the 21st Century.
References
Budapest Open Access Initiative (2001), available online at <http://www.soros.org/openaccess/>
Copyright and External Research Funding (n.d.), available online at www.copyright.org.au.


Fisher, Richard. 2007. “Getting Published.” A talk at the University of Sydney (23 March).


FOSFSA 2003 [chk]


Neave, Lucy, James Connor, and Amanda Crawford, eds. 2007. Arts of Publication: Scholarly Publishing in Australia and Beyond, Melbourne, Australian Scholarly Publishing.
Nourou Dia, 2005, Donor nations pledge support for African science. IRD/Dukhan.
Pochoda, Phil, 2008, Scholarly Publication at the Digital Tipping Point, Ann Arbor, MI: Scholarly Publishing Office, University of Michigan, University Library, vol. 11, no. 2, Spring
Denis A. Katebire. Promoting Visibility of African Scholarship through Access to Appropriate Technology

UNCTAD 2003 [check]
http://www.bridges.org/software_comparison/about.html (accessed on 15/11/003).