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Abrahams, Lucienne; Burke, Mark; Mouton, Johann

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LINK Centre, University of the Witwatersrand (Wits), Johannesburg

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RESEARCH PRODUCTIVITY-VISIBILITY-ACCESSIBILITY AND SCHOLARLY COMMUNICATION IN SOUTHERN AFRICAN UNIVERSITIES

Lucienne Abrahams
Senior Lecturer, LINK Centre, Graduate School of Public and Development Management, University of the Witwatersrand
Mark Burke
Visiting Researcher, LINK Centre, Graduate School of Public and Development Management, University of the Witwatersrand
Johann Mouton
Professor, Centre for Research on Science and Technology, University of Stellenbosch

ABSTRACT: The project for the revitalisation of Southern Africa's higher education sector is dependent on, among other things, the capacity of the region's universities to produce research, to communicate that research to a broad public audience and to use the research output in the process of educating future generations of graduates. Given this context, research output in the great majority of Southern African universities is barely visible. While the introduction of new digital media may offer greater accessibility and expanded opportunities for the visibility of scholarly communication, this may be insufficient to meet the needs of the many scholars and other actors who seek to build on existing bodies of knowledge, whether to advance society or in order to create knowledge for its own sake. This article reports the findings of two 2008 studies – *The state of public science in the SADC region* and *Opening access to knowledge in Southern African universities*. Working within a frame which understands knowledge produced in universities as a public good, this article examines the issues at play in terms of the productivity-visibility-accessibility of scholarly communications in regional higher education. The conclusion discusses a possible approach to improve such productivity-visibility-accessibility, through the adoption of a strategic vision of open access to knowledge and through consideration of two breakthroughs pertinent to achieving a vision of revitalised higher education in the region.

Revitalisation of scholarly communication in the subcontinent

After more than a decade of existence of the open access movement, scholarly publishing in Southern Africa has nevertheless remained rudimentary for a great number of reasons. In many parts of the world, universities operate at the cusp of the information society, as knowledge and information exchange among students, academics and researchers define the business of the university. African universities are emerging from a period of sustained neglect over several decades, during which they operated with limited resources to advance their mission and experienced limited academic freedoms within the context of the region's various political dispensations. Assie-Lumumba (2005) points to the historical failure to invest in research facilities and dissemination channels. Investment in electronic networks, and the changes in research and scholarly communications practice that are set in motion by the introduction of these networks, has been slow to take root on the continent. But initiatives such as the African Union's plan of action on the Second Decade of Education for Africa 2006 – 2015 recognise the 'link between high-level human resources, knowledge production and sustainable development' (African Union, 2006). This plan prioritised the promotion of original knowledge production, quality assurance and advocacy for increased funding. The 10-year partnership programme on Renewing the African University,[1] provided further

1 A partnership constituted by the Association of Commonwealth Universities, the Association of African Universities and the South African University Vice Chancellors Association, now Higher Education South Africa.

impetus for renewal, based on the belief that universities 'must be at the heart of any sustainable effort to rebuild the continent' (Association of African Universities, no date).

Initiatives for institutional change are beginning to permeate Southern African universities, with the main goals being student access and success, quality in higher education, research and engagement with the country and regional context. These goals are connected, in different ways, to the accessibility of the knowledge that may be present, though not visible, within the universities. The value of electronic media as enabling platforms for the greater flow of knowledge is also recognised (SARUA, 2009: 26-27).

Among a number of recent studies on universities in the Southern African Development Community (SADC) region,[2] prepared for the Southern African Regional Universities Association (SARUA), two studies in particular examined issues relating to the strengths and weaknesses of research and scholarly communication. The study on *The state of public science in the SADC region* (Mouton et al, 2008) discusses the 'de-institutionalisation' of scientific production, the limited visibility of regional scientific knowledge in the global pool of academic journals, the quality of local journals and the constraints on the publishing of scientific research from the region. The study on *Opening access to knowledge in Southern African universities* (Abrahams, Burke, Gray & Rens, 2008) explores the constraints on research availability and perceptions of open access within the region's universities. When exploring the data from these studies, it is apparent that visibility and accessibility are worthy of examination from the perspective of a region characterised by low research productivity.

This article, therefore, reports on the findings of the two studies and examines the issues of productivity-visibility-accessibility in Southern African knowledge production at the beginning of the 21st century. It posits a response to the lack of improvement in research visibility and to the rigidity of the scholarly publishing system by presenting an open knowledge platform for scholarly communication. This strategic, conceptual platform seeks to inform the emerging discourse and practice on research productivity in the region, with a view to fostering the greater abundance of and greater access to published knowledge.

Southern Africa – economy and development

Southern Africa's economy had a combined GDP of US$483 325 million[3] in 2008 (African Development Bank, 2009a: 41), low relative to other regions of the world. The region's economy is dominated by the services sector, except for Angola, which has significant mining and small-scale industry, and Malawi and Tanzania, which have high shares of both services and agriculture (African Development Bank, 2009b: 44). Challenges facing the countries of Southern Africa, often common concerns, are poverty, threats to food security, high HIV prevalence, and high rates of tuberculosis (TB) and malaria. Southern Africa had the highest incidence of TB in the world in 2005, with nine countries listed among the 15 countries with the highest incidence (ibid: 2). This regional context is characterised by the need to increase the size and complexity of the region's productive output and by the need for local knowledge to address the many issues in population development beyond those mentioned above. Selected development statistics (Table 1) show a region with relatively small populations, low gross

2 The SADC region includes 15 countries, namely Angola, Botswana, the Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. Madagascar was suspended from the regional economic body in March 2009 for an unconstitutional change of government.

3 No data available for Zimbabwe for 2008.

national income per capita and low life expectancy at birth, suggesting the many hurdles to development that the countries, and therefore also their university populations, confront.

Table 1: SADC development statistics by country

Congo (DRC)	64.7	Kinshasa	7.8	140	46.8
Lesotho	2.0	Maseru	0.210	1 000	43.0
Madagascar	20.2	Antananarivo	1.6	320	59.8
Malawi	14.2	Lilongwe	0.732	250	48.7
Mauritius	1.2	Port Louis	0.150	5 450	73.0
Mozambique	21.8	Maputo	1.4	320	42.4
Namibia	2.1	Windhoek	0.313	3 360	52.9
Seychelles	0.087	Victoria	-	8 960	73.1
South Africa	48.8	Johannesburg	3.4	5 760	49.5
Swaziland	1.1	Mbabane	0.078	2 580	39.7
Tanzania	41.4	Dar es Salaam	2.9	400	52.9
Zambia	12.1	Lusaka	1.3	800	42.8
Zimbabwe	13.4	Harare	1.5	340	44.3

Source: *African Development Bank, 2009b: 26, 50, 40, 31*

Based on the above statistics, the following country groupings can be presented with respect to population size and level of development:

- Group A: Angola, Congo (DRC), Madagascar, Mozambique, Tanzania – large, widely distributed populations with significant rural footprint; low or very low GNI per capita; average life expectancy; few higher education institutions (HEIs)
- Group B: South Africa – large population, widely distributed but highly urbanised, high GNI per capita, average life expectancy, 23 public universities and a large number of higher and further education institutions
- Group C: Botswana, Mauritius, Namibia, Seychelles – small populations, medium to high GNI per capita, average to high life expectancy, few HEIs
- Group D: Lesotho, Malawi, Swaziland, Zambia, Zimbabwe – small to medium population size, large rural populations, generally low GNI per capita, few HEIs

Except for South Africa, the remaining countries of Southern African all exhibit low levels of research visibility at both local and global levels. South Africa, too, has mixed fortunes in that some universities are research productive, while many are severely under-resourced from the perspective of research infrastructure and funding. Here, it would appear, low visibility is primarily a function of low research productivity in general. For these reasons, Southern Africa's universities struggle to meet their obligations as contributors to regional development, through creating and disseminating locally produced knowledge.

The value of visibility and accessibility of scholarly communication in Southern Africa

A starting point for this analysis is to frame the meaning of visibility of and access to scholarly communication as regards the social and economic value of this visibility and accessibility to the region. Visibility is comprised of a number of features including visibility

of authors and content through abstracting and indexing databases, through availability in library collections, through web-based publishing, and visibility of research performance as measured through various bibliometric measures such as citation counts and impact factors. Visibility of scholarly communication means that specific knowledge and authored works can be discovered because they are traceable. More importantly, in this regional context, visibility means that research on subjects and themes of local interest should be made public in ways that will enable the relevant actors (researchers, students and development practitioners) to easily identify local research that can be a valuable contribution to society, whether for future knowledge production or for development practice.

The study on *The state of public science* conceptualises visibility, in a bibliometric paradigm, as international visibility, using the numbers of publications in the Thomson-ISI (now Thomson Reuters Web of Science) and Medline databases. The Web of Science currently indexes articles across the world in over 10 000 journals in all fields of science. As the original bibliometric database, it is regarded by most scholars as the benchmark for international visibility. Journals are selected for inclusion in the Web of Science on the basis of their visibility (measured by number of citations per paper) in their respective fields.

Accessibility means that potential users can gain access to the hard copy or electronic format of the research, in order to evaluate the work through a review of the abstract, or through engagement with the full text or content of the work. If the technological means for access exists (both on the publisher's side and on the user's side) and the copyright constraints to access are addressed, then most, but not all, the requirements for access are met. This is generally applicable in regions of high research productivity (Chan, 2004). It is argued here, however, that, in a region of low research productivity, low visibility of Southern African research in the vast pool of global literature on any particular subject may indeed negatively influence its accessibility.

The value generated from higher education encompasses the creation and socialisation of new knowledge in the broad public interest, compared with the private sector where the commercialisation of knowledge is the dominant form of value creation. While research-intensive universities have begun to adopt commercialisation models (Etzkowitz, 2002), socialisation remains the dominant mode of knowledge dissemination (UN Millenium Project, 2005: 88-99), though doubt has been expressed about the public interest nature of much research output (Garnham, 2002). Benkler (2006: 31–32) attributes changes in the processes of knowledge and cultural production and exchange to the greater flows of knowledge throughout society in this Internet age, since 'the capacity to make meaning—to encode and decode humanly meaningful statements—and the capacity to communicate one's meaning around the world, are held by, or readily available to, at least many hundreds of millions of users around the globe' (ibid, 33). A renewed interest in scientific research among younger generations of students and academics is being generated by the greater availability of research made accessible through digital media: 'Science, or building of shared objective knowledge about the world, is a collective human endeavour, and the advent of the connected cyberworld has emphasized this more forcefully than ever before (ASSAf, 2006: 81)'. These changing conditions of communication and dissemination are enabling the emergence of new social and economic practices of knowledge production and sharing, not only in society at large, but also in higher education. For example, digital

libraries, institutional research repositories and online journal publishing are changing the practices of research access and usage within academic, epistemic communities.

Why are visibility and accessibility of scholarly research important to Southern Africa?

Greater visibility is important in order to raise the level of awareness of problems under research investigation, the applicable methodologies being used, the data collected and analysis derived, as well as the presentation of ideas for addressing these problems with respect to their relevance to Southern Africa. Greater accessibility of research, through evaluating analytical perspectives which offer fresh or distinctive views, can fuel the utilisation of knowledge for social and economic development and offer return on investment in scholarly research. The relationship between visibility and accessibility is an important theme in discussions on scholarly communication (Chan, 2004; Halliday, 2001; Kling & Covi, 1995). Chan (2004: 279) argues that:

> *Authors who contribute freely to academic journals do not expect any monetary return for their writing. Authors also perform peer review as part of their professional obligation and contribution to their disciplines. In exchange, they wish their papers to be widely circulated, read, cited, and built upon. This process in turn generates further research questions and funding proposals, and increases the impact of the research. Limiting access leads to lower visibility and needless loss of research impact for the researchers.*

In a context where there is a high volume of scholarly publishing and competition for visibility, lack of accessibility to scholarly works is a barrier to greater visibility and to research impact, including future productivity and utilisation. However, in countries where the volume of scholarly research and publishing is very low, such as in the countries of Southern Africa, what is published is marginally visible, compared to the greater visibility of northern authors and northern journals. For example, students, researchers and practitioners are likely to cite and utilise authored works from abroad over work from the region because of high versus low visibility in particular areas of study, such as in genetics, education and environmental engineering, where regional research output is particularly low. Thus, low visibility and low accessibility are major factors in slowing down research production on the sub-continent, thus limiting the application of knowledge for development purposes.

Here, access to information infrastructure is not the only barrier to dissemination and access to knowledge. Rather, the low levels of published research, whatever form it takes, is a barrier to the process of generating future research questions, generating funding proposals and achieving impact. Even with advanced infrastructure, little research would be available for discovery through abstracting and indexing databases, in library collections or on the Web, given the general lack of availability of the services required for web-based publishing, though this situation is beginning to change.

Initiatives are being undertaken to develop electronic networks among libraries in the region, for example, the INASP[4] and eIFL[5] projects (Ojedokun & Lumande, 2005), in order to encourage the flow of university-produced knowledge across the region. The work of INASP, which was established in 1992 by the International Council for Science (ICSU), is focused on building the

4 International Network for the Availability of Scientific Publications

5 Electronic Information for Libraries Direct Project

capacity to create, manage and communicate scholarly information and knowledge through national, regional and international networks. Through its programmes, INASP facilitates affordable access to international scholarly literature, publishing and creating digital libraries, including in several Southern African countries – Angola, Mozambique, Zambia, Zimbabwe.

Authored works often have low visibility in the academic fraternity because of the form they take, such as consultancy research and research in non-peer reviewed publications (Mouton, 2007; Abrahams et al, 2008). eIFL.net provides support for making available electronic resources to library users in developing countries through programmes that negotiate affordable access to commercially available journals and electronic library resources and through capacity building in areas such as open access publishing and building institutional repositories for research. *The South African Journal of Science* has become the first high profile journal to join the Brazil-South Africa Scientific Electronic Online Library (SciELO) initiative, which aims to make 35 internationally accredited journals freely available by the end of 2009.[6] The University of Pretoria has a policy for mandatory submission of accredited journal articles by its staff to its institutional repository, and voluntary submission of other research output by academics, students and affiliates, all of which are hosted online, giving the output of a single institution greater visibility than before.

Drawing on the discussion above, we construct a rough conceptual framework from which to explore the challenges of productivity, visibility and accessibility:

- **Proposition A:** Knowledge is a non-rival[7] public good (Benkler, 2006; Stiglitz, 1999) and the socialisation of knowledge should aim to enrich society at large and reduce social exclusion. Therefore, a culture of knowledge sharing should be encouraged as a means to increasing research productivity.
- **Proposition B:** As knowledge producers, universities should aim for scholarly communication to 'weigh in' on the side of the socialisation of knowledge for community and country development (Castells, 1999). This should emerge as the main objective of making local, university-based research visible.
- **Proposition C:** New media and new scholarly communication practices are producing beneficial change in the socialisation of knowledge (Houghton, 2006; Nentwich, 2003) and the 'wealth of networks' (Benkler, 2006) can be tapped into to promote the accessibility and rapid distribution of knowledge to a very wide audience.

Encouraging the socialisation of knowledge from research in knowledge-poor developing countries is a necessary ingredient, among many interventions aiming at the revitalising the role of African higher education in society. The challenge for Southern Africa's universities is (a) to raise research productivity, (b) to raise the 'capacity of the whole society to be educated, and be able to assimilate and process complex information' (Castells, 1999: 3-4), (c) to set a public interest research agenda for university-based knowledge production, and (d) to adopt new modes and technologies of academic production and socialisation that enable scholars to make visible and accessible existing bodies of research, both published and unpublished, as required for continuous knowledge production (Houghton & Sheehan, 2006).

6 See http://www.scielo.org.za

7 The utilisation of knowledge by one person is not devalued by the utilisation of the same knowledge by any number of other people.

Methodology

We present two questions for consideration that were either explicitly or implicitly posed by the two SARUA studies, namely:

(1) What are the barriers to productivity-visibility-accessibility of scholarly communication in the process of the revitalisation of higher education in the electronic age?
(2) What approaches to improving productivity-visibility-accessibility are appropriate for Southern African universities?

The objective of the analysis in this article is to offer an understanding of the state of productivity, visibility and accessibility for the actors involved in the project of revitalising university-based research and scholarly communication. This may enable policy-makers and decision-makers to develop approaches that promote both visibility and accessibility as a means to increasing knowledge production and dissemination.

The study on the state of public science in the SADC region involved a mixed-methodological approach that included a review of historical studies on regional research, a web-based survey of top scientists in the region (n = 634), field visits to 10 countries and a bibliometric study of scientific output from the region. The bibliometric analysis was done on papers published in the journals of the Web of Science (ISI) and journals published by Medline. More specifically, the bibliometric analysis was based on data in Africa Knowledgebase, a database developed by CREST.[8] Data in this database are extracted from various sources, including the Web of Science (ISI), Medline and African Journals Online (AJOL) and contain information on articles produced by SADC researchers as from 1990. The discussion of the visibility of science in the region in this paper is based mainly on these bibliometric analyses. Relevant questions from the web-based survey reported on here relate to (a) the preference of local researchers in relation to publishing in local and/or foreign[9] journals and (b) the reasons for publishing preferences in foreign journals.

For the accessibility study, 89 semi-structured qualitative interviews were conducted. Respondents were drawn from university management and from researchers and academics in the health and life sciences, natural sciences and engineering, and the humanities and social sciences across eight universities in seven SADC countries. Thematic analysis was employed to analyse the transcribed interviews, for which a coding structure was developed pertaining to constraints to accessibility of scholarly communication, as well as knowledge of and interest in open access approaches.

The analytical approach for this paper is to evaluate the findings of the two studies that are related to the productivity-visibility-accessibility nexus. This is in order to explore the issues of visibility and accessibility from the perspective of the actions necessary for revitalising scholarly communication in the region.

Findings on productivity-visibility: State of public science in Southern Africa

There has been a steady decline in Africa's share of world science as measured in papers published in ISI-indexes over the last two decades (Gaillard, Krishna & Waast, 1997; Tijssen, 2007), while the decline in sub-Saharan science has been dramatic, increasing marginally

8 Centre for Research on Science and Technology
9 Journals not published in the SADC region.

between 1980 and 1987 and slowing from around 1.0% in 1987 to 0.7% in 1996 through 2004 (Mouton & Waast, 2008). Recent analysis of SADC articles included in the citation databases of the ISI Web of Science, Medline and AJOL journals, in the study on *The state of public science*, confirms the picture painted by Tijssen (Mouton et al, 2008: 47-48). Total output for the 14 SADC countries in the study[10] for the period 1990 – 2007 was 95 711 papers. Table 2 lists the detailed output by country in alphabetical order. The dominance of South Africa in the region is reflected in the fact that it has produced nearly 80% of this output, while Tanzania and Zimbabwe produced the next biggest shares of SADC's output over this period. At the other extreme, countries such as Angola, Lesotho, Mauritius, Mozambique, Namibia and Swaziland have produced very small numbers of papers – none of them contributing more than 1% to the overall scientific production.

Table 2: ISI-publications per FTE researchers per six-year window

	FTE researchers	ISI-publications 1990 – 2007	ISI-publications 2002 – 2007	Publications: FTE researchers: six-year window (2002 – 2007)
Angola	167	182	81	0.48
Botswana	265	1 876	948	3.5
Congo (DRC)	2500	1 118	242	0.09
Lesotho	69	192	68	0.98
Madagascar	440	1 315	675	1.5
Malawi	389	2 001	922	2.3
Mauritius	180	621	313	1.7
Mozambique	795	713	366	0.46
Namibia	84	895	423	5.0
Seychelles	-	-	-	-
South Africa	6 329	75 544	29 225	4.6
Swaziland	60	249	93	1.5
Tanzania	1 047	4 815	2 248	2.1
Zambia	263	1 724	696	2.6
Zimbabwe	520	4 466	1 460	2.8

Source: Mouton et al, 2008

Different pictures of research productivity emerge depending on whether ISI-publications output is measured in absolute numbers, as a proportion of total ISI-listed publications, or as a proportion of the full-time equivalent (FTE) researcher population. When viewed from the perspective of absolute numbers, South Africa is the only producer with a relatively tractable degree of visibility. When viewed in proportion to FTE researcher population, however, then Namibia, South Africa (around five ISI-listed publications per FTE researcher over six years), Botswana, Zimbabwe, Zambia, Malawi, Tanzania (more than two ISI-listed publications per FTE researcher over six years) can be considered as contributors to the visibility of Southern African research. However, when viewed against

10 Seychelles not included in study.

the global 'web of science' the visibility of these Southern African research producers is very low, even cumulatively over countries and years.

The dominant fields of scholarly publishing for the SADC countries are public health, environmental and occupational health, tropical medicine, infectious diseases, veterinary sciences, immunology, environmental sciences and plant sciences. Low-production fields include the engineering sciences, medium- and high-technology fields, history and economics. Yet these latter fields are necessary for economic development in the region, not merely for competitiveness in the international journal publication stakes.

Web of Science and Medline journals are not readily available to Southern African universities, either in libraries or on the Internet. Thus academics, researchers and students face a triple bind: (a) low accessibility in relation to academic journals in general; (b) low accessibility to journals from the region; and (c) low accessibility of subject matter relevant to regional development concerns. In addition, researchers experience low research impact due to poor visibility of their output. If the 'visibility of science' and 'accessibility of scientific knowledge' are necessary conditions for growth in knowledge production as well as for functions such as post-graduate training and technology transfer, then the future efforts to codify and publish knowledge in publicly accessible journals, whether local or international, is a major strategic requirement for higher education revitalisation. Only through such codification and publishing can local knowledge be cited, used or applied and therefore add to our body of knowledge.

The web-based survey indicated that the biggest single group of South African respondents (36%) preferred to predominantly publish (but not exclusively so) in foreign journals, with a further 21% saying that they only publish in foreign journals. A greater percentage of SADC respondents indicated that they only publish in foreign journals (27%). In total, 57% of South African (SA) respondents and 47% of respondents from other SADC countries indicated that they prefer publishing predominantly or exclusively in foreign journals. On the other hand, 29% of SA respondents and 40% of respondents from other SADC countries indicated that they publish in both local and foreign journals.

Even though a relatively small number of Southern African journals are indexed in the Web of Science, most scholars agree that it is their aim to publish in these journals. The reasons given by the respondents for their preference to publish in foreign journals includes greater exposure (84%); the research field is of an international nature (78%); superior scholarly quality (76%). These results show that, despite the imperative – which is particularly strong in small and developing science systems – to publish in local journals, the vast majority of respondents prefer to publish in foreign journals for reasons of greater international visibility.

Findings on productivity-accessibility: Constraints to scholarly communication and perspectives on open access

The study *Opening access to knowledge in eight universities*[11] *in Southern Africa* reveals the following dominant features in relation to constraints on scholarly communication: awareness of research and scientific output; availability of research output; concerns about copyright; capacity for online communication; publishing criteria for promotion and reward; and journal publishing patterns. In addition, views on open access include concerns regarding quality and

11 University of Botswana, University of Dar es Salaam, Eduardo Mondlane University, University of Malawi, University of Mauritius, University of South Africa, University of Pretoria, University of Zambia

peer review; fear of plagiarism; recognition of open access research output and capacity for making open access operational.

Awareness and accessibility

Awareness of research output within the respondents' own departments or institutions and in institutions across the Southern African region appears to be limited. There is a preponderance of unpublished research, including conference and advocacy papers, technical and consultancy reports, theses and dissertations ('grey' literature) which is not easily accessible because it is generally not held in university libraries or available online:

> *This local research is also not readily available and accessible to researchers within the institution itself. … Very few researchers submit their publications to the library. More importantly, if those articles are deposited, they are supposed to be organised properly so that they can be easily accessible with good information retrieval tools. This has not been done and therefore it is not easily available* (Librarian).

Views on accessibility as expressed by librarians, university management and senior researchers differed from those expressed by academics and heads of faculties or schools. Librarians were unanimous in the view that Southern African research is not accessible across institutions in the region. This view was largely echoed by university research managers and by senior researchers. Deans and academic teaching staff were more inclined to find research output accessible. This difference is attributed to the differing needs of each group with respect to research output, with teaching staff having a less immediate need for advanced research in a particular field.

Availability and researcher practice

Researchers exhibit unwillingness to publish their work in formats that are not peer-reviewed, such as published research reports or thematic issue papers, limiting the availability of their data, methods, analysis and conclusions to researchers in the same and related fields. Given that the book chapters and journal articles published internationally are not easily accessible from Southern Africa, or are only available at a substantial cost, the lack of access to 'grey literature' further limits the flows of knowledge and novel ideas through the broad scientific community:

> *We have a culture where people don't feel comfortable sharing information even when something has been published. People want to keep information to themselves and that is not easy to get rid of, but it is a constraint* (Senior scientist).

Local investment in research funding is meagre, setting the scene for heightened competition for limited international research funds available for Southern African researchers. This reality, combined with institutional policy which emphasises promotion on the basis of peer-reviewed published work, provides hard motives for the unwillingness of researchers to engage in other, potentially valuable, forms of scholarly communication:

> *There is a limited number of research grants in the university and what happens is that you apply for that grant, backed up by a good proposal. But, the university hasn't got enough of that money so it's a cake which we are sharing between so many. Some proposals are shut down, or you keep on refining or finding other research projects. You tend to hold on to your research and ideas in these circumstances* (Researcher).

This view was confirmed by a senior manager, positing that researchers are guarded '*for fear that their research might be stolen and used in applications for research grants*' (DVC Research).

Copyright

Among researchers, the assumption that they must gain permission from publishers and must pay to use their own published material appears to be accepted without contest. While respondents were not aware of, or did not understand the options available for retaining access to their intellectual property, universities appeared to have ineffectual processes for managing copyright and intellectual property rights issues in ways that contribute to the greater accessibility of published work:

> *We are trying to educate researchers that if their articles are accepted, they still have the right to that information pre-final draft. If I send the editor the final copy, I can send it to the repository. That is the loophole. You can have a footnote saying where it will be published as you already have acceptance of it. Their ownership still exists prior to the final draft* (DVC Research).

A more forthright response on the effects of copyright practices on accessibility was heard from a librarian: 'Copyright holds academia by the scruff of the neck'.

Capacity to make research output available online

Respondents agreed that the Internet provides a highly effective channel for scholarly communication, but expressed concern that the potential of online dissemination is not yet being realised:

> *Upcoming academicians don't have avenues where they can disseminate information. … If we had better dissemination, not just journal papers, but also conference papers which can be given to people who do not attend the conferences ... All of these can be put onto a website but they are not there* (Dean of Humanities and Social Sciences).

In reality, many universities lack the capacities and skills necessary to operate in the online environment, in addition to the scarcity of funding and technical infrastructure:

> *One (constraint) is the ability for us to put information on the university website. We have no capacity to do that …* (DVC Research).

Journal publishing patterns

The most frequently used publishing media are academic journals and conference proceedings. The objective is to publish in rated international journals, despite the challenges of having an article accepted. This view appears to apply across all disciplines. A large proportion of respondents emphasised the difficulties and challenges:

> *To publish internationally is always a problem. Our papers are of a high quality but it is not always accepted. It helps if you do (collaborative) research with international known researchers, then it becomes easier to get your papers published* (Researcher in Science and Engineering).

Many views seem to militate against publishing, such as the view that the problem-solving focus of much (African) research is not suitable for publication in northern journals; or the view of

perceived bias against African knowledge by the northern scientific community:

> *The definition of international journals must be redefined as it currently does not include African journals* (Dean, Humanities and Social Sciences).

This latter bias is seen to be entrenched by African researchers themselves, as expressed here:

> *Yes, but it (your research) must be accredited and validated. You need something that is internationally validated and this is a problem with local non-accredited publications. How valid is the research? ... We have to internationally validate ourselves* (Researcher, Health and Life Sciences).

and

> *Our researchers prefer to publish in other journals, as the* Malawian Medical Journal *is a small local journal and people think it is of a lesser standard in terms of acceptance to the wider community* (Respondent, Health and Life Sciences).

There is some merit to the range of concerns expressed, when the challenges of publishing in local journals is considered. Concerns include lack of regularity of journals, perceptions of poor quality, and the problems associated with the availability of a relatively small pool of experienced peer reviewers and editors. Lack of accessibility of journals published in the region was raised as a major constraint.

Quality and peer review

Respondents were concerned that open access material would not be of good academic quality, particularly when not peer reviewed. The assurance of the peer review process appears to influence the willingness of many respondents to support open access, as this provides a basis for validation of the work:

> *It should be open but with responsibility and therein lies the problem in that you could get … information that is inaccurate. The fear in the academic world is in how you distinguish between valid, useful information and that which is not valid* (Dean, Health and Life Sciences).

Recognition of open access research output

Respondents confirmed that promotion and reward policies are skewed towards recognition based on publishing in international journals, rather than on recognition of the academic value of creating open access to local research:

> *We are generally better at producing regulations for dissemination than we are at producing regulations for access. We have regulations telling people where, how and even what to publish but the conditions as it stands, constrains access* (DVC Research).

Analysis and conclusion: research productivity–visibility–accessibility and revitalisation

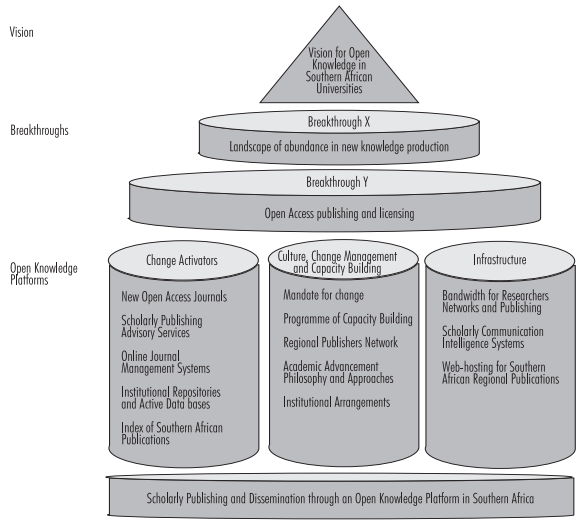
The advancement of knowledge is a contributing factor to social and economic development in all societies, not least in countries with low GDP and major development challenges, such as the countries of the SADC region. The studies on the *State of Public Science in the SADC Region* and *Opening Access to Knowledge in Southern African Universities* can be used to gain an enhanced understanding of issues at play in the productivity-visibility-accessibility of research produced in the region. Evidence shows that research is produced, but the recorded level of scholarly communication in formats that have high visibility is low. Furthermore, grey literature, including unpublished research reports, is poorly represented online and its existence is poorly documented. This combination of low productivity, along with low visibility of and low accessibility to what is produced, places Southern Africa in a downward spiral as regards cycles of research productivity.

Emerging approaches to the socialisation of Southern African knowledge must address all three elements, making research output visible and accessible across a broader range of communication forms and channels than the 20th century mode, which has been dominated by the publishing industry in the global north. Scientists, scholars and students can, through the medium of the Internet, publish their own work, without recourse to the publishing industry as intermediary. They can do this while still maintaining the requisite standards of academic quality in research communication, through online management of peer review and other quality assurance processes. This is important to Southern African universities, where the tradition of university publishing is very limited and where the region historically lacks a research publishing services base.

The perception that (Southern) African research is not sufficiently valuable to be made visible, except for individual career progression, is akin to a 'death wish' for scholarly communications. Furthermore, low visibility and accessibility have a mutually reinforcing effect, explaining the downward spiral observed in the visibility study. Yet what is currently visible does not fully describe the patterns of research output in Southern Africa. It is not possible to build greater visibility or accessibility without changing the paradigm about what is valued and therefore what is made visible and where. Funding the tip of the research production iceberg, where Southern Africa does not yet compete, makes accessibility a continued challenge. The lack of funding for access to scholarly communication using electronic channels presents a further constraint to increasing visibility, because there is so small and fragmented a public knowledge base on which to build. A sea-change in national and institutional thinking and policy on the resourcing of research is sorely needed.

It has been argued that the system does not produce sufficient output (research and successive generations of researchers) to reproduce itself. The system is seen to be in 'subsistence mode', with the majority of universities barely able to reproduce themselves as viable knowledge producing institutions (Mouton et al, 2008). Many researchers demonstrate exceptional performance; however, individual scientific endeavour rarely converts into building institutional research capacity which is cumulative over time and which can act as a platform for future research and post-graduate training.

If universities are to reproduce and revitalise themselves, what do they need to invest in and what changes should be introduced in institutional and national policy?



(Abrahams, L & Burke, M, in Abrahams et al, 2008)

DIAGRAM 1: OPEN KNOWLEDGE PLATFORM FOR SCHOLARLY COMMUNICATION

The restoration and improvement of Southern African universities requires a strategy that focuses on institution-building interventions as presented in Diagram 1 above, while simultaneously building the capacity of individual scientists. Our proposition is that such individual capacity building should be embedded in a framework of building the institutions of science and the platforms for open scholarly communication.

Such interventions and support should be based on the following platform for scholarly communication:

Firstly, a strategic vision for open knowledge in universities which places open access to scholarly communication at the core of creating a visibility-accessibility-productivity relationship. Open access in this context means 'free availability on the public Internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself' (Budapest Open Access Initiative, 2002). Such a broad strategic approach will enable greater numbers of scholars to source knowledge from (Southern) Africa, creating the foundations for greater utilisation of this knowledge and hence for greater productivity and visibility.

Achieving this vision will require two major breakthroughs:

- **Breakthrough X** is to systematically create, over the next two decades, a landscape of increasing abundance of research outputs, both peer reviewed and non-peer-reviewed – journals, books, monographs, published reports and thematic papers, documentaries and video materials, theses and dissertations, even in the context of limited financial resources. This will require concentrating efforts in fields of low productivity such as economics, education and environmental sciences, while increasing capacity in fields of

good yield such as public health and tropical medicine. All these forms of research output should be formally recognised by institutional research committees and acknowledged for the purposes of promotion and funding. Universities can encourage the establishment of platforms for research collaboration by academics and post-graduate students across the region, both in the online environment and through face-to-face engagement. The purpose of this push for productivity-visibility-accessibility is to provide a greater engagement with society – making knowledge accessible not just *online*, but *in African society* as well.

- **Breakthrough Y** would involve the systematic introduction of open access publishing and licensing approaches, most notably 'creative commons' licensing (Creative Commons) and other activators for systemic change. The work would include among other measures, extending early efforts to shift to open access journal publishing; developing the capacities for online journal publishing at limited cost while retaining quality standards; introducing institutional mandates for compulsory submission and/or encouraging voluntary deposit of research output for the purposes of online publication (repositories) to promote visibility of authors and their works; and working to effect national policies that support open licensing of public interest research. These efforts can be made in collaboration with organisations such as the SARUA, INASP and eIFL.net, expanding to more Southern African countries, to more HEIs and to more fields of research. The advantage of these approaches is that they would place Southern African research in public view – for researchers, students and other interested parties who may wish to utilise, critique or build on the work. This may also serve to encourage researchers to publish locally, as they would retain the ability to be visible to an international audience.

As in any revitalisation project, capacities that were previously not available have to be brought in and developed. These cultural, change management and capacity building initiatives should include focus on peer review and publishing practices for a range of research publication types and formats; crafting an understanding of the issues in intellectual property rights; lower cost online formats such as print-on-demand; measures to attract high quality publication in local (Southern African) journals. As regards infrastructure, intelligent applications for accessing local research will be as important as the physical network infrastructure.

The breakthroughs presented here are needed to address the constraints to productivity-visibility-accessibility as expressed by the researchers, scientists and managers in the two studies discussed above. Without addressing such concerns, any increase in electronic communications infrastructure may fail to lead to greater visibility of Southern African knowledge. The analysis of the two abovementioned studies further suggests that there is a nexus of productivity-visibility-awareness-accessibility-utilisation.

With respect to the four groupings presented at the beginning of this article, HEIs in Groups A and D, as well as many South African universities where research and scholarly communication are rudimentary, should adopt the breakthroughs at a very basic level, given the scale of the challenge in their environments. Institutions in Group C and South African universities with relatively higher research productivity may consider an approach which makes more rapid progress in relation to Breakthroughs X and Y.

In the final analysis, the revitalisation of Southern Africa's universities and their evolution into African centres of research productivity will only take place if future institutional and

national policy interventions take account of the productivity-visibility-accessibility relationship. An important area for future study will be a review of locally published and unpublished works, in order to gain an understanding of what research is available for publishing on an open access platform. ❑

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