The Case for Open Access Publishing, with Special Reference to Open Access Journals and their Prospects in South Africa

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Declaration

I declare that the work contained in this thesis is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references

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Signed:

Abstract

Open access publishing is an initiative that aims to provide universal, unrestricted free access to full-text scholarly materials via the Internet. This presents a radically different approach to the dissemination of research articles that has traditionally been controlled by the publishing enterprise that regulates access by means of subscriptions and licences fees levied on users, predominantly academic libraries.

In presenting the case for open access publishing, the thesis explores the contemporary research environment, changing modes of knowledge production, the problems associated with the existing academic journal system, and the subsequent growth of the open access movement as an intervention to reclaim scientific communication. It highlights the ways in which open access better answers the requirements of researchers, funders, governments, and society more broadly. Free access to publicly funded scientific research is more democratic and is necessary for knowledge dissemination and production in a knowledge economy, particularly for developing countries such as South Africa. Attention is drawn to the ways that open access intersects with the ethical norms guiding the practice of research, with the idea of information as a public good, and with other parallel initiatives that resist the enclosure of knowledge through excessive copyright legislation.

The study also closely interrogates the economic viability of open access journals, and shows how the 'author pays' model represents a reasonable approach, but by no means the only one available to publishers considering the transition to open access. Sections are also devoted to examining the impact potential of open access articles and the ways in which open access journals can achieve greater permanence.

The main research question centres on the feasibility of open access journals becoming widespread within the South African research system. The study presents the findings of an investigation undertaken to assess the current awareness, concerns and depth of support for open access amongst South African stakeholders. Separate questionnaires were distributed to government departments, research councils, research funders, research managers within universities and a sample of published authors from biomedical fields.

The conclusion recommends proactive engagement by faculty librarians and organized advocacy on the part of LIASA to promote the cause of open access within South Africa. It further calls for government to mandate open access to publicly funded research as a more democratic, cost-effective and strategic intervention to promote South African science. The gains to be won are particularly relevant for present challenges: training a new generation of researchers and scholars, and stimulating knowledge production and its subsequent application to solve the nation's developmental needs.

Keywords: open access, journals, costs, publishing, scientific communication, knowledge, researchers, feasibility study, survey, South Africa

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The open access phenomenon is evolving on a weekly, if not daily, basis. It would not have been possible to monitor all the initiatives, meetings, and sites of development without recourse to two important open access listservs (the SPARC Open Access Forum and the American Scientists Forum on Open Access), convened by Peter Suber and Stevan Harnad, respectively. Peter Suber produces a daily blog and a monthly newsletter, both exhaustive compendiums of current developments. Stevan Harnad moderates a discussion forum that attracts incisive comments and analysis following the twists and turns of emerging issues. The daily injection of information and insight, not to mention exemplary steadfast belief in the eventual triumph of open access, has been a vital source of encouragement and stimulation. By extension, I also thank the regular contributors to these forums.

I should like to express my appreciation for the enabling environment at the University of the Western Cape. As a staff member, I was actively encouraged to advance my studies, fees were waived, financial assistance was provided for the coding of the online survey and for printing costs, and expert guidance was available through the Postgraduate Enrolment and Throughput (PET) programme. This support made a great difference to the research process.

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I am very fortunate to enjoy the support of my family. Francois, my husband, has taken on far more than his fair share of domestic responsibility to allow me time to read and write. He also prepared and delivered refreshments to keep me going, provided expert computer support and kept me company through some very late nights in front of the PC. My daughters Nina and Lara, in their final year at university and school, unselfishly let their mother be a distracted and sometimes unavailable parent. Their daily affection and pride in me has also been a great incentive to do my best.

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List of Abbreviations and Acronyms

AGORA	Access to Global Online Research in Agriculture
AJOL	African Journals Online
ALPSP	Association of Learned and Professional Society Publishers
CHE	Council on Higher Education (South Africa)
CHET	Centre for Higher Education Transformation (South Africa)
DOAJ	Directory of Open Access Journals
DoE	Department of Education (South Africa)
DST	Department of Science & Technology (South Africa)
eIFL	Electronic Information for Libraries
HCT	Human Capital Theory
HINARI	Health Inter-Network Access to Research Initiative
HSRC	Human Sciences Research Council (South Africa)
ICT	Information and Communication Technology
INASP	International Network for the Availability of Scientific Publications
JISC	Joint Information Systems Committee (United Kingdom)
LIASA	Library and Information Society of South Africa
NACI	National Advisory Council on Innovation (South Africa)
NRF	National Research Foundation (South Africa)
OA	Open access
OAI	Open Access Initiative
OAI-PMH	Open Access Protocol for Metadata Harvesting
OECD	Organisation for Economic Cooperation and Development
SPARC	Scholarly Publishing and Resources Coalition (USA and Europe)
STM	Scientific, Technical and Medical
TA	Toll access
UK	United Kingdom
US	United States of America
WHO	World Health Organisation

Chapter 1: Introduction

Several hundred billion dollars is invested worldwide in research and development in order to solve scientific, technological and social problems and to advance our understanding of the present and the past[1]. Most of these research findings are communicated in scholarly journals that are disseminated on the basis of subscriptions or licences. In the US alone, the scientific, technical and medical publishing market is estimated at between $7-11 billion (OECD, 2004:14).

It is clear that scholarly research is a costly process and that its refined product, ie, published articles, represents a highly valuable resource. This study focuses on a tantalising proposition: given that publicly-funded researchers do not expect to receive royalties or other financial payment for communicating their findings via research articles, why should not these publicly-funded articles be freely available from the Internet? The free availability of published research offers greater opportunities for its discovery and subsequent application in contexts that may advance knowledge, facilitate problem solving and enhance technology transfer, which represent the purpose of scholarly endeavour in the first place.

Open access publishing is an initiative that aims to provide universal, unrestricted free access to full-text scholarly materials via the Internet. This presents a radically different approach to the dissemination of research articles that has traditionally been controlled by the publishing enterprise that regulates access by means of subscriptions and licences fees levied on users, predominantly academic libraries. Early experiments with open access publishing appear to offer evidence of a more efficient, economical and fair method of scholarly communication. In an age that demands increasing accountability for public spending, there is a sense of obligation that publications arising out of research supported by public investment be made available to all, rather than to those able to afford it. While it is unlikely that many in the publishing industry would agree with him, the following comment reflects the forthright view of an editor who worked for the *British Medical Journal* for 25 years:

[1] OECD countries spent $638 billion on research and development in 2001; South Africa's spend for the same year amounted to just under R7,5 billion (*Science and Technology Statistical Compendium 2004*, OECD, Paris; *South African National Survey of Research and Experimental Development (2001/02 Fiscal Year)*, Dept of Science & Technology, Pretoria)

> Before the Internet came along, scientific papers had to be published in journals. But now journals should give up what are effectively immoral earnings. They add no value to the scientific research, and yet it may take a year or more before they publish and they then charge people to read it. Making money out of restricting access to research is immoral. (Boseley, 2005).

While there are several catalysts that have induced the call for a new model of publishing, the strongest of these are highlighted within the quote above: the emergence of the Internet, and the unsustainable prices charged by publishers. The Internet has brought about a myriad of changes within society broadly, and the research sector has not been immune. The rapid growth, success and resulting dependence upon the Internet has changed the information seeking, research practices and reporting behaviour of researchers (Houghton, Steele & Henty, 2003: 41-57; OECD, 2004:15). The Internet offers unprecedented opportunity for widespread dissemination of research findings.

The existing model of scholarly journal publication is criticised on account of the following factors:

- dissemination of research findings is limited to individuals or institutions that can afford subscription fees. This is inimical to the ethos of open scientific inquiry;
- formal publication of research findings can take from 6 to 18 months after submission;
- copyright over the text describing research findings is signed over to the publisher, limiting the author's right to use, copy and share the text; and
- librarians are critical of the terms of commercial publishers' licencing contracts for e-journals. These encroach upon fair practice which is a legal limitation on copyright laws.

In addition to these emerging dissatisfactions, the practice of journal publication has also inherently become subject to problems of scale in the past two decades. The imperative for academics to publish in order to achieve recognition and advancement has resulted in an upsurge in the number of journal titles to accommodate the outpouring of articles. The growth of journal titles is also due to the increasing specialisation within disciplines and the trend towards interdisciplinary studies. From the academic library's perspective, it is no longer possible or affordable to provide all researchers with all of the material that they require.

Notwithstanding these difficulties, the factor that has brought the present crisis to the fore has been the alarming increases in subscription rates over the past fifteen years. Part of the reason for the ongoing surges in cost is the narrowing of competition and subsequent monopolisation of the journal market by one or two multinational giants (Steele, 2003: 113). This has brought tension into the relations between publishers and librarians. The latter feel that they have little possibility for manoevre when negotiating contracts with commercial publishers and are forced to cancel journals that exceed finite library budgets.

Briefly, the claims made by supporters of open access is that it provides global free dissemination, greater impact potential for research, a speedier publication process, and presents overall savings by means of cheaper operations. The underlying principle is that greater access to publicly funded scientific research is more democratic and is necessary for knowledge dissemination and production in a knowledge economy.

Since academics themselves are both authors (producers) and readers of journal literature (its prime market), it is this constituency that has taken the initiative to make an intervention to dislodge the locus of power that presently resides with commercial publishers. This originally manifested itself in small measures. Since the early 1990s, academics began self-publishing their research findings on their departmental sites or in pre-print servers on the Internet. Their desire was to achieve greater exposure, to obtain feedback and to stake a claim for their recent advances.

Open access journals began emerging during the early 1990s. The newly-launched journals were relatively low-key, departmentally-based initiatives that relied upon voluntary services for editorial processes (Hedlund, Gustafsson & Bjork, 2004:201). These represent the early beginnings of open access journals. A different kind of open access journal is now becoming more common. This is a commercial profit-based concern that nevertheless is committed to making research freely available. This type of organisation typically relies upon author charges as well as sponsorships from national bodies and philanthropic foundations (e.g. JISC and Open Society Initiative) that seek to boost uptake of open access. BioMed Central and the Public

Library of Science are two well-known examples of commercial open access publishers.

Since librarians have been at the sharp end of the serials crisis for around fifteen years, and because of their traditional role as protector of the global commons, or the record of public knowledge, it is understandable that library organisations have been at the forefront of the open access movement and supportive of the principles that underlie it. Recently, several high-level international interventions emanating from professional associations, learned societies and research foundations in the form of declarations of support for open access have added authority and momentum to the call to funding agencies, higher education institutions and researchers to throw their weight behind open access publishing. It is clear that open access is an option that must be seriously considered.

1.1 The case for open access within South Africa

Nations without access to new knowledge and information become marginalised and their opportunities for full participation in the global economy become more limited. The implications of open access publishing for South African research are explored as part of the study. Beyond conference presentations and papers[2], there are almost no local sources addressing this important issue. De Beer's 2005 M.Phil thesis (De Beer, 2005) is the first serious study to be undertaken.

South Africa is in the process of implementing recently-developed science and technology policies[3]. Broadly speaking, these have three main objectives: to coordinate the country's research and development agencies that previously were isolated and not coherent; to develop highly strategic research themes to make research more responsive to the socio-economic needs of the country, via the newly established Centres of Excellence, for example; and to build a new generation of researchers, particularly amongst black and female South Africans (Dept of Science & Technology, 2002:54-57 and 61-62; Losego, 2005; Council on Higher Education, 2004:110-111). Improvements in the national skills base within engineering, technology, medicine, business, economics and social science can address South

[2] See list of De Beer's presentations at http://eprints.rclis.org/view/people/De_Beer,_Jennifer_A..html and Moller's paper at http://www.codesria.org/Links/conferences/el_publ/moller.pdf

[3] The key policy documents are the White Paper on Science and Technology, 1996 and the National Research and Development Strategy, 2002.

Africa's urgent problems in healthcare, clean water, sanitation, food, housing and transport.

Losego and others (National Advisory Council on Innovation, 2004:117-118; Council on Higher Education, 2004:113-114) have noted that an indicator of stagnation within the South African research system is the inability to improve its publication output. The Director of one of the research councils that participated in the present survey remarked: "It is anticipated that open access publishing will motivate the individual researcher to publish more than he (sic) previously did", suggesting a potential for increased scientific productivity as an additional outcome of wider and faster exposure to relevant literature. This study argues that improved access to recently published studies would materially and qualitatively improve South African postgraduate education, by exposing researchers-in-training to stimulating and novel ideas, methods, experimental results and observations.

The study also draws a connection between the current demands for cost efficiency and accountability within the higher education sector and the rationale that open access provides a better return on the high costs of scholarly research. South Africa's overall spending on R&D has not yet reached the targeted 1% of GDP that is recognised to be an important threshold for national investment in knowledge creation (Dept of Science and Technology, 2002).

Ten years after democracy, South Africa remains an unequal society with one of the most highly polarised income distribution levels in the world (Bhorat, 2004: 942). For example, Leibbrandt et al (2004: 10) report that white per capita income increased from 9 times higher than African income in 1996, to 11 times higher in 2001. Pockets of privilege exist alongside widespread deprivation and poverty. Despite the application of targeted funding strategies, racial and gender imbalances persist in most sectors, including the research population, which appears to have changed little in its composition (Council on Higher Education, 2004: 125).

Apartheid's systematic exclusion of the majority of the population from equal and adequate educational opportunities has resulted in a relatively low 2.2 FTE researcher per 1,000 employed (Dept of Science & Technology, 2004:14). This automatically reduces the pool for knowledge production and the number of

publications for the country. In order to increase the visibility and effectiveness of publicly-funded research that addresses the nation's urgent developmental needs, it is imperative that such output should be universally and immediately available.

It is important to examine the promise of open access publishing and to problematise the long-term sustainability of the new model. For example, skeptics have raised issues that address economics, quality and preservation. The debate is still in progress and open access journals are still fairly experimental but the study will report on the findings of several recent important studies.

1.2 Aim and objectives

This study aims to explore open access publishing as a remedy to the present serials crisis and as a model that serves stakeholders better than the existing system. A more strategic expression of this purpose is reflected in the following research question: "What is the feasibility of the widespread uptake of open access journals as a publication channel within South Africa?"

In order to achieve this aim and determine an answer to the research question, the following objectives were set:

1. To analyse the environmental and operating context of academic research and publication in the light of the possibilities offered by open access.
2. To examine the motivations for introducing a new model of publishing.
3. To investigate the challenges facing open access journals.
4. To undertake a survey of local stakeholders to determine levels of support for open access.

1.3 Research design and chapter outline

In presenting the case for open access publishing it was necessary to cast a wide net to incorporate all the evidence that could usefully advance arguments in its favour. The study begins with a broad overview of current influences and pressures that are transforming the research arena, particularly the higher education sector. The effects of globalisation, rapid and rampant advances in information and communication technologies, a competitive knowledge economy, and a pervasive market approach are discussed in a critical scan of the current research environment. The purpose of this review is to identify the strategic points where the

principles of open access intersect with the imperatives of the contemporary research setting.

Chapter 3 then presents a more narrowly focused survey of developments within the scholarly publishing industry with a view to understanding the motivation for open access publishing. Secondary sources will provide a basis for a more thorough examination of the serials crisis, publishers' practices of bundling electronic journals and the effects of these on academic libraries. The chronic nature of the serials crisis and its effects upon researchers and teachers led to an official enquiry by the UK House of Commons Science and Technology committee between December 2003 and July 2004. The committee requested written submissions from commercial publishers, not-for-profit and learned society publishers, open access journal publishers, research councils, leading academics and librarians. Thereafter, representatives from these sectors faced critical questioning in public hearings as the committee attempted to gather evidence to determine what measures should be taken to ensure that researchers, teachers and students have access to the publications they need. The expert submissions and the transcripts (Science & Technology Committee, 2004a-d) of the questions and answers from the public sessions of the inquiry provide a wealth of informed opinion and experience to inform this section of the study.

Since the exclusive assignment of copyright has set up the conditions for the serials crisis, current ideas regarding the ownership and control of information are subjected to a critical review in Chapter 4. Further motivation for open access is underscored by demonstrating that the economic characteristics of information predispose it to be treated as a public good. The study also advances the theory that open access principles are concordant with the ethical norms that govern the practice of scientific research.

In order to examine the critical challenges facing the transition to open access, Chapter 5 draws upon evidence presented in very recent surveys and case studies. For the most part, these represent studies commissioned by professional organisations, research funders and other national bodies charged with facilitating research and its communication. The studies were undertaken in order to gather empirical evidence that could serve to guide the decision-making processes of these

leading institutions in the light of the challenge thrown by open access[4]. This information is supplemented by my own experimentation with websites offering open access resources. I assessed the editorial policies, searchability and retrieval of articles from these sites.

Besides the issue of the economic viability of open access journals, academic authors will need to be convinced of their quality and impact factor. An enduring perception is that they are less rigorous and lack stringent peer review. Since impact is the chief concern, how do open access journals compare with subscription journals within this critical dimension? These issues are also addressed in Chapter 5. Open access journals across the range of disciplines need to capture the attention and confidence of authors in order to become recognised as reputable publication channels. On the other hand, they are unlikely to attract authors unless the reward and incentive structures that govern research funding and academic promotion are more inclusive of open access publication.

The last stated objective was to explore the role that could be played by local stakeholders in mainstreaming open access journals. Publication is a central feature of academe and plays a vital role in the reward structure of academic rating of individuals and institutional ranking. An important condition for the widespread acceptance of open access journals would be their recognition and accreditation by institutional, national councils, and government agencies that have the power to influence decisions about faculty tenure and promotion (Bjork, 2004:online).

Chapter 6 presents the methodology and results of a local survey undertaken to collect information from different constituencies. The following sectors were surveyed: government departments, science councils, the National Research Foundation, academic deans of research, and published authors working in biomedical fields. The main purpose of the survey was to establish each sector's awareness of and recognition of the importance of the current debate and to gather information that would demonstrate to what extent open access has been placed on the agenda of policy makers and research organisations. Other questions addressed issues regarding author charges, copyright, quality and accreditation of open access

[4] The groups I refer to include the Joint Information Systems Committee (JISC) in the UK, the Wellcome Trust (a large research funder), the Academic Research Libraries group and the Association of Learned and Professional Society Publishers (ALPSP).

journals, and the academic reward system. The three different questionnaires are appended to the study.

1.4 Definition of terms, assumptions and delimitation of the study

While the study refers to the "open access movement", it should be noted that there is no such formally constituted group and this designation is used to refer collectively to a growing trend that subsumes many different efforts and processes underway to achieve the goal of open access. There are also differences in the conception of what qualifies as "open access". For example, some consider that a six-month embargo on journal articles after publication begins to equate with open access; others might consider that an institutional repository that restricts access to members of its community nevertheless constitutes open access to those individuals. For clarity, this study is uncompromisingly strict that "open access" refers to immediate, free, unrestricted and universal online access to scholarly resources. It is mindful that not all academic communities have the requisite infrastructure and sufficient facilities for ready access to such resources. This is a factor of pre-existing and continuing material inequalities that cannot be rolled back through open access alone. The "digital divide" and the "information divide" are separate though highly inter-related issues. It is expected that existing and future initiatives addressing the former[5] will rapidly decrease the latter problem and enable open access to reap its full benefit universally. All university-based researchers within South Africa presently have reasonable online access.

Open access is achievable through two strategic courses of action, through open access journals and by the self-archiving activities of published authors. Self archiving refers to the practice of depositing peer-reviewed journal articles published elsewhere within freely accessible online archives that may be institution-based (decentralised institutional repositories) or discipline-based (centralised archives). The importance of such online archives at this point in the evolution of open access publishing is as a result of groundbreaking work undertaken by the Open Archives Initiative (OAI). The OAI seeks to develop and maintain standards that will facilitate searching across these online collections of papers. More details are presented in

[5] One example is the Bandwidth Consortium that is funded by the Partnership for Higher Education in Africa. In September 2005 the Partnership pledged a further $200 million to universities in Africa over the next five years. The Bandwidth project is the major beneficiary. Further information is available from http://www.rockfound.org/documents/722/pheapressrelease.pdf

Chapter 4. The literature on open access widely refers to these two strategies as the "gold road" (open access journals) and the "green road" (self-archiving).

Within the open access movement it is apparent that two camps are developing, ostensibly over which "road" offers the optimal route to 100% open access to the scholarly literature. Some individuals align themselves strongly with the green road, arguing that open archives are less disruptive of the publishing industry as authors may continue to publish in established journals and still render their articles open access through self-archiving. Others favour the gold road, claiming (with reason) that authors have so far proved to be reluctant (for various reasons) to self-archive, and they therefore wish to replace all current journals altogether (Harnad, 2005).

Since the prime focus for this study is on the progress of open access journals and only considers open archives briefly, it might be deduced that this choice represents a "road not taken", or that it reflects a personal prejudice or inclination. This choice was made in order to provide a neat limit on the extent of this study, which otherwise would have become extremely long and dispersed. A further rationale for the present emphasis is that open access journals employ peer review mechanisms comparable with subscription journals, while repositories may be inclusive of all kinds of research materials that may be self-archived by their authors, including data, learning objects, media-based demonstrations, videos etc. In other words, open access journals presented a model that allows for more direct comparison with subscription journals. One of the conclusions reached through this study nevertheless finds that, within the present framework, more immediate progress is likely on the institutional repository front in South Africa.

The movement towards open access is rapidly evolving and it is not possible to represent each of the strands that are emerging, fascinating though they are. For example, this study has not incorporated discussion of initiatives to provide open access to the massive amounts of scientific data that have become essential tools within e-Science. Copyright legislation that protects the commercial interests of the creators of databases presents a parallel to the situation with commercial publishers of scholarly journals. .

A further limitation related to the currency of this topic is that in some areas, there is a lack of sufficient evidence to make decisive pronouncements. This is the case for

the issues relating to the economic sustainability or for the impact studies of open access journals. Because this research topic is constantly under development, one is limited to reporting on findings, analysing trends and attempting to forecast likely trajectories.

The limitations of the size of the survey groups also constrains the extent to which one can extrapolate for a broader population, ie, all relevant policy makers, all university research managers, and researchers within all disciplines.

Since the debate is unfolding on a weekly, if not daily, basis, these developments require constant monitoring. The main vehicles for news or commentary are dedicated discussion groups (such as the Scholarly Publishing and Academic Resources Coalition [SPARC] Open Access Forum and the American Scientist Open Access Forum) and journal articles. Many of the articles and papers consulted have been reported in the monthly *SPARC OA Newsletter* which provides links to reported items.

1.5 Background to the study

The seeds for this study feasibly lie in the frustration and disappointment I experienced as a faculty librarian from 1990 to 2000. Year after year at faculty meetings we faced the bitter prospect of cutting journal subscriptions, sometimes by as much as 20-30% in one year. Whenever a newly-arrived faculty member wished to develop a particular field of study, and nominated one or two journal titles, these could only be purchased if others representing the equivalent cost were sacrificed. Teaching graduate students how to use indexing tools became an exercise in futility as it served to whet their appetite for resources that were not available in South Africa.

A brief spell managing an academic library in London during 2001 showed me that while academics in advanced societies enjoy more rapid and wider access to scholarly resources, these tended to be sources produced in Northern countries; there was a noticeable absence of titles published in the South. Their lack of visibility within the academic mainstream showed me that research from developing countries is marginalised. Upon my return to South Africa I spent a year organising a library and information service for a NGO that rejects the maxim that there is no alternative to a neoliberal global order and that calls for a more just social

dispensation. This short period served to sharpen my critical awareness and taught me to question dominant paradigms.

When I began working at the University of the Western Cape in 2003, I was intrigued to discover that it was actively promoting open source and open content development. Attending the first African open source conference that was organized by UWC in January 2004, I was introduced to the Creative Commons philosophy. This was my first acquaintance with the ideals of open access and I immediately knew that this was an area I wished both to work on and work towards. Presenting ideas towards this thesis at a conference on electronic publishing in Dakar, Senegal in September 2004, I was encouraged that these received support from my African counterparts; the only dissent came from publishers and from scholars from the North. The past two years have seen enormous worldwide progress and advances in open access. It is hoped that this study may be used as a source to advance its course here in South Africa.

Chapter 2: The Social and Economic Context of Academic Research

This thesis is interested in scholarly journal publication and the ways that researchers choose to disseminate their findings. Until recently this process has followed a pattern that has remained relatively unchanged for several hundred years. This chapter will provide a brief review of some of the change factors that are transforming universities as sites of research and teaching. It will provide a broad environmental scan of the social, political and technological developments that have shaped the research environment over the past two decades. Such factors include the rise of the knowledge economy, global competition, the increasing marketisation of higher education, new modes of knowledge production, and the rapid advances in information technology.

It is important to note that the publishing industry has also experienced massive change as it has been subject to similar forces. It is surmised that the sum of all these change processes has brought about a disjuncture between the interests of each party within the scholarly publishing system, and that a fundamental change in the communication of research is required. The movement towards open access is an outcome of the desire to optimise this function. A consideration of the benefits of and prospects for open access journals thus needs to be measured against the prevailing socio-economic environment within which research and publication takes place. As will be shown, this environment has undergone huge changes and it needs to be demonstrated that open access provides a publication model that responds better to the imperatives for improved efficiency within higher education.

2.1. Social change

2.1.1 Globalisation

The term globalisation is routinely invoked within virtually all discussions of the recent past. It provides a useful backcloth against which other concurrent developments may be viewed. As a pervasive force it has operated as a diffusing agent, ensuring the rapid circulation and infiltration of the effects wrought by other economic, social and technological developments. The term refers to the increasing global convergence of processes and activities that previously were conducted and transacted in relatively localised areas. The result is that boundaries of space and time have become increasingly irrelevant in a world where transcontinental communication is instantaneous (Castells, 1996:476-77; Held and McGrew, 2003: 3-

4). The following definition highlights both the spatial aspect of globalisation as well as the political dimension of power differences it engenders:

> "A process, or set of processes, which embodies a transformation in the spatial organization of social relations and transactions – assessed in terms of their extensity, intensity, velocity and impact – generating transcontinental or interregional flows and networks of activity, interaction and the exercise of power." (Held et al, 1999: 16).

It is widely acknowledged that such flows have generally benefited countries of the North and that the global economy has exaggerated the inequalities between rich, powerful nations and poorer developing countries on the periphery (Castells, 1996: 133-136; Castells, 2001b: 14-20; Held and McGrew, 2003:30-32)[6]. Another area of power that has become circumscribed is that of the nation state. Several commentators have drawn attention to the weakening of the sovereignty of the state in the face of the growing power of multinational corporations or overarching supranational organisations such as the World Trade Organisation, the OECD, the World Bank, or regional blocs such as the European Union, amongst others (Carnoy and Castells, 1999; Stiglitz, 2003:480). Particularly in the sphere of public policy it is possible to discern a general consensus in policy practices that reveal a convergence around specific goals (Robertson, 2005:153). Olssen & Peters (2005: 331) refer to a "policy template". The protection of markets is one such characteristic objective. Stromquist and Monkman (2000: 17) write, "(t)he new state will be less concerned with the welfare of its citizens than the creation of legal norms that enable the protection and coherence of the market."

In the sections that follow, it will be seen that, irrespective of geographic location, higher education systems have universally been subject to the same political pressures to reform their approach to teaching, learning and research (Jones, McCarney & Skolnik, 2005: 17-18).

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[6] "For most of the world's poorest countries the past decade has continued a disheartening trend: not only have they failed to reduce poverty, but they are falling further behind rich countries. ... In 1990 the average American was 38 times richer than the average Tanzanian. Today the average American is 61 times richer." The 2005 Human Development Report, "International Development at a Crossroads: Aid, Trade and Security in an Unequal World", United Nations Development Programme, p. 36-37. Available http://hdr.undp.org/reports/global/2005/

2.1.2 The global economy

It is immediately apparent that globalisation has arisen out of the dramatically enhanced mobility of information, finance, and market and transportation systems across national borders. Each of these now operates within a global network, enabled by the dramatic advances in information and communication technologies (ICTs), including telecommunications, satellite and computing technologies (Castells, 1996; Held et al, 1999; Carnoy and Castells, 1999; Castells, 2001a: 152-156). These global networks have enabled the rise of the multinational conglomerates that have overpowered, absorbed or sidelined less powerful firms. Dick (2002:97-98) and Trasler (2003:2-4) have described how powerful media conglomerates, already giants in the leisure industry, have bought up educational publishing houses. Chapter 3 of this thesis provides a fuller account of the solidifying concentration of publishing firms under the control of very large publishing magnates, for example, Reed Elsevier, Springer, Wiley and others. The monopolisation of the publishing market has not served authors or readers of scholarly literature (Case, 1998: online; Wyly, 1998:online) and is one of the drivers of the open access movement.

The result of this increased global network activity is both a growing interdependence of commercial systems (trade, multinational corporations, money markets) as well as a heightened emphasis on national competitiveness as countries jostle for pre-eminence within the global economy that handsomely rewards national high performance with better standards of living and punishes slow-starters by marginalising them (Castells, 1996: 133-136; Amin, quoted in Stromquist and Monkman, 2000: 19-20). This has spurred the creation of deliberate policies of national systems of innovation that set the agenda for strategic research with accompanying funding incentives. A robust national research system is viewed as the vital wellspring that can enable a national economy to compete effectively in the global economy.

The already existing inequalities between countries are further entrenched when scholars in developing countries operate within institutions unable to supply the necessary research tools to enable them to participate in global science. Teferra (2003:129-130) has recently reported on the difficulties associated with scientific research in Africa. His study of the research environment reveals a shrinking community of researchers bled by brain drain (flows to the North), shrinking state funding and inadequate research facilities and salaries that lead many to abandon

research. Those that remain are over-burdened with teaching and administrative loads that do not allow for reading and writing. The open access movement pronounces that its goal is to promote wider sharing of scientific knowledge. While it may be argued that the digital divide presents a barrier, open access nevertheless will enhance the possibilities of scientists, medical personnel and agricultural researchers, amongst others in developing countries, to intersect with international scholarly networks.

2.1.3 The knowledge economy

The World Bank approach to development (critiqued by Odora Hoppers (2000) and Jones in Stromquist and Monkman, 2000:36-39) stresses the link between education and the economic growth, between skills development and productivity. A skilled workforce is viewed as crucial to national economic performance. Probably the most potent force driving this idea is the now universal construct of the knowledge economy.

Developing out of the post-industrial vision of Daniel Bell (Robertson, 2005: 152), this theory pronounces knowledge capital to be the most important factor for economic development. "The ability of a society to produce, select, adapt, commercialise and use knowledge is critical for sustained economic growth and improved living standards" (World Bank, 2002: 7). In essence, it highlights the importance of systems that enhance innovation, which is seen as "the sole means to survive and prosper in highly competitive and globalised economies" (David & Foray, 2002:11). The application of knowledge to create new goods and services, ie, innovation, is what drives the knowledge economy. National systems of innovation are developed, "based on the core principles of partnerships, coordination, problem-solving, multi-disciplinary knowledge production, and a societal culture which privileges the advancement of knowledge and information in all its forms" (Kraak, 2000: 25). Open access explicitly addresses the latter requirement. Industrialised economies now pursue innovation in a way that is reminiscent of the space race of the `60s.

> "Britain must be first for science", says Chancellor Gordon Brown. On the eve of the budget, he promised to make Britain the world's most attractive location for science, saying that boosting hi-tech business was vital to fending off the growing challenge from India and China (Curtis, 2004)

The European Commission produces an annual European Innovation Scoreboard Working Paper[7] which plots statistically the relative position of Europe to the United States and Japan. The indicators it measures are high-tech patents, population with tertiary education, science and engineering graduates, business research and development (R&D) expenditures, public R&D expenditures and ICT expenditures.

These criteria, together with new forms of partnerships between government, industry and higher education, illustrate a development which has been termed the "triple helix" model which was originally advanced by Etzkowitz and Leydesdorff (Kraak, 2000; Jacob and Hellström, 2000: 11; Delanty, 2001: 120). Coordination amongst these partners is essential for successful technology transfer (Houghton, Steele & Henty, 2003:7).

The thrust of this section has been to demonstrate the importance of efficient information dissemination and knowledge management which is essential for advancing knowledge and human capital. The predominantly descriptive account has not problematised the concept of the knowledge economy as a departure point for education policy[8]. Scott (2005b:19) draws attention to recent studies that question the benignity of the knowledge economy and asks:

> "[I]f knowledge is a key economic resource, it must also be – in market societies, at any rate – a tradable good; how can the idea of knowledge as a commodity be reconciled with the rival idea of knowledge as a public good; and, most intractably, how can the creativity (and 'quality') of science, which currently depend upon its free circulation and exposure to expert assessment, be maintained if its results are no longer so openly available?"

This quotation neatly encapsulates several key issues for the open access movement: publishers' licences and subscriptions have created an artificial 'shortage' of information, so that it has become a scarce commodity, when in fact there is an abundance of it. Supply of knowledge and information is regulated by financial tolls and when access is cut, this stifles the progress of knowledge.

Besides enabling "creative" science, open access offers the potential for enhanced teaching and learning in the training of skilled workers and researchers. Within the dynamic of the knowledge economy it is counter-productive to restrict the progress

[7] http://www.cordis.lu/scoreboard/what.htm
[8] See Robertson (2005) and Peters (2001).

of knowledge to institutions that can afford to access knowledge and information. This directly impedes the ability of developing countries to play their part in the knowledge economy.

2.2. Political change

The effects of globalisation have also extended to the realm of culture and political ideas, with the result that the ideologies and values of powerful nations tend to overwhelm alternative beliefs and systems. Accordingly, with the demise of socialism and central command economies after 1990, capitalism ascended to an uncontested position and the pursuits of the free market system (profit, monopoly, individual freedoms) have crowded out countervailing ideas and approaches that are predicated upon different values (Odora Hoppers, 2000). As Bates (2002: 145) remarks: "There is … a significant cultural shift implicit in the establishment of global free markets: towards the abdication of the collective responsibilities of societies for all their members and the establishment of a culture of competitive individualism". Fitzsimons (2002) also draws attention to the tremendous cost to a shared community form of life in a culture where individual competitive values are esteemed. The open access movement represents a push back against such an approach. The free dissemination or sharing of research findings for the larger public good may be viewed as a reaction to the excessive user costs demanded by corporate publishers that automatically bar fellow scholars working in poorer countries or institutions from access to research information. Chapter 4 will show that open access reorients the communication of scholarly research towards the traditional scientific norm of research as a cumulative and communal endeavour.

2.2.1 Rise of neoliberal economic policies

During the 1980s Margaret Thatcher and Ronald Reagan introduced monetarist policies that deviated from the Keynesian welfare practices that had brought about unprecedented economic growth in the postwar era. Worldwide recession as a result of the oil price crisis of the '70s sent governments scurrying for an antidote to inflation (Olssen, Codd & O'Neill, 2004: 141; Shumar, 1997: 79). Monetarist policies emphasise a reduced role for the state in the economy and open the way for increasing privatisation of state functions and enterprises. Fiscal discipline was also a watchword of this decade and this resulted in decreased expenditure on public services, including education (Olssen, Codd & O'Neill, 2004: 139-142; Delanty, 2001: 122-123).

Because the UK and the US are world powers, their economic policies became more widely applied with an accompanying spread of neoliberal ideas. Neoliberalism entails "subjection of the state to the requirements of capital" (Bates, 2002: 149), and furthermore demands positive intervention by the state in the shape of incentives to fuel economic growth. These incentives privilege industry over the public sector and include such instruments as subsidies and other forms of economic protectionism. Moreover, there is increasing expectation that the public sector should be managed more efficiently, ie, run along business principles (Olssen, Codd & O'Neill, 2004:153; Henkel, 2005: 163-4; Baatjes, 2005: 29). The image of universities as remote ivory towers has rapidly eroded as various stakeholders (governments, funding agencies, taxpayers) require that these institutions become more accountable and responsive to changing social needs and provide a better return on public investment. One consequence of this growing external pressure is that the traditional authority or legitimacy of the university has diminished as higher education has become another enterprise in a world where markets rule (Gumport, 2000: 67-72 and 85-87). The South African Minister of Education reports that the higher education sector is viewed as "elite, expensive, spoilt and individualistic" (Centre for Higher Education Transformation, 2005: 30).

2.3. Change factors within higher education

2.3.1 Managerialism and the marketisation of higher education

The application of market values and priorities in the sphere of education has been accompanied by an overall reduction in state funding, which has forced higher education institutions to adopt a more entrepreneurial approach (Subotzky, 2000:97-98; Delanty, 2001:122-126; Weber & Duderstadt, 2004). This may be seen in the widespread practice of forging partnerships with business, industry, community as well as an intensification of commercialisation of intellectual property. Many universities have set up offices whose purpose is to analyse the commercial potential of research findings and to register patent applications (Wolson, 2002; Hasse, 2004; Kahn, 2003; Weber & Duderstadt, 2004). The maxim of "putting knowledge to work" reflects a more instrumentalist approach to knowledge production in contrast to curiosity-driven, "blue skies" research or liberal education. The section on commercialisation of research below probes the implications of this approach for open access projects.

Another way in which a business culture has transposed itself upon academe may be seen in the ways that the university decision-making is now organised. Faculty Deans, once academic leaders, have become business executives in control of the financial management of departments that are run as administrative cost centres, rather than as disciplinary units. Vice-chancellors and university managers make corporate-style decisions based on strategic plans and model themselves as entrepreneurs as they conceive of new methods of maximising income and devise marketing campaigns (Shumar, 1997, 128-132; Delanty, 2001:107; Henkel, 2005: 163). A wide range of terms borrowed from the lexicon of business management have been assimilated into public sector management. Some examples are *strategic planning*, *recapitalisation programmes*, *performance indicators*, *quality assurance, outsourcing*, *management by objectives*, *input/output analysis*, etc. Each of these terms is used as an instrument to promote productivity or measure efficiency.

Previously relatively autonomous, higher education institutions now are ranked hierarchically according to externally determined benchmarks (Merisotis, 2002: 360-363). Commentators (Olssen, Codd & O'Neill, 2004:194-197; Schmidtlein, 2004: 268) have asserted that higher education quality audits and other external quality mechanisms reflect a sign of decreased confidence. "In particular they signify a withdrawal of trust by governments and other social groups in the competencies and motivations of individual academics and in the institutionalized arrangements for quality control of academic communities and disciplines" (Brennan, 2002: 121).

The requirement to produce tangible results for external auditors is reflected in the drive to produce research outputs, mostly in the form of scholarly publication. In England, the Research Assessment Exercise (RAE) is a quality management mechanism that is performed periodically (1992, 1996, 2001, 2006) to rate the productivity and quality of research conducted in university departments and research units as a basis for determining their funding. The exigencies of this formal and public exercise have exaggerated the 'publish or perish' syndrome. Other countries, including South Africa, focus on quantities of outputs in order to maximize funding impact. This can lead to the practice of 'recycled' articles that are variations on work already published. One substantive piece of research is parceled out in a number of articles that represent the "lowest reportable unit" (Waltham,2005:2).

Most rating systems emphasise publication in accredited journals or those with a high impact factor. Impact is measured by means of citation analysis as conducted by the ISI *Citation Indexes*. ISI analyses citations to articles published in journals that they recognize as being internationally significant. At present, this is a subset of about 5,000 journal titles from a total of 24,000 peer reviewed scholarly titles. Researchers are critical of the bias of ISI towards English language publications and for the way that areas of specialization that are territorially based (for example, earth sciences or health problems) are sidelined (Seglen, 1997: online; Rey-Rocha et al, 2001:595-596; Nwagwu, 2005:250-251). Rey-Rocha et al considers that research evaluation over-emphasises citation and impact factor over other considerations such as scientific quality, utility and societal quality. Competition to publish in high impact journals can push rejection rates up to 80-90%. The operations of prestigious high impact journals necessarily exacerbate existing problems associated with scholarly publishing: lengthy delays in publishing results as authors queue to publish in these titles, and the excessive costs associated with swollen peer review costs. The pressure to publish in these journals does not serve scholarship as authors routinely massage their articles to fit the space constraints of the journal. These problems are explored further in the following chapter.

2.3.2 Higher education: a public or private good?

The demands of the knowledge society require a higher level of skills amongst the workforce and governments have pushed for higher levels of participation in higher education, at the same time as overall funding has been reduced (Jones, McCarney & Skolnik, 2005: 7-8; Stumpf, 2004:5). One way of resolving the conflict of massifying higher education within a shrinking budget has been to shift the costs of education to the individual user.

The '80s also saw a revival of interest in human capital theory, which had initially been formulated by economists in the '60s. This theory posits a direct connection between the heightened cognitive abilities and skills gained through investment in higher education and correspondingly increased productivity and increased levels of earnings (Assié-Lumumba, 2001:8). Human capital theory (HCT) originally recognised both private and public returns on investment in education, the latter manifesting itself in strengthened moral, ethical, social, cultural and political participation within societies (Olssen, Codd & O'Neill, 2004: 148). It is also

recognised that graduates rely less on public health and welfare systems, thus reducing the state's social burden.

The resurgence of interest in HCT within the predominantly neoliberal framework of the '80s emphasised the private rewards, such as increased salary and enhanced status that accrue to the individual. In the process, the idea of education as a public good diminished in favour of its value as a private benefit (Olssen, Codd & O'Neill, 2004:146-150). As a result, governments strive to make education and training the responsibility of individuals and have increasingly moved towards "user pays" systems.

This privatisation of education has resulted in an important shift towards the commodification of education (Shumar, 1997; Gumport, 2000: 80-82). Students are now valued as consumers as a result of increasing reliance upon user fees, or upon funding systems that are linked to student enrolments. In the process, institutions compete with one another for student revenue and this competition is viewed as a recipe for increased quality and productivity. Marginson has observed:

> "Increased competition is meant to increase responsiveness, flexibility and rates of innovation… increase diversity of what is produced and can be chosen… enhance productive and allocative efficiency… improve the quality and volume of production … as well as strengthen accountability to students, employers, and government … there is an imagined line of causation from competition to consumer sovereignty to better efficiency and quality that is the virtuous ideal glowing at the core of micro-economic reform in higher education" (Marginson, 1997:5)

Funding cuts have also shifted the nature of academic work, as academics are required to do more with less, have greater teaching and administrative loads which decreases proportionally the amount of time available for reading and writing (Stumpf, 2004:4). But this by no means reduces the increasing pressure placed upon them for scholarly output in the shape of accredited publication.

The dilemma of finding cost savings while serving a larger and more diversified student body within a quality management regulatory framework challenges university managers universally. Faced with difficult choices, many have targeted support divisions such as university library services for budget cuts. Over the years, academic libraries have routinely trimmed their acquisitions and personnel budgets trying to find a balance between economy and quality service delivery. Open access

to the research literature offers a positive antidote to this depressingly familiar scenario. Instead of being limited to the sources that the university library can afford to purchase, students and lecturers would have full access to a wide array of newly published research materials, as massively reduced serials budgets would enable a better supply of textbooks for undergraduates. The open access model of scholarly publishing provides both economic relief and a promise of better quality teaching and learning.

2.4 Outcomes for research and knowledge production

Beyond teaching and learning, the research terrain has also been shaped by social and economic forces. These have affected the nature, process and outcomes of research and knowledge production. The following section identifies recent trends in research and knowledge production and attempts to locate how the open access philosophy intersects with these.

2.4.1 Research management and funding

The South African policy framework for research funding will serve as an example of the increased regulatory environment for research management. Following the new *Funding Framework for Funding of Higher Education in South Africa* (Ministry of Education, 2003a), from 2004/5 institutional provision for research funding is entirely based upon "actual totals of research graduates and research publications [correlated against] a normative total which it should have produced in terms of national benchmarks". (Ministry of Education, 2004: 12). Research funding accounts for 12% of the annual block grants for higher education institutions. These funds are weighted as follows: publication units (1), research masters graduates (1), doctoral graduates (3).

As far as publications are concerned, the normative total is based on the number of permanently employed instruction/research staff within an institution and a benchmark publication rate set by the Minister of Education.

The 1999 National Plan for HE had proposed that

> "research resources should be concentrated in institutions where there is demonstrated capacity and/or potential based on *approved mission and programme profiles*;… greater *accountability* for the use of research funds;…research *productivity* should be enhanced" (Ministry of Education, 2003a: 7). [Italics mine: the italicised sections indicate the increasing degree of regulatory control and impetus towards efficiency.]

Following these proposals, the new funding framework allocates funds purely on the basis of research outputs, with no provision for research input grants. This funding regime will serve to concentrate institutional efforts to secure a better throughput rate of postgraduates and to reach the normative publication benchmark. The Dept of Education subsidy forms one stream of income which is supplemented by research grants secured on a competitive basis from the National Research Foundation and the Medical Research Council on the one hand, and by private research contracts, donations and investments on the other (Dept of Science & Technology, 2002:65). In this way it can be seen that the research funding environment is steered towards higher outputs, competition and entrepreneurial activities. Henkel (2005:166) has reported on the effect of reformed research policies on researchers' identities as academics. "While reinforcing the value of research, they [the policies] were also making the right to research conditional on attracting income and delivering regular assessable output that met increasingly demanding evaluative criteria". Muller has cautioned that this funding dependency, whether steered by state policy or by industrial and private sources, can lead to a situation where the progress of knowledge becomes beholden to exogenous pressures (2003: 114).

This is borne out by a 1999 OECD study, *University Research in Transition*, which expressed a concern that external funders commission projects that are "mission-oriented", requiring demonstrable and measurable short-term performance.

> "Creative research is frequently a long-term process which requires some reasonable assurance of stable, long-term funding. Over-reliance on conditional or contract support can lead universities to prefer short-term research projects when they are not sure that contract support for specific projects will continue to be forthcoming." (Houghton, Steele & Henty, 2003: 32)

The uncertain and highly competitive environment for research grants makes it likely that publishing authors will not venture far from the established routine path of submitting papers to prestigious journals. Open access journals, for the most part, have not yet begun to register impact. On the other hand, there is no question that open access provides more efficient and accountable use of public funds. This has been recognised by the Research Councils UK (RCUK), the umbrella organisation for Britain's 8 public science councils. In a June 2005 policy announcement, it mandated that all research sponsored by the RCUK be made freely accessible via e-print

repositories or open access journals. "Ideas and knowledge derived from publicly-funded research must be available and accessible for public use, interrogation and scrutiny, as widely, rapidly and effectively as possible" (Research Councils UK, 2005:1). This statement endorses the position that open access offers an improved model for the communication of newest knowledge and will promote an improved foundation on which to build new research.

2.4.2 Changing nature of knowledge and mode 2 knowledge production

In the knowledge economy, knowledge has become a form of capital that is pursued for its social and economic use value rather than for enlightenment or humanistic ideals of individual fulfillment (Gumport, 2000:82-83; Delanty, 2001: 150). At the research level, knowledge production is also changing in its forms and processes. For example, until recently it was generally accepted that disciplines shaped their own scientific problems and these were worked on within the context of the academy and the research findings were also disseminated within this same domain.

"Mode 2" knowledge production, originally identified by Michael Gibbons, typically finds multi-disciplinary teams of specialists working collaboratively in applied research to solve new types of problems, for example in the environmental or health sciences. Mode 2 research differs from traditional Mode 1 enquiry in that it works outside and across the norms and rules of separate disciplines. The origins for this new mode might partly be explained by demands for research to be more socially responsive, by new ICT channels that facilitate socially distributed research, and because there are now several other sites outside the university (industrial laboratories, corporate R&D divisions, hospitals, think tanks and consultancy agencies) that are active in applied research (Gibbons, 2000: 42; Jacob and Hellström, 2000: 20). The university is no longer the unchallenged citadel for the production of new knowledge and is under considerable pressure to form partnerships with corporate, industrial or government agencies to forge regional growth (Delanty, 2001: 120-123; Kraak, 2000: 28-29; Scott, 2005a: 53).

The diversification of research across disciplinary, sectoral or geographic boundaries means that there is an increasing number of channels of information flows that need to reach diverse users. Locking the output of this form of cross-sectoral knowledge production behind toll-access journals targeted at a specialised readership does not appear to answer the dynamic of its creation. It would appear that alternatives to the

scholarly journal, for example, open access archives searchable by *Google Scholar* would provide a more optimal communication platform for successful dissemination of the findings of research teams that are made up of experts from different settings and specialties.

2.4.3 Impact of ICT on research

The growth of and reliance upon information and communication technologies (ICTs) has been the most crucial determinant that has accelerated the transition to the knowledge economy. The increasingly rapid advances in computer and networking technologies have made information transfer faster and cheaper. The digital revolution has released enormous flows of information which are intensively used in the creation, application and dissemination of new knowledge.

Research practices have been fundamentally changed as a result of information and communication technologies. Houghton, Steele & Hentry (2003: 42) summarises these as follows:

- Enhanced communication amongst scientists, encouraging collaboration, regionally and internationally, and within interdisciplinary projects
- Enabling access to information of all kinds, textual, graphic and media
- Providing new ways of modeling, simulation and visualization
- Enabling access to remote instruments (remote sensing) and facilities (remote data collection)
- Promoting easier manipulation and synthesis of information and data
- Providing a greater variety of publication and dissemination platforms.

Collectively, these have expanded the ways that scholars communicate, conduct research and share findings.

2.4.4 Research collaboration

Advances in ICT have opened the way for greater networking and collaboration amongst researchers. Email is widely used to exchange information and online conferences have reduced the need for expensive face-to-face meetings. A number of other factors have contributed to the growth in cooperative research. Katz and Martin (1997: 4) have identified the following additional incentives:

> "… changing patterns or levels of funding; the desire of researchers to increase their scientific popularity, visibility and recognition; escalating demands for the rationalization of scientific manpower; the requirements

> of ever more complex (and often large-scale) instrumentation; increasing specialization in science; the advancement of scientific disciplines which mean that a researcher requires more and more knowledge in order to make significant advances …; the need to gain experience or to train apprentice researchers; the increasing desire to obtain cross-fertilisation across disciplines; and the need to work in close physical proximity with others in order to benefit from their skills and tacit knowledge."

Houghton, Steele & Henty (2003: 44) reports that co-authored publications, particularly international collaborative works, have achieved higher impact as measured by citation analysis. As a result, international research partnerships are encouraged as they are perceived to result in higher levels of innovation and enhance the exchange of knowledge. Open access publication promotes scholars' awareness of overlapping research projects and this can lead to exchange of information and increase the potential for future collaboration.

2.4.5 Commercialisation of research

"Knowledge is now regarded not as a public good, but rather as 'intellectual property', which is produced, accumulated and traded like other goods and services in the Knowledge Society" (Nowotny, Scott & Gibbons, 2003:185). In the light of steady shrinking, in real terms, of public funding for research, universities have been forced into a market consciousness of the value of the knowledge "products" derived from research. As reported above, the entrepreneurial university has adopted closer ties with business and industry in the form of strategic alliances. Although this can provide much needed funds in the form of research contracts, there are significant implications for the 'openness' of this system. Commercial confidentiality imposes restrictions on the circulation of research findings, as the intellectual property cannot be given away by open publication in peer reviewed journals (Nowotny, Scott & Gibbons, 2003: 183). Duderstadt (Weber & Duderstadt, 2004: 81) reports that in America, universities have adopted aggressive commercialisation policies and invested heavily in technology transfer offices to promote and protect the ownership of intellectual property. In South Africa, the NRF's Innovation Fund has invested R30m in a new commercialisation office to provide expert assistance to researchers in evaluating whether an innovation is worth developing (Kahn, 2003). Once patents are registered, universities would be able to derive royalties and licence fees by licensing its technology to third parties that wish to exploit it. The Dept of

Science & Technology is currently working on a draft Bill to legislate procedures for the handling of intellectual property arising out of publicly financed research[9].

2.5 The position of South Africa

The foregoing review has generalised the effects of the external pressures on academic institutions and has not differentiated amongst different regions or countries. This is because, by and large, the transformations are not localized but are being universally experienced (Bleiklie, 2005: 31-34; Jones, McCarney & Skolnik, 2005: 17-18; Subotzky, 2000). That said, local conditions undoubtedly create variations within this pattern and these will determine different priorities. For example, the emergence of a democratic South Africa in 1994 also marked its insertion into the global economy. While South Africa's situation might be comparable to Central and Eastern European countries that are also in a state of transition, these economies have a strong tradition of an educated citizenry. By contrast, the new dispensation in South Africa inherited a fragmented education system constructed along racial divisions that was designed to deliver inferior and inadequate provision for the majority of the population. The legacy of this ideological aberration is that South Africa does not have sufficient social and intellectual capital to make rapid advances in the knowledge economy (Dept of Science & Technology & Dept of Education, 2005; Centre for Higher Education Transformation, 2005).

Accomplishing political freedom at this particular juncture presents a policy tension in that the national project to deliver social and economic justice to previously disadvantaged groups ('redress') is compromised by policies that are determined by a global agenda. There is a conflict between the political imperative for social development and the government's macroeconomic policies that satisfy the conditions for foreign investment and for competitive positioning within the global economy. Fataar (2003:33) and others (Subotzky, 2000: 108-110; Subotzky, 2003: 164; Kraak, 2004: 254-258) have pointed to the disjuncture between "symbolic" policy that requires higher education institutions to provide equity of access within a fiscal environment that does not permit the implementation of redistributive policies. In March 2005 the Dept of Education released its contentious "enrolment capping" policy, limiting the number of new students that institutions may admit as a way of

[9] The draft text was sent to me but is confidential as it has not yet been released publicly.

containing costs (Dept of Education, 2005). Muller also refers to the contradictory logics of the state's "two redemptive longings" (Muller, 2003: 101-102).

The higher education sector in South Africa is thus facing enormous challenges to meet the quality challenge of producing sufficient numbers of skilled graduates to meet the demands of the knowledge economy while at the same time transforming its institutions to meet the equity and developmental needs for social justice. Beyond equity of access, there is the corollary of successful throughput. The Student Enrolment Planning document reports "(i)t seems possible that this first time entering cohort of 2000 may not achieve an overall graduation rate of even 40%" (Dept of Education, 2005: 9). Bhorat (2004:957-960) has identified the beginnings of a graduate unemployment problem due to inadequate supply characteristics, ie, inadequate and inappropriate skills. Besides other contributing systemic limitations, these findings point to inadequate academic support and a shortage of learning materials (textbooks and journals).

2.5.1 Scholarly publication in South Africa

The current demography of research output in South Africa reflects the inheritance of the apartheid regime. The evolution of higher education in the 20th century saw the establishment of various types of higher education institutions that settled into distinct functions and roles. Muller explains further: "The correlative research expectation for the three sets of institutions, underwritten by resourcing, was: the elite universities would do basic research, the second phase Afrikaans institutions would do applied research, and the black institutions were not expected to do research at all, at least initially. This is now imprinted into the institutional histories of these institutions." (Muller, 2003: 107).

Notwithstanding the rapid rate of policy changes introduced over the past ten years, the "overall higher education workforce remained dominated by white staff and thus extremely unrepresentative" (Council on Higher Education, 2004: 78). The current research output of South African academics is the natural outcome of the inequitable, fragmented and divisive apartheid system. A 2004 study commissioned by the National Advisory Council on Innovation (NACI) produced the following overall results for research productivity and capacity:

> Historically advantaged universities (English and Afrikaans) produced 90% of publication units in 2001. Whites and males with higher qualifications levels at universities dominated research output. … A gradual aging of publishing academics at higher education institutions is evident in terms of which more articles are being produced by authors 50 years and older, and fewer by authors younger than 50 (National Advisory Council on Innovation (NACI), 2004:117). … The percentage of publications attributed to female authors has remained unchanged between 1995 and 2000 (19,1% to 19,8% of total publications) (NACI, 2004: 82).

The NACI report also finds that, within the overall system, research productivity has remained static. Although the report does not identify causes, possible factors could be reduced levels of funding that have increased workloads or the rapid rate of policy directives that have disrupted institutional patterns. In order to improve the research system, the first task is to provide a critical mass of senior researchers. The problem of developing the next generation of researchers and scholars has been recognised as a severe problem by the Dept of Science & Technology. The June 2005 Ministerial Conference on Human Resources for Knowledge Production produced a Declaration and Plan of Action. Excerpt:

> The conference noted with concern,
> - that we have not generated new researchers in sufficient numbers to achieve the economic and social outcomes that are possible only through investment in science and technology;
> - that this has resulted in an inflexibility in the National System of Innovation, making it difficult for South Africa to enter new and important global arenas of innovation;
> - that the future viability and success of the National System of Innovation is dependent on the capacity of the schooling and FET systems to provide quality inputs into the higher education system; and
> - furthermore, that quality improvements in undergraduate education are needed to enhance postgraduate growth and development." (Dept of Science & Technology, 2005)

The Plan of Action requires the successful recruitment and retention of research Masters, Doctoral and post-Doctoral fellows, explicit development of research skills, and increasing funds to strengthen research facilities. It is heartening to read that another strategy is to "establish an urgent and appropriately resourced programme to enhance e-Research resources for all South African researchers, especially **open access to the current high-impact literature**" [emphasis mine]. Improved access to recently published studies would materially and qualitatively improve South

African postgraduate training by exposing researchers-in-training to stimulating and novel ideas, methods, experimental results and observations.

The current problem of successful throughput at both undergraduate and postgraduate levels to meet the present and future knowledge needs of the country are due, in major part, to the crippling legacy of apartheid. Democratic South Africa now faces the challenge of making up this deficit within a competitive and skewed global economy that marginalises late starters. Chapter 5 deals with the economics of open access journals, showing that developing countries, exempted from the imposition of author fees, are overall beneficiaries of open access. Improving students' and lecturers' access to research resources would undoubtedly impact on South African higher education institutions' success rate.

The purpose of this chapter has been to provide an overview of the prevailing challenges and imperatives that the higher education research community faces as a result of large-scale and endemic social change over the past two decades. It is surmised that these conditions influence the research environment and the behaviour of scholars. It is further asserted that, within the logic of the neoliberal drive for market efficiency, open access secures a better return on public investment and provides an improved model for developing human and knowledge capital. Open access also contributes to promoting national systems of innovation, reaches emerging networks of knowledge producers, and attempts to roll back the unequal flows of power and information. These assertions can better be demonstrated by means of a review of the existing problems associated with traditional scholarly publishing as presented in the following chapter.

Chapter 3: Current Problems in Scholarly Communication

The previous chapter showed how political, social and technological changes have affected higher education and research. Equally, in the sphere of scholarly publishing there have been more profound technological, organisational and economic changes within the past 15 years than in the previous 300 years since the first journal was produced. Not surprisingly, these sweeping changes have disrupted established practices and opened up fundamental questions about the ownership of information and the ways that scholarly knowledge should be disseminated.

The overwhelmingly predominant change factor has been the growth of the World Wide Web and electronic publishing, but even before the ICT revolution had taken hold during the 90s, other forces had also influenced the industry and its output. This chapter presents an account of the development of the serials crisis and its effects in order to highlight the need for the remedial intervention of open access publishing.

3.1 Growth of scholarly literature and the role of the commercial publisher

Immediately after World War II, the expansion of research funding produced a much greater volume of research to be published (Johnson, 2000:online; Branin & Case, 1998:476). The existing portfolio of journals published by learned societies could not accommodate this flow so that commercial publishers, who realised that there was money to be made, began to create new journals. This shifted the economic foundations of scholarly communication as publishers, who now held sole copyright, discovered that the demand for their publications could chase up their profits.

> It didn't take long for commercial publishers to discover that demand for journals was remarkably inelastic. And since they were incentivised to maximize profit, they did the rational thing -- they raised institutional prices of journals dramatically and relentlessly to exploit the elasticity curve. Institutional subscribers, accounting for the lion's share of the revenue supporting publication of journals in most fields, paid the price because their users demanded access. (Johnson, 2000)

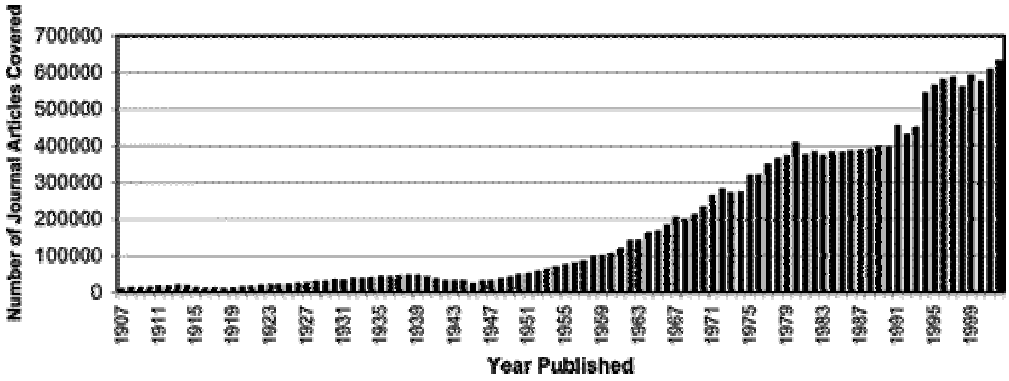
The exponential growth of information resulting from increasing specialisation within all disciplines also brought about further expansion of new journal titles until the flood of new periodical literature began to spur the notion of 'information overload'.

A 1988 article by Eugene Garfield[10] (1988:367) on this phenomenon has a list of references spanning a 20 year period. The titles employ vivid imagery, illustrating the impact of the growth in journals.

> The explosion in published literature (1968)
> An inflation of paper (1971)
> The growth of journals (1979)
> The proliferation of scientific literature (1980)
> Impact of information explosion on library users (1986)
> Science can't keep up with flood of new journals (1988)
> Drowning in a sea of knowledge (1988)

The massification of higher education also served to produce a greater number of researchers contributing to the growth of journal literature. Many more students, in more countries, were becoming actively engaged in research that could be published (Fjallbrant, 1997:12-13). The field of information science emerged at the same time, in part to research the dynamics of information behaviour but also to develop ways of "controlling" the burgeoning levels of information. By 1988 it was reported that there were around 40,000 printed journals (Broad, 1988). **Figure 1** below charts the sudden steep growth in the number of journal articles indexed in Chemical Abstracts after 1950 until 2002.

Fig. 1 Growth in number of journal articles indexed in *Chemical Abstracts*, 1907-2002 (reproduced from Garson, 2004:144)



Computer technology began to be introduced by publishers as a means of helping researchers navigate their way through the secondary literature. During the 70s and 80s, a few publishers, such as Dialog, National Library of Medicine and Thomson

[10] The founder and Director of ISI and inventor of the journal impact factor, a means to identify the most important journals within different fields of study.

ISI began introducing electronic delivery systems for their indexing and abstracting products (Garson, 2004: 142).

3.2 Growing corporatisation of scholarly publishers

At this time, commercial publishers became aware of the impending electronic revolution and recognised the need to take a lead. The 90s saw a prolonged phase of acquisitions and takeovers by commercial publishers, particularly European companies such as Elsevier, Kluwer, and Springer (Graham, 1991; Poynder, 1997:1; Siklos, 1999: 6). The growth of the global economy during this period meant that publishers began a stampede towards international market dominance. "In order to square up against other players in the new media world, it is necessary to have global reach and scale" (Poynder, 1997:1). The rash of corporate acquisitions of smaller publishers and mergers during the 90s transformed the nature of academic publishing, as commercial publishers also took over the journals produced by learned societies, increasing the cost of subscriptions as they did so. As Johnson (2000:online) describes,

> …commercial publishers built substantial portfolios of journals, aided by a trend of society "outsourcing" of their journal publishing to commercial firms. The high corporate profits from these journals have funded aggressive programs of internal development and wave upon wave of acquisitions and consolidation among publishers. As society publishing increasingly gave way to commercial publishing, the cost of scholarly journals, especially those in the science, technology and medical (STM) fields, skyrocketed -- limiting access to research and threatening to diminish scientific progress."

The growing concentration of the ownership of academic journals brought about a monopolisation of pricing as publishing giants increased their market power. Consolidation allowed them to increase subscription prices far faster than the rate of inflation. At the receiving end of rocketing prices, research librarians became increasingly vocal against merger activity. In 2000, U.S. research libraries unsuccessfully attempted to block the merger of Reed Elsevier and Harcourt General in a $4.5 billion deal that gave Elsevier control of more than one third of the market for high quality biomedical journals (Malakoff, 2000: 9-10). In 2002, a group of six library organizations formed the Information Access Alliance and sent the U.S. Dept of Justice legal and economic arguments against mergers. In 2003 the Alliance requested that the Department oppose the application of a European private equity firm to buy BertelsmannSpringer, in order to prevent its plans to merge Springer

with Kluwer Academic Publishers, another of its acquisitions. This action was also unsuccessful, with the result that in December 2004 the merger of Kluwer and Springer took place, making Springer the second largest academic publisher behind Elsevier, with an estimated 10% of the market (Hane, 2003:10). Scholarly publishing has become a global multi-billion dollar industry. In the process, publishers appear to have lost sight of their primary goal: to facilitate the widespread distribution and dissemination of peer-reviewed articles. The declining number of readers, diminishing circulation of knowledge and corresponding loss of potential impact resulting from financial barriers to recent studies inhibits and debilitates the progress of science, particularly within poorer countries and institutions, preventing their development and engagement with an international research agenda that has tended to marginalise contributions from developing countries.

3.3 Serials crisis

The combined effect of the aforementioned exponential growth of scholarly content together with the ascendence of the monopolistic commercial publishing giants has resulted in an enormously expanded corpus of content that is costing academic libraries more and more. When these conditions are factored against the decreasing or static library budgets that arise from the broader scenario of shrinking government funding of higher education, as outlined in Chapter 2, it is clear how the term "serials crisis" arose. The term was first applied in a 1992 report commissioned by the Mellon Foundation and published by the Association of Research Libraries (Yess, 2004:53).

The statistics are well documented and have been reported as follows:

- In the **U.S.**, From 1986 to 2002, the Consumer Price Index rose 64%, journal prices rose 227%, and book prices rose 75%. The typical research library spent 227% more on serials in 2002 than in 1986, but the number of titles purchased increased by only 6%. (Office of Scholarly Communication, University of California).
- In 1993, **Australia's** university libraries purchased a combined total of 200,666 scholarly journals. By 1998, total subscriptions had dropped to 112,974, a decline of 43.7%. During the same five-year period the average cost per title for journals increased from A$286 to A$485. (Figures from the Committee of Australian University Librarians (CAUL), reported in Tredea, 2000:online)

- In the **UK**, the average price of an academic journal rose by 58% between 1998 and 2003, while the UK Retail Price Index increased by 11% over the same period. Although the proportion of university library expenditure on serials had increased it could not maintain serials purchasing power. (Memorandum from CURL (Consortium of University Research Libraries) and SCONUL (Society of College, National and University Libraries), presented as written evidence before the UK House of Commons Science and Technology Committee, 2004.)
- In **South Africa**, the downward trend in access is repeated. Moreover, the legacy of inequality between historically white and black universities has not yet been eradicated, as the following figures from a survey conducted by Muthayan (2004) demonstrate. They represent a sample from one region of South Africa

Fig 2 Decline in serial holdings in South Africa, 1997-2002 (Muthayan, 2004: 135)
(* accurate figures could not be provided for this institution)

	Historically Black University	**Historically White Afrikaans University**	**Historically White English University**
Print subscriptions **1997**	850	1559	1300* (approx.)
Print subscriptions **2002**	462 45,6% decrease	1057 32,2% decrease	1300
Electronic database subscriptions	14	13	21

Responses from academic libraries to these unsustainable price increases are described after the following section that examines the benefits and problems associated with electronic journal publications.

3.4 The new technology

Garson (2004:142) reports that although non-profit learned society publishers had experimented with online full-text delivery during the 80s and early 90s, the lack of software to adequately reproduce tables, graphics, line art, half tones and colour, as well as the slow speed of dial-up telecommunications presented serious limitations that limited their adoption and use. It was only after Tim Berners-Lee opened the way for the World Wide Web in 1992 with the release of hypertext markup language (HTML) and hypertext transport protocol (HTTP), and the first graphical user

interface (GUI) browsers were widely released in 1994, that the possibilities of electronic publishing took hold.

Since 1995 publishers have made hefty investments in setting up electronic platforms for producing digital versions of existing journals. During the inquiry led by the Science and Technology Committee of the UK House of Commons, managing directors of the leading commercial publishers testified that they were currently investing substantial amounts towards improving the efficiency and functionality of their electronic products. Percentages of revenue ploughed back into product development were reported as follows: Macmillan (30%), Wiley Europe (15%), Blackwell Publishing (25%) while Elsevier currently spends £150 million each year on developing its ScienceDirect platform (Science and Technology Committee, 2004a). Since the publishers used this information to justify steep annual increases, it is certain that these costs end up being carried by end-users. While there is no doubt that electronic journals offer distinct advantages for readers, the development of the electronic journal has also brought new challenges for libraries.

3.5 Electronic journals: technology enhances accessibility

The networking of authors, editors and reviewers allows a speedier editorial process. But the workflow for the provision of electronic desktop delivery also requires additional tasks. For example, publishers make the article available in several formats so that it can be read by most browsers. They also encode the articles in such a way as to ensure their persistent interoperability on the Web. The recent Digital Object Identifier (DOI)[11] technology is the key to uniquely identifying articles and providing permanent links to the publishers, thus facilitating online transactions, such as digital distribution, e-commerce and rights management. Many publishers also now participate in the CrossRef[12] system which is a cooperative effort among 276 publishers (representing 9,200 journals) to enable cross-publisher citation linking to full-text using the DOI (Brand, 2004:3-4). The publisher also sends the article or its metadata to various abstracting and indexing services and databases to ensure maximum visibility. It is estimated that 75% of all scholarly journals are now online.

[11] International DOI Foundation, http://www.doi.org/about_the_doi.html.
[12] http://www.crossref.org

The advantages of these functionalities are the ease and enhanced productivity brought about through linked articles. Readers with access to a database such as Elsevier's *ScienceDirect* may search among 6 million archived articles appearing in the 2,000 journals published by Elsevier. From citations of these articles, they may additionally be dynamically linked to the full-text of articles published by a further 170 science, technology and medical (STM) publishers that are part of the CrossRef membership association. Other publishers have also followed the practice of bundling their journals into one commercial product. These may be primary publishers (for example, Kluwer produces the *Kluwer Online Journals* database) or secondary publishers that aggregate other publishers' output (for example, Ebsco's *EbscoHost*). Academic libraries are then offered subscription to these bundles in what is known as a "big deal". It is the Big Deal bundles that have exacerbated the serials crisis for libraries.

Academics and students, already accustomed to the gratification of desktop access to the Web and the speed of information retrieval via metasearchers and *Google*, have come to expect electronic delivery of journal articles that obviates the need to make a physical trip to the library to make photocopies. Because of the often seamless ease with which they may navigate electronic scholarly resources, even off campus, they can be blithely unaware of the difficulties the electronic bundles bring to the library acquisitions budget, or the limiting provisions of complex licences that restrict the library's mission to enable access to a wide readership.

3.6 The "Big Deal" from the library's perspective

The problems associated with bundling may be grouped under a few headings:

Renting, not owning

Unlike the case of print journals which remain accessible to a campus community even after a title is discontinued, electronic subscriptions are only leased to the library by means of a licence that is a legal contract between the publisher and the subscribing library. When libraries cancel a subscription they may lose access to the back file they leased. While some publishers undertake to supply the discontinued back file on CD ROM, others, such as Ebsco Publishing's General Manager, are less sanguine: "You subscribe each year, and if you don't subscribe next year, you don't get access" (Rogers, 2004). This tends to lock libraries into a dependency of rolling over their electronic subscriptions annually.

Restrictions on "fair use"

Libraries that subscribe to bundled ejournals also find the terms of many licences to be highly restrictive regarding who may access the online content and how the content may be stored and used. These restrictions encroach upon the exceptions to copyright law that libraries have customarily traded upon with regard to print and audiovisual materials. These are the traditional limitations to copyright, such as fair use, first sale doctrine and preservation (Fernandez-Molina, 2004:152). These limitations have allowed libraries to pursue their primary mission of allowing individuals reasonable access and permission to copy sections of work for educational purposes. Newly passed legislation designed to protect digital copyright particularly in the entertainment industry has been applied to electronic scholarly work. Drawing upon legislation such as the Digital Millennium Copyright Act (passed in the U.S. in 1998) and the EU Directive on Copyright in the Information Society (issued in 2001), licences typically have clauses that prevent downloading and storing of electronic or paper copies. Such licence provisions for electronic journals seriously impede the library's work. For example, interlibrary loan of digital materials is prohibited; classroom and off-campus use is complicated; and copying of the material for archiving and preservation is not allowed (Fernandez-Molina, 2004:150-152; Wiley, 2004:95). Moreover, librarians that have traditionally allowed visitors free access to inhouse materials are now gatekeepers and enforcers of these excessive legislative terms. By virtue of the licence contract they are obliged to restrict use of the electronic resources to bona fide staff and students (Science and Technology Committee, 2004c). Academic libraries, funded with public money, are becoming off-limits to representatives of local industry and members of the public.

Disproportionate spending

In order to maintain access to the big bundles, acquisitions have become skewed in favour of STM journals. Because these consume the lion's share of the budget, there is less money to allocate amongst the other disciplines, or to purchase monographs or the journals of smaller publishers (Science and Technology Committee, 2004c; Branin and Case,1998). In this way libraries have experienced a steady erosion of book purchasing in addition to massive cancellation of library subscriptions.

Technical hazards of contracts

Professionals also despair at the complexity of negotiating the technical aspects of the licences. A representative from the Joint Information Systems Committee (JISC) testified before the House of Commons inquiry, with regard to the difficulty of the technicalities of finalising national deals to provide access to bundles for all UK universities:

> One would be Elsevier, where last year we spent about six months doing national negotiations, and we are still spending another four months in sorting out the details at proposal level. You agree a national price of, say, 5 percent on what you paid last year; but then, when the detail gets down to the local level, you find that the reality is very different. That negotiation has been extremely time-consuming, and is still not resolved for many universities. (Science and Technology Committee, 2004c)

At institutional or consortia level, libraries complain of a lack of transparency regarding the deals that other libraries have secured with publishers. Confidentiality clauses prevent librarians from sharing information on how much they paid for a certain product (Davis, 2004:online).

Lack of flexibility

Beyond the legal or technical complexities of the terms of licences, libraries also find that publishers are inflexible about changing the size or content of the bundle. Librarians are aware of the important journals in each discipline but find that, in order to obtain electronic access, they are obliged to subscribe to a product that bundles the premium journals with other, less important and unwanted journals. (Science and Technology Committee, 2004c).

In sum then, the "big deal" offered by commercial publishers and vendors comes bundled with unsatisfactory conditions: high prices, inflexible terms and copyright obstacles.

3.7 Libraries revolt

The trend towards bundling of electronic journals has added to the existing dimensions of the serials crisis to the extent that some large research libraries have instituted protest actions. Falk (2004:185) reports on a spate of firm responses from a range of large academic libraries. The University of California, Santa Cruz, passed a resolution that targeted Elsevier.

> "The senate resolution called for tenured faculty to stop submitting papers

> to Elsevier journals, refuse to referee papers for publication in those journals, and resign any editorial positions they hold with Elsevier publications … At Harvard University, the contract to renew purchase of a bundle of Elsevier journals has not been renewed. Harvard's complaints include inflexible bundling and the heavy penalties imposed for cancellation of individual journal subscriptions" (Falk, 2004:185)

Other libraries that have cancelled their subscription to bundles are those of Cornell, Missouri and North Carolina universities. They have opted to reduce the quantity of online content in favour of selecting annually only the individual titles that they want, even though this is more expensive and time-consuming.

3.8 Developing countries' access to information

While well-endowed universities in the North are demonstrably acting to counter the rising costs of journals, those in the poorest developing countries have reached the point where libraries have no current journal subscriptions besides those funded by aid agencies. Teferra (2003:135) reports from a 1994 survey by Patrikios:

> "The University of Addis Ababa, which in 1983 had subscribed to 2,700 titles, received only 126 through funding from the Swedish Agency for Research and Cooperation with Developing Countries (SAREC) … The University of Nigeria had virtually no subscriptions except the 80 journal titles acquired from the American Association for the Advancement of Science (AAS)"

Because access to scholarly materials is crucial for research, for developing solutions to social and health problems, and ultimately for the overall economic development of countries, several high-level initiatives have been developed to ensure that the academic community, hospitals and research institutes have access to journal literature. These operations have been launched after 2000 in recognition of the chronic problem of unaffordable journals in developing countries.

Two of the larger initiatives are:

HINARI[13] (Health Inter-Network Access to Research Initiative) was launched in 2002 by the World Health Organisation (WHO) to bring relevant information to professionals, researchers and policy makers in the health sector. WHO brokered a partnership amongst publishers representing 2,082 medical journal titles. The full-text of the articles is available free to institutions of countries where the Gross

[13] http://www.healthinternetwork.org

National Product is less than $1000 per capita, or at highly discounted prices where the GNP range is between $1000-$3000 (INASP, 2003:online)

AGORA[14] (Access to Global Online Research in Agriculture) was launched in 2003 by a partnership amongst the Food Agency Organisation (FAO), WHO, and Cornell University. It provides access to over 500 journals from major scientific publishers in the fields of food, agriculture, and environmental science to qualifying institutions in eligible developing countries.

INASP (The International Network for the Availability of Scientific Publications) conducted a survey of publishers to determine their involvement in these and other related projects. It is instructive to find that the response rate from commercial publishers was only 13% against 87% of not-for-profit publishers and that 36% of respondents did not offer their publications to less developed countries at any discounted rate (INASP, 2003).

Besides the problems of insufficient funds, disadvantageous exchange rates and currency controls that present serious problems with affording international journals, the journal publications produced by learned societies in the South struggle to achieve readership and recognition because of the dominance of Northern research paradigms.

3.9 Other current issues

The pervasive reach of the Internet and the economics of electronic publishing have generated new possibilities for scholarly dissemination. In turn, some of the practices and processes associated with traditional journal publishing are also being subjected to challenges. There has been renewed debate around issues that critically examine the nature of scholarly publishing in its present form. Academic journals have provided a vehicle for the formal publication of papers for over 300 years. They have fulfilled the function of communicating new knowledge, establishing priority over new findings and validating this information through peer review. The advent of the electronic medium has the potential to make way for larger changes in these functions, especially where traditional forms have become problematic. The following are some of the questions being raised:

[14] http://www.aginternetwork.org

- Are publishers needed as intermediaries in the cycle of scholarly communication when desktop publishing and software for automating journal publication is freely available (eg, the Open Journal Project)? (Branin and Case, 1998:483; Odlyzko, 1995). The growth of supplementary communication channels such as threaded discussion groups and Web logs may also be replacing some of the social networking functions formerly played by journals.

- How long will the journal format continue as a "wrapper" for articles? Articles have become the unit of consumption within aggregated full-text databases which offer "pay-per-view" transactions. Pre-print servers and other online archives also store articles independently of journals as organising frames (Odlyzko, 1995; Guédon and Siemens, 2001:online)

- In the Internet environment, where material is widely available for critical scrutiny, is the formal anonymous peer review system required? New modes of communication will offer more freedom of choice to scholars, and will provide faster, more complete, and more flexible feedback mechanism about the quality of available information. The primary role of journals, the peer review, may also become less centralised through the increasingly multi-disciplinary, multi-site, collaborative world of research, where facts and data are easily available, checkable and vetted (Odlyzko, n.d.; Guédon and Siemens, 2001; OECD, 2004:77)

The era of electronic publishing is still in its infancy and these questions are not yet answered but continue to be debated, especially within the open access arena. The following chapter will introduce open access and assess the possibilities it holds for providing solutions to the problems identified in this chapter.

Chapter 4: The Open Access movement, its principles and practice

The aim of this chapter is to present some of the ideas that give force to the concept of open access. It will show that open access principles are in alignment with the fundamental ethics that underpin the practice of academic science. It will also examine what is meant by information as a public good and examine how published information benefits society, considering the role played by intellectual property rights. Finally, it will introduce the two main avenues of open access, namely, submission of articles to open access journals, or self-archiving peer reviewed articles within institutional or disciplinary online archives. Some of the major projects that have become important showcases of each of these options will be highlighted.

4.1 Scientific communication through journals

Publishing articles within scholarly journals achieves several functions: to communicate advances in knowledge, to register a researcher's priority of discovery, to submit findings to the critical examination of the researcher's peers, and, through the resulting imprimatur of experts, to achieve recognition for verified original findings, primarily through enhanced career prospects or further research grants (Fjallbrant, 1997:online). Scholarly publishing has achieved these objectives since the first publications were disseminated in the 17th century.

This period also saw the formulation of the modern scientific method, led by the ideas of Francis Bacon. The chief principles expounded through Bacon's writings were that progress in science is achieved by incremental accumulation, that it is "fertilized through sustained social interaction between scientists and attained through reasoned and systematic empirical methods of inquiry" (Merton, 1973:349). Dalrymple (2003:37) also cites from a tract written by Bacon in 1620: "For the benefits of discoveries may extend to the whole human race … for virtually all time". Prior to the existence of journals, scientists had conducted their work under secretive conditions, not trusting or sharing much information until their proofs were ready. In order to establish priority of discovery, a scientist would devise a cryptic anagram that represented the chief formulation, write it together with the date, and seal it within a document and lodge this with a trusted authority. In this way, should his claim be contested, a scientist's priority might be proved (Fjallbrant, 1997:online; Guédon, 2001:online).

The new printed journals were also a means of communication in an age where post was uncertain, carried by hand, carriage or ship between towns and different countries. It allowed fellow men of science to become aware of which problems were being tackled as well as the progress of the work. The journal as a new medium also provided a channel of correspondence amongst scientists. Letters commenting on previously published articles were published, setting off intense debates about methods. Through the wider dissemination of authoritative journals, scientists achieved status through the recognition and scholarly regard of their peers.

4.2 Norms of science

With the establishment of new scientific societies and academies in the 17th century, there also emerged a fairly rigid set of norms guiding the professional behaviour of scientists. Merton, a key figure in the sociology of science, codified these in a 1942 paper entitled, "The Normative Structure of Science" as follows: communism, universalism, disinterestedness and organized skepticism. In elaborating on these ethics it is possible to discern some overlap with the principles of open access publishing.

The ethos of **communism** is probably best expressed through Newton's famous remark, "If I have seen further it is by standing on the shoulders of giants". This underscores the fact that scientists depend upon and build on former findings that are common property. The conception of science as belonging to the public domain may be linked to the imperative for full disclosure of findings (Merton, 1973:273-275). Scientists that do not share their findings face disapproval from their fellows. The open access movement seeks the widest possible diffusion of research results, in the belief that science is a socially collaborative process, reliant upon previously established knowledge.

Universalism refers to the characteristic that scientific knowledge is objective and impartial and hence that particularities of a scientist's gender, nationality, ethnicity, religion or class have no bearing on the validity or critical reception of his or her work. Merton also recognised that the institution of science is set within larger social systems that may not embody such principles of universalism (Merton, 1973:270-273). For example, Western hegemony in setting research agendas implies unequal relations within the world of science. Another anti-universalist tendency would be

the race amongst nations to be "first in science" (Wagner & Juma, 2005:online). The open access movement maintains that the differential material conditions that exist around the world do not serve the international, impersonal character of science. One of the stated aims of open access is to begin to level the playing fields by ensuring that the cost factor no longer serves as a barrier to information. Another is to establish greater visibility for all scientists' work, setting up better information flows from South to North (Lor and Britz, 2004:15).

Disinterestedness as an ethos describes the motivation of the scientist as he or she pursues a research problem, faithfully and truthfully recording and registering the findings which emerge. Since priority of discovery is an important incentive for researchers, competitive conditions can occur, generating the possibility for "eclipsing rivals by illicit means" (Merton, 1973:275-277). Although the practice of science is subject to rigorous review (**organized skepticism**), the quality of dispassionate detachment is also applicable to peer reviewers who should not allow personal interest to influence editorial decisions about the publication of rival, novel or unpopular findings (Merton, 1973:492-3; Lawrence, 2003:260; Daniel, 2004:online). The movement to "return science to the scientists" may be partly attributed to the assertion that commercial publishers have artificially engineered the status and prestige of high impact journals for profit motives (Guédon, 2001:online; Johnson, 2000:online). Lawrence writes: "Scientists are increasingly desperate to publish in a few top journals and are wasting time and energy manipulating their manuscripts and courting editors. As a result, the objective presentation of work, the accessibility of articles and the quality of research itself are being compromised." (Lawrence, 2003: 259). One of the remedies he promotes is for established authors to publish in open access websites, setting an example to younger scientists, to begin to break the "cult" of these journals.

In sum, these norms promote openness in the conduct and communication of science, which ideally occurs within a collaborative and cooperative ethos. Findings are fully and freely disclosed so that their reliability may be verified and vetted by fellow scientists and so that others may build upon them. In the main, these collegial ideals continue to be practiced within the scholarly community and while there may be increased competition within the current funding climate, the opportunities for collaboration are increasing. It is submitted that there appears to

be a natural concord between the norms of science and the ideals of open access. At its root, there are two main motivations for open access: one is to serve readers (ensuring inclusive access for all for the progress of science); the other serves authors (reaching the widest possible readership for improved impact and recognition). Within the current publishing system, neither of these groups is being adequately served.

4.3 Information and knowledge

Having identified the purposes of publication and the normative principles which guide scientific pursuit, it is possible to proceed with examining ideas about the social and economic benefits that open access publishing is seeking to maximise. As a preliminary, it is necessary to distinguish between knowledge and information, as these should not be confused. A useful starting point is the recognition that information may be viewed as both an input and an output of knowledge production (Dalrymple, 2003:35).

Publications are units of information that represent an author's attempt to codify the knowledge he or she wishes to communicate. It has been variously noted that such information is invariably an imperfect substitute as it does not incorporate the tacit knowledge (processes, experience) possessed by the author (David and Foray, 2002, p4; Forero-Pineda & Jaramillo-Salazar, 2002:132, and famously formulated by Michael Polanyi[15]). It should also be appreciated that accessing publications does not automatically infer that a transfer of learning can take place as this presupposes that the reader has a pre-existing stock of knowledge that will enable him or her to use the published information (David & Foray, 2002:4 and 10). Knowledge is understood to be a cognitive capacity that allows its possessor to use or act upon fresh information.

4.4 Information as a public and a private good

Economists have established that information is a public good because of its inherent properties (David 2003:19-20; Dalrymple, 2003:36) The phrase "public good" refers to a specific economic condition where the nature of a "good" (in the sense of product) predisposes it to be supervised by the state, rather than be supported entirely within the realm of the market. This condition occurs when the good may be

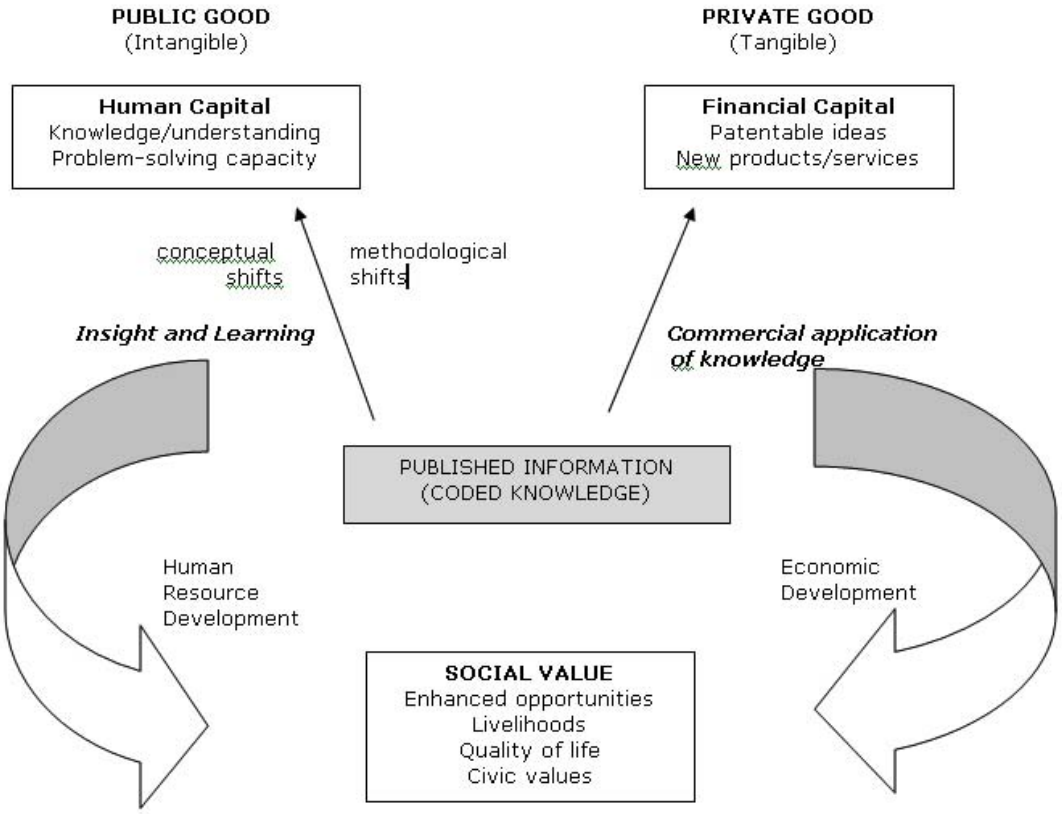
[15] Polanyi's well-known phrase "We know more than we can say that we know" refers to his idea that knowledge is not capable of full explicit expression (http://www.meta-library.net/gengloss/polan-body.html).

shared and widely used without diminishing its value (expansibility), and where the use of the good by one does not prevent its simultaneous use by another (non-rivalrousness). It is these properties of information that separate it from other market commodities.

There is no doubt that information may also have an intrinsic private good dimension. The Cold War era drew attention to the strategic role played by scientific research in the political economy. Nelson (1959:299) writes, "Scientific knowledge has economic value when the results of research can be used to predict the results of trying one or another alternative solutions to a practical problem." In other words, informed decision-making saves money and reduces investment risk. The diagram overleaf (**Fig.3)** represents a schematic summary of the tangible (private) and intangible (public) goods that may be derived from access to published information.

As can be seen from the diagram, the benefit of published information may result in expanded knowledge and enhanced understanding where the reader's ideas are shifted through a previously un-thought of insight, enabling him or her to solve new problems. This benefit may be viewed as a public good as it enlarges the human capital available to society. It also makes possible the cumulative progression of knowledge that depends on sharing, as posited through the behavioural norm of "communism" mentioned above. On the other hand, an original finding reported in scholarly literature may find commercial application within a patentable idea that might in fact not even have been conceived by the author. Where this application is followed through to new products and services, the benefit may be viewed as a private good, accruing financial capital to the patent holder, as well as to society more broadly as this process stimulates economic development. By highlighting the difference between public and private benefits, it is possible to discern the point at which intellectual property rights (patents, copyright and data protection) might ideally be inserted.

Fig. 3 Public and Private Goods Derived from Access to Published Information



As has been noted in Chapter 2, the predominant influence of the market economy in all sectors has tended to shift society's evaluation of what equates a public good. Merton notes the inherent conflict for scientists operating within an open paradigm:

> The communism of the scientific ethos is incompatible with the definition of technology as 'private property' in a capitalistic economy. … Patents proclaim exclusive rights of use and, often, nonuse. The suppression of invention denies the rationale of scientific production and diffusion. … Scientists have been urged to become promoters of new economic enterprises. Others seek to resolve the conflict by advocating socialism. These proposals – both those which demand economic returns for scientific discoveries and those which demand a change in the social system to let science get on with the job – reflect discrepancies in the conception of intellectual property. (Merton, 1973: 275).

Chapter 2 also highlighted the current pressure for scientific researchers to form close partnerships with industry, to be the beneficiaries of corporate research funding, as well as the overall push towards commercialisation of research findings.

4.5 Information and the global commons

It is the predominance of the private over the public dimension that has given rise to both the open access movement as well as several allied international efforts to return information to the global commons. Some examples are:

- The **free open source software** movement has arisen in opposition to the worldwide dependence upon expensive proprietary software systems that lock organizations into licensed dependency on computer programmes that cannot be customised for optimal use. Open source programmers distribute their source code freely, and in this way contribute to the greater societal good by making available software that others can use, learn from, or adapt to make them more effective for different operating environments. The University of the Western Cape hosted the first open source conference in Africa in January 2004. It has also spearheaded a number of other open source initiatives, such as the establishment of the Free Software Innovation Unit, that aims to develop and apply free software with a focus on higher education in Africa (UWC, 2004:online). Open source is also being promoted within South African educational and business sectors by the Shuttleworth Foundation (Shuttleworth, 2005)

- The **Creative Commons** movement, launched by Lawrence Lessig in 2002, is an initiative that seeks to break the copyright stranglehold of corporate publishing interests (Lessig, 2004). The Creative Commons philosophy promotes the free dissemination of creative or artistic works over the Internet and provides a variety of legal licences that enables authors or artists to allow others to use their creative works without paying royalties, particularly where the use is non-profit. The Creative Commons South Africa[16] has organized a series of workshops in order to develop South African Creative Commons licences. These became available from its website in June 2005.

- **Open courseware** is another growing trend which sees distinguished universities such as Cornell, MIT and Berklee College of Music providing free access to all their teaching and learning materials over the web. The term **Open Content** is also used to refer to repositories of learning objects that enable compilers of online courseware to collaborate and share resources for teaching and learning (Diamond, 2003:online; Keats & Shuttleworth, 2003: 163-169).

[16] http://za.creativecommons.org

A common thread drives these movements and connects them to open access. They each embody the more enlightened vision of sharing for greater public good. The fact that they are all emerging at the same time suggests a common rejection of the commodification and commercialisation of information, and the over-strenuous application of ever-restrictive copyright and intellectual property provisions which favour corporate interests while stifling the kind of sharing that leads to innovation and creativity. These open access initiatives represent a counterbalance to the competitive force of globalisation, which is antithetical to the collaborative ideal. In each of these phenomena, there is a use of the World Wide Web to democratise the use of information. In each case, one has a sense of the subversion of traditional publication.

4.6 Copyright as barrier to access

The tension between what information rightfully belongs within the public domain and what information warrants protection as private property is a longstanding debate between different stakeholder groups such as lawyers, librarians, corporate executives, civil society agencies, inventors and artists. This fundamental argument is renewed with force each time a new reproductive technology is introduced: for example, photocopiers, video recorders, digital audio tape, etc. With the advent of information and communication technologies that enable rapid and easy reproduction of digital files, the owners of copyrighted materials, predominantly large corporates in the leisure industry, have shepherded governments through a succession of new legislation that protects intellectual property within the digital environment. The Digital Millennium Copyright Act (1998) is a highly restrictive law that incorporates encryption and "click through" licences to prevent the circumvention of electronic copying (Sarocco, 2003:14). Publishers of online journals use this technology to exclude non-paying readers and use the provisions of this legislation within their licence agreements so that publicly funded libraries, including academic libraries, are prevented from providing information to the wider public.

> In the digital age copyright has expanded to include every conceivable act of transmitting, viewing, receiving, or simply accessing a copyrighted work. Furthermore, the potential of using "code" (technological measures) and contracts clauses as substitutes of additions to copyright, threatens to further erode the existing freedoms and exceptions. (Sarocco, 2003: 25)

David and Foray (2002:13) and Johnson point to the irony that much creative energy is expended to circumvent the innate properties of the Internet.

> At a time when the Internet has created opportunities for free and wide communication of research with potentially broad societal benefit, scholarship is increasingly regarded as an article of commerce to be guarded and parceled out for maximum financial return. (Johnson, 2000:online)

It is instructive to compare the strictures of digital rights management with the Budapest Statement on Open Access that defines its scope:

> By "open access" to this literature, we mean its 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. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. (Budapest Open Access Initiative, 2002)

Legal copyright provisions apply equally to commercialised goods as well as to resources that are the product of publicly funded missions, such as scholarly research. The inappropriateness of blanket copyright regulations has been signaled by Altbach:

> The concept of ownership of knowledge products, from computer software to poems, from Mickey Mouse to physics textbooks, is universally accepted. The products of the mind are considered as commercial property, to be bought and sold in the marketplace. Few see any difference between knowledge products and any other commodity. GATT enshrines the idea that those who bring knowledge products to the marketplace should be able to completely control them. …Textbooks, technical reports and research volumes are subject to the same regulations as a novel by James Clavell. Those who control the distribution of knowledge treat all intellectual property equally – and are perfectly happy to deny access to anyone who cannot pay." (Altbach, 1995: 1-2).

The overemphasis of legal and economic aspects of copyright have overshadowed larger social causes, such as ensuring that developing countries have the opportunity to access information and knowledge. Knowledge monopolies are now ruthlessly

upheld by rich nations that were not such strict defenders of international copyright rules during their own developmental phase (Altbach, 1995:7; Nicholson, 2005).

4.7 Freeing the journal and conference literature

The dilemma of copyright legislation hinges on how to protect the income of the copyright holder while balancing this with fair and legitimate access. It is the commercial aspect that drives the problem. The question arises: what if there was no income to protect – in other words, if the financial factor were to be removed from the equation? In 1994, Stevan Harnad, a professor of psychology at Southampton University and a pioneering advocate for open access, posted a "subversive proposal" to a discussion list debating electronic journals. This seminal debate was subsequently published as a book edited by Okerson and O'Donnell (1995) Harnad's contribution drew attention to the critical distinction between the output that scholars want to give away (journal articles, conference papers) and that from which they expect to derive royalty income or fees (books, magazine articles). In part because of the normative imperative to share research findings, and partly because the impact factor is more important within the academic reward system, researchers have never expected financial return on the papers they submit to journals or present at congresses.

> Unlike all other authors, researchers derive their income not from the sale of their research reports but from the scholarly/scientific impact of their reported findings, i.e., how much they are read, cited, and built-upon by other researchers (Harnad, 2003:online).

"Impact income" (such as research grants, salaries, promotion, tenure, prizes) represents a far greater reward to scholars than any hypothetical "imprint income" that might possibly be accrued from highly technical, esoteric articles. David (2003, 21-22) has also identified the "functionalist rationale" that propels scientists to conform to openness, pointing out that the collegiate reputational reward system of open science connects with the social efficiency of sharing new information (diffusion of research findings reduces duplication of research efforts).

Harnad points out that publishers' "toll charges" (subscriptions, site licence fees and pay per view charges) in effect constitute an impact barrier in that they prevent the widest possible readership for refereed articles. He contends that it is in scholars' best interests to ensure that their work is made freely available and proposes that

they institute a practice of self-archiving their pre- and post-prints (updated final version of the published papers) within institutional or disciplinary online archives that are purpose-built and that conform to the Open Archives Initiative protocol (discussed further below).

Gadd, Oppenheim & Probets (2003:250-255) find that although higher education institutions might theoretically have a legal claim to the copyright on the output of their academic staff (as work performed in line with their contractual agreement to teach and undertake research), this is seldom pursued. This claim is usually waived, either because it is perceived as an encroachment upon academic freedom, or because research outputs (excluding patentable ideas) are not deemed to have financial value. As copyright holders for their pre-prints, authors are therefore at liberty to make these publicly available.

With regard to the self-archiving of post-prints, which are the peer-reviewed texts that appear within branded journals, Harnad (presumably in "subversive" mood) recommends that authors attempt to obtain permission from the journal, and where this is refused, proceed to publish the corrigenda file (containing the necessary adjustments that would need to be made to the pre-print to make it conform to the published version) alongside the archived pre-print.

Fortunately, in most cases, authors would not need to resort to this 'workaround'. As part of a JISC project to support the establishment of institutional repositories, publishers' copyright policies have been analysed to determine their stance on the practice of pre- and post-print archiving. Of 120 scholarly publishers, 72% - including Elsevier (1882 journals), Springer (837 journals), and John Wiley & Sons (378 journals) - have already conceded to allow some form of self-archiving. In most cases, publishers' conditions require that authors use their own post-print file rather than the publisher pdf version, and that the online archive provide links to the publisher's site. Nevertheless their readiness to allow authors to archive the full text of the post-print is a surprising concession and marks a growing realisation by commercial publishers that open access is an irreversible trend. The searchable database of publishers' self-archiving policies is available online.[17]

[17] http://www.sherpa.ac.uk/romeo.php

Self-archiving represents one of the two strands of open access publishing. Both will be discussed after a brief review of the history of the open access movement.

4.8 The development of open access publishing

There is no doubt that the Internet has been the catalyst for open access. Alongside the transition to electronic subscription journals, there has been a growing diversification of electronic publications, each of them parallel developments to the traditional journal, and all of them made possible by the Internet. Scholarly authors now frequently make use of a wider range of channels to disseminate their work. These include pre- and post-print servers, open access journals, discipline-based and institutional repositories, portals and subject gateways, newsletters and bulletins, and personal web pages (Houghton, Steele & Henty, 2003:57-62). In some cases, these web-based products may have arisen as part of a fashionable trend, or as the 'latest thing' to implement. But within the last five to eight years, many initiatives have been ideologically driven, and have collectively become representations of, and aligned themselves with, the open access movement. With the failure of electronic journals to deliver relief from spiraling costs, individuals and organisations have sought alternative avenues of publication.

The history of this movement is charted in the *Timeline of the Open Access Movement* (Suber, 2004a:online). The pattern of chronological entries reveals how early open access ventures were initially only occasional footprints in the mainstream of academic publishing. By the mid-1990s, the entries on the timeline become denser as use of the World Wide Web gained wide currency. Since 2003 the open access timeline has become a busy road with multiple entries. Some of these entries document critical actions. For example, over ten entries document the protest resignations of entire editorial boards over publishers' exorbitant subscription hikes. These panels of editors subsequently launched their own cheaper or open access journals. From the universities' perspective, beginning in September 2003, the chronology also documents a wave of protest actions that have been taken by universities against inflexible publishers. These include large-scale cancellations, new institutional policies, Senate resolutions, public statements and recommendations to faculty, librarians and administrators. These actions are indicative of the ongoing serials crisis that has been described in Chapter 3.

4.9 Support for the movement

The flurry of activity after 2002 might well have occurred as a result of a spate of high-level public statements that endorse and promote open access. These declarations are based upon principled stands by a wide range of stakeholders, including funding agencies, public interest groups, library organisations, academies and not-for-profit publishers – and more recently, government agencies. Below is a chronological summary review of these public endorsements of open access.

- September 2001 **Public Library of Science (PloS) Open Letter**[18]

This non-profit association of scientists and physicians registered the signatories' commitment to publish in, edit, or review for only those journals that allow authors to deposit their published articles in publicly accessible online archives (such as PubMed Central) within 6 months of publication.

- February 2002 **Budapest Open Access Initiative Statement**[19]

Prepared by the Open Society Institute and subsequently signed by over 3,900 individuals/organisations. This statement introduced the term "open access" and articulated the two avenues to open access, self archiving and open access journals, both made possible by Internet technology and by individual scholars' willingness to share research findings without payment, to promote inquiry and knowledge.

- June 2003 **Bethesda Statement on Open Access Publishing**[20]

Stakeholders working in the biomedicine research community (funding agencies, libraries and publishers, scientists and scientific societies) attending a conference hosted by the Howard Hughes Medical Institute drafted a statement which documented the steps each constituent group planned to take to promote the rapid and efficient transition to open access publishing, so that it "becomes the accepted standard for publication of peer-reviewed reports of original research in the biomedical sciences."

[18] http://www.plos.org/support/openletter.shtml
[19] http://www.soros.org/openaccess/read.shtml
[20] http://www.wsis-si.org/mdpi-bethesda.pdf

- June 2003 **Comments and Inputs from the Scientific Community on the Draft Declaration and Action Plan for the WSIS**[21]

Compiled by the Third World Academy of Sciences, the International Council for Science, the International Centre for Theoretical Physics, CERN and UNESCO, this document suggests amendments to the *Draft Declaration of Principles* and *Draft Action Plan* in preparation for the World Summit on the Information Society held in Geneva in December 2003.

The document highlights the central role of science in the information society, noting that ICTs "provide an historic opportunity to reduce the scientific divide: they improve and increase the transfer of scientific knowledge between developed and developing countries". It specifically urges the Summit to "promote electronic publishing, affordable pricing schemes and appropriate open source initiatives to make scientific information affordable and accessible on an equitable basis in all countries".

- October 2003 **Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities**[22]

The Declaration was signed by participants at a conference hosted by the Max Planck Society and subsequently endorsed by many large research organisations internationally. Signatories declare their commitment to promote open access by:

> "Encouraging our researchers/grant recipients to publish their work according to the principles of the open access paradigm; Developing means and ways to evaluate open access contributions and online journals in order to maintain the standards of quality assurance and good scientific practice; Advocating that open access publication be recognized in promotion and tenure evaluation; Advocating the intrinsic merit of contributions to an open access infrastructure by software tool development, content provision, metadata creation, or the publication of individual articles."

The Berlin Declaration also recognised the importance of finding solutions to legal and financial problems in order to assist the transition to open access. Bi-annual

[21] http://rsis.web.cern.ch/rsis/Links/fulldeclaration.pdf
[22] http://www.zim.mpg.de/openaccess-berlin/berlindeclaration.html

follow-up conferences are held to review progress on implementing these resolutions.

- December 2003 **Statement on Access to Scientific Information**[23]

This was prepared by the InterAcademy Panel on International Affairs meeting in Mexico City, and supported by more than 50 scientific academies worldwide, including the Academy of Science of South Africa. The main recommendations called for a special dispensation for scientists in developing countries to have electronic access to journals immediately upon publication; and that scientific databases obtained by intergovernmental organisations be made freely available.

- July 2004 **Scientific Publications: Free for all?** Report of the Select Committee on Science and Technology, UK House of Commons[24]

An eight-month inquiry into the provision of scientific journals to the academic community and the wider public yielded a report with the following main recommendations, as summarized by Suber (2004b):

(1) The government should provide funds for all UK universities to launch open-access institutional repositories.
(2) Authors of articles based on government-funded research should deposit copies in their institutional repositories.
(3) The government should appoint a "central body" to oversee the launch of the institutional repositories, their networking needs, and their compliance with "technical standards needed to provide maximum functionality"
(4) The government should create a fund to help authors pay the processing fees charged by open-access journals. The committee was not yet ready to endorse the upfront funding model for OA journals (which it calls the "author-pays" model), but proposed the creation of a fund in order to promote further experimentation with the model.
(5) The government should develop a wider, long-term open-access strategy, including open-access journals, "as a matter of urgency".

[23] http://www.interacademies.net/iap/iaphome.nsf/weblinks/WWWW-5U6HHG?OpenDocument
[24] http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/39902.htm

[In a setback, when the Government response was made available in November 2004 (Science & Technology Committee, 2004e), it endorsed much of the Committee's report in principle, but did not undertake to implement any of the recommendations in practice.]

- August 2004 **Open Letter to U.S. Congress from 25 Nobel Laureates**[25]

The letter supports the US House of Representatives' direction to the National Institutes of Health to prepare a policy to increase taxpayer access to medical science research (see below)

> "There's no question, open access truly expands shared knowledge across scientific fields – it is the best path for accelerating multidisciplinary breakthroughs in research".

- February 2005 **Policy on Enhancing Public Access to Archived Publications Resulting from NIH-Funded Research**[26]

When the US National Institutes of Health released its final policy and implementation, it announced its aims:

> 1) To create a stable archive of peer-reviewed research publications resulting from NIH-funded research to ensure the permanent preservation of these vital published research findings;
> 2) to secure a searchable compendium of these peer-reviewed research publications that NIH and its awardees can use to manage more efficiently and to understand better their research portfolios, monitor scientific productivity, and ultimately, help set research priorities; and
> 3) to make published results of NIH-funded research more readily accessible to the public, health care providers, educators, and scientists."
> (National Institutes of Health, 2005)

The final policy "requests and strongly encourages" scientists to email a copy of the final peer-reviewed journal article as soon as possible (and within a period of 12 months) to the NIH for posting on PubMed Central for public accessibility.

The stipulations of each of these statements vary in minor detail but are unified in their intent and spirit. Collectively they have provided a strong public and institutional momentum for the open access movement. In several cases, significant financial resources (worth millions of dollars) have accompanied the verbal support.

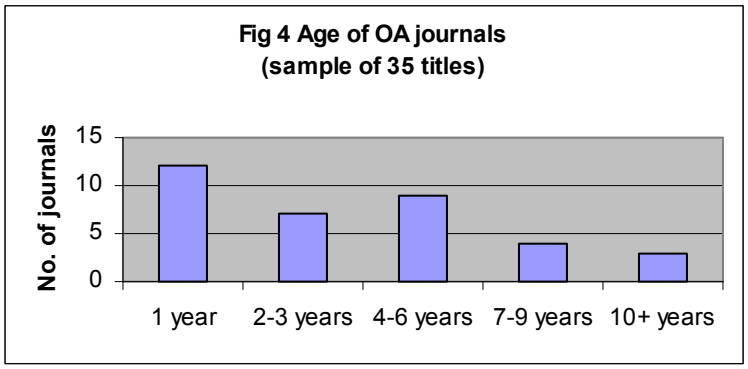
[25] http://www.fas.org/sgp/news/2004/08/nobel082604.pdf
[26] http://grants.nih.gov/grants/guide/notice-files/NOT-OD-05-022.html

These have provided financial support to individual open access projects, sponsoring start-up costs for OA journals as well as experimental projects for Open Archives. The following section describes these two forms of open access publishing.

4.10 Open Access journals

One of the projects sponsored by the Open Society Institute-Budapest is the Directory of Open Access Journals (DOAJ)[27]. As its name suggests, the website aims to provide comprehensive access to quality controlled research journals that provide free full-text to all articles. The DOAJ currently includes 1,888 such journals, 461 of which are searchable at article level. The aim of the Directory is to provide visibility of and exposure to open access journals to promote their usage and impact, a key consideration for their uptake by prospective authors. Journals representing all disciplines and several different languages may be found at the site. A chart presented in Chapter 7 (see Fig.57) provides a breakdown of the journals by discipline.

Besides indicating the number of journals within each field, the DOAJ website does not provide statistical information about the journals. To gain a sense of the longevity, quality, language representation and searchability of these open access journals, a subset of 35 journal titles, identified as the latest journals added to the DOAJ within the 30 day period from 22 February to 22 March 2005, was analysed as a representative yet random sample.



The longevity chart shows a preponderance of new journals, presumably "born open access", with a dropping-off of journals older than 6 years. This bears out the

[27] http://www.doaj.org

evidence from the OA Timeline which showed only a few initial entries in the early- to mid-90s. The DOAJ will continue to host journals that are discontinued.

The quality of the OA journals can be partly assessed from the standing of the editorial and review panels and the peer review mechanisms employed. Twenty-one of the 35 titles (60%) are managed by international groups of professorial level personnel; the editorial boards of 7 titles (20%) are represented by scholars within a single country; 7 titles (20%)do not provide sufficient information to assess the excellence of the editorial board. With regard to quality control, 17 journals (48%) provide explicit information demonstrating a rigorous peer review process (eg, scholarly reputation of the editorial board plus 2-3 external reviewers); 4 (11%) rely exclusively upon the judgement of the review panel; 8 (23%) merely mention a "review process" without elaboration; a further 6 journals (17%) do not provide any information. As is the case with any given spread of journals, this mini-sample of open access journals provides evidence of variable quality. As will be discussed in Chapters 5 to 7, this aspect is a critical factor in the acceptance of these titles by the scholarly community.

Quality may also be discerned from the articles themselves. Several articles were downloaded from each of the 35 journal sites. Although these were not read in depth, the content and presentation appeared uniformly acceptable, following the norms of scholarly articles (eg, structure, evidence of surveyed literature, clarity of diagrams, conclusions reached, inclusion of recent references).

The spread of languages used by these 35 journals was as follows: English (69%), Portuguese/Spanish (20%), with French, Japanese, Slovak and polyglot journals just 3% each.

Notwithstanding the progress of the DOAJ in achieving cross-journal searching (just under 25%), the accessibility of article-level searching within each journal's site was examined. Thirteen sites (37%) provide internal search screens that enable the user to search for articles across the archived back issues. A further 13 sites (37%) do not provide any clear access to the articles, so that the user would need to browse each journal issue to find articles. Nine sites (26%) do not provide a search interface but specify a range of external indexes and abstracts that link to their journals. As a whole, this result will compromise the overall visibility of the journals, and hence their potential impact. "Research has demonstrated that, *with appropriate indexing*

and search mechanisms in place, open access online articles have appreciably higher citation rates than traditionally published articles." (Johnson, 2002:online; italics mine)

The purpose of this mini-investigation was to acquaint myself with the kind of offerings available from the DOAJ site. The benefits and limitations of OA journals will be further expounded in Chapter 5. With OA journals representing just 5% of active scholarly journals, it is clear that these titles have some way to go before they become the publications of choice for authors in most or all disciplines.

4.11 Self-archiving in open access repositories

A second, complementary option for open access publishing is self-archiving within open archives or repositories, via the process recommended by Stevan Harnad as mentioned earlier. The oldest and largest open archives are discipline-based and the practice of publicly archiving research papers is already common within the disciplines of physics, computer science and economics (Poynder, 2004:online; Guédon, 2001). In 1991, physicist Paul Ginsparg recognised the potential of the Internet for sharing research and founded the first preprint service, Arxiv[28], which enabled researchers to store and access papers from a central location. It rapidly became a primary means of communicating ongoing research within several scientific communities. Arxiv presently hosts 336,838 articles in physics, mathematics, and computer science. It also served as a conceptual model for other e-print servers; a few of the better-known ones are listed below.

Name of Open Archive	Field of Study	No. of full text papers
CERN Document Server	Particle Physics	24,629
CITIDEL (Computing and Information Technology Interactive Digital Educational Library)	Computer Science	136,693
Research Papers in Economics (REPEC)	Economics	33,383
PubMed Central	Health Sciences	391,119
SciELO (Scientific Electronic Library Online)	Predominantly health sciences	46,312

[28] http://arxiv.org

Lagoze and Van de Sompel (2001:55) explain the motivating factors that caused the growth of disciplinary online archives:

> An increasing number of scholarly disciplines, especially those in the so-called "hard sciences" (eg, physics, computer science, and life sciences) are producing results at an increasingly rapid pace. This velocity of change demands mechanisms for reporting results with lower latency times than the ones experienced in the established journal system. The ubiquity of high-speed networks and personal computing has created further consumer demand for use of the Web for delivery of research results. Finally, the economic model of scholarly publishing has been severely strained by rapidly rising subscription prices and relatively stagnant research library budgets."

4.12 The Open Archives Initiative (OAI)

While researchers took the initiative in creating online open archives, it was library-based organisations that formed the Open Archives Initiative (OAI) in 1999. The OAI coordinates in-depth collaborative projects with a view to creating technical standards to allow interoperability and federated searching amongst distributed archives (Lagoze & Van Sompel, 2001:54-57). The availability of rich deposits of content is praiseworthy, yet impractical if a searcher does not know about the collection or has to conduct searches by visiting a large number of separate archive sites.

Interoperability relies upon uniform naming, metadata standards and access protocols. Content is provided by the distributed archives and is described and represented by means of standardised metadata records (eg, Dublin Core) which include bibliographic information as well as a Uniform Resource Indicator (URI). Other agencies or service providers use the information from the metadata to provide innovative services such as creating cross-repository search interfaces, linking citations and providing current awareness services. In January 2001 the OAI released the OAI Protocol for Metadata Harvesting (OAI-PMH). This Web-based network protocol supports the batch transfer of selective new metadata from content providers (archives) to a service provider by means of incremental updates (Suleman et al, 2003:301-302). The rapid growth of OAI compliant repositories (644 currently listed at the OAI registry) is testimony to the widespread authority and acceptance of the OAI standards, which serve as a kind of "glue" to harness the benefits of data or content providers and the work of service providers.

An example of an OAI service provider making use of the PMH is OAIster[29] at the University of Michigan. OAIster provides cross-repository searching of metadata describing publicly available academically oriented digital objects, including electronic books, journals, audio files, images and video files. At the end of September 2005, OAIster contained over 5 million records from 536 institutions. As the website explains: "When you search in OAIster, you're searching a wide variety of collections from a wide variety of institutions. These institutions have made the records of their digital resources available to us, and we have gathered and aggregated them into the OAIster service".

Another OAI service provider, Citebase[30], allows searchers to find research papers and to display results by selecting different ranking criteria, such as how many times the paper or the author has been cited or browsed. Citebase covers selected full-paper archives that comply with the Open Archives Initiative (OAI). It is an experimental project that will be expanded to include other archives.

The expanding number of OAI institutional repositories (as distinct from disciplinary archives) is also due to the ready availability of open source OAI compliant software designed to enable institutions to capture, store, index, preserve and redistribute the output of its faculty. *Dspace*, developed by Massachussetts Institute of Technology, and *GNU EPrints* developed by University of Southampton, are the most commonly used platforms (Open Society Institute, 2003). The growth of institutional repositories and the expansion of the number of papers held within them is monitored by *Eprints.org* and is charted in a graph that appears at **Fig 5** on p. 68. The graph only registers institutional directories that allow harvesting of their metadata, ie, that are OAI compliant. The radical growth in the number of archives and available records after 2002 is a direct result of the pioneering technical work done by the OAI.

4.13 Improving information flows from the South

South Africa would do well to follow the example of developing countries such as Brazil and India which are actively working and supporting their local journals to become online and open access. This provides greater visibility for local research and creates better opportunities for South-North and South-South information flows.

[29] http://www.oaister.org
[30] http://citebase.eprints.org/cgi-bin/search

Brazil and India are actively producing open access journals and developing open archives to improve awareness and sharing of their national research output.

Chan & Costa (2005:152-6) report on several initiatives underway in these countries. SciELO (Scientific Electronic Library Online)[31] is a portal of open access scientific journals published within Latin America. SciELO was formed by a partnership between the Sao Paulo Research Foundation and the Latin American and Caribbean Centre on Health Sciences information (BIREME) with the express objective of improving the visibility, accessibility and impact of science from Brazil and other regions of Latin America. The SciELO site hosts over 200 open access biomedical journals.

Bioline International is a Brazilian-Canadian non-profit publishing organization dedicated to the open distribution of bioscience and health journals from developing countries. Over 40 peer-reviewed journals from South America, Asia and Africa are accessible from the Bioline site. The Bioline website[32] reports:

> Document downloads have increased by ten-fold for many publications. In addition, one of the journals on the system reports a substantial increase in submission rates and a three-fold increase in citation impact over a three year period. Several publishers also report that the number of international authors submitting manuscripts to their journals has been steadily increasing, indicating that researchers now recognize and value the increased visibility and impact provided by open access.

MedKnow Publications is one of several Indian-based initiatives and provides open access to 21 Indian medical journals without charging author fees, relying on advertising revenue in its online and subscription-based print editions[33]. Organised groups of scholars, such as the Indian National Science Academy and the Indian Academy of Science have also instituted open access journals to promote Indian research. Taking advantage of its mandate to promote and publish scientific knowledge, the Indian National Science Academy obtained funding from the Indian Dept of Scientific and Industrial Research to convert its journals from print to digital

[31] http://www.scielo.org
[32] http://www.bioline.org.br
[33] personal communication with the Managing Director; http://www.medknow.com

format and to host these for global dissemination and access[34]. The Indian Academy of Science hosts 11 open access journals on its site[35]. A sample test using *Google* discovered all the articles in the latest issues of several of these journals, proving that these efforts enable wide discovery. Besides presenting avenues for greater visibility of research emanating from the South, these initiatives strengthen indigenous science journals and with them the quality of research. Chan and Costa draw attention to the role of government funding and support in these projects. While India and Brazil have not yet formalised policy to mandate open access for publicly funded research, their governments are actively seeking ways to bolster the knowledge-base of their countries.

By way of comparison, *The South African Journal of Science*, the official journal of the Academy of South Africa (ASSAF), is firmly established as a subscription journal and also charges for articles from back issues that are online[36],[37]. Aggregations of South African journal articles are currently only available through toll access databases provided by SABINET and NISC. A showcase of African journals is provided by the African Journals Online (AJOL) project[38] developed by the International Network for the Availability of Scientific Publications (INASP). AJOL is an initiative that aims to assist African journals to become more visible through online publishing. At present access is limited to tables of contents and abstracts of articles from 207 titles across 21 African countries. Sixty-five of the hosted titles are South African. Beyond the hosting of journals, AJOL, now managed by NISC in South Africa, trains journal administrators to manage the entire process of journal production online using the open source Open Journal system. This undertaking is an important one and deserves official recognition and support by governments of participating African countries.

Local institutional repositories represent another possibility for improving the accessibility of South African research, especially where these employ OAI standards allowing their metadata to be harvested by open archive service providers across the world. The Directory of Open Archives[39] indicates four such registered sites in South

[34] http://www.insa.ac.in/html/aboutproject.asp
[35] http://www.ias.ac.in/journals.html
[36] http://www.nrf.ac.za/sajs/index.stm
[37] Ironically, ASSAF was a signatory to the InterAcademy Panel Statement, see p. 58 above.
[38] http://www.inasp.info/peri/resources/ajol.shtml
[39] http://archives.eprints.org

Africa. These are located at the University of Johannesburg[40], the University of Pretoria[41], Rhodes University[42] and the Dept of Computer Science at the University of Cape Town[43]. While the first two are devoted to theses and dissertations, the latter two include all kinds of research output. It is interesting to note that articles from the toll access *Journal of South African Science* have been made open access through the self-archiving activities of their authors at the Rhodes repository! *Google* searches also uncovered material located in these sites.

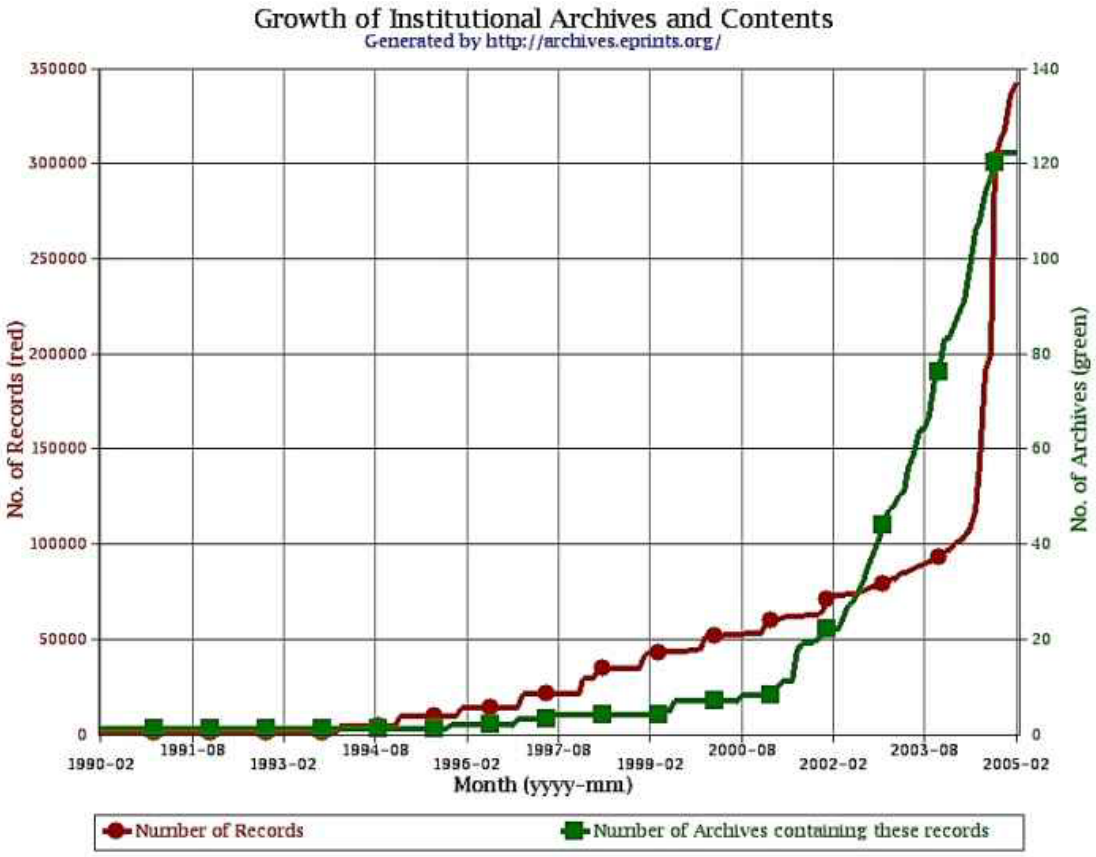
At least some of this activity may be the result of a groundbreaking workshop held in 2005 to provide technical training in establishing repositories[44]. This workshop arose from the first South African national conference that focused on open access scholarly communication[45]. Chan and Costa point out that it is significant that it was SASLI, the South African Site Licensing Initiative division of the Coalition of South African Library Consortia, that took the lead in organising these events. They identify that it signals a realisation by librarians that "a national site licensing approach to information access is not sustainable in the long term and complementary approaches to information provision need to be supported and developed" (Chan and Costa, 2005: 156).

The open access movement has emerged at this juncture as a result of concurring and coinciding factors and conditions, including the availability and widespread uptake of the Internet and the dissatisfaction with constraints of traditional publishing. This chapter has demonstrated that open access is championed and supported by a broad range of stakeholders: scholars, non-profit publishers, librarians, public interest groups and foundations. They recognise the need to reclaim publicly funded scholarship for the widest possible readership, thereby sowing the seeds for further discovery. Even within the present inflexible and cutthroat copyright regime, it is possible to integrate the scientific ethos of openness with the public good dimension of scholarly research so that journal articles may be universally shared. The alternative scholarly communication models introduced

[40] http://etd.rau.ac.za/
[41] http://upetd.up.ac.za/
[42] http://eprints.ru.ac.za/
[43] http://pubs.cs.uct.ac.za/
[44] "Institutional Repositories: Creating Tomorrow's Information Infrastructure for Today's Scholarly Community", 11-13 May 2005, CSIR, Pretoria. Report available from https://mx2.arl.org/Lists/SPARC-OAForum/Message/1978.html
[45] Open Access Scholarly Communication Conference, Pretoria, July 2004, http://archive.sabinet.co.za:8080/dspace/handle/123456789/38

demonstrate that open access publishing has the potential to transform scholarly communication over the long term and in fact represents an important bulwark within current attempts to enclose information as a commodity. The following chapter will discuss the challenges facing the open access movement in overcoming present barriers to the widespread uptake of open access publishing.

Fig 5



Chapter 5: Challenges facing the uptake of Open access journals

Considerable attention has so far been focused on the problems surrounding the current model of scholarly publishing. The open access model has been presented as a panacea to maximise the accessibility and impact of published information while providing a better return on public funding. Despite its laudable aims and promising outcomes, it is apparent that open access publishing (via the gold road of open access journals or the green road of self-archiving articles in open archives) will have to overcome skepticism and resistance from several quarters if it is to gain widespread acceptance. Since open access is disruptive of established practices that have been in place for many generations, it is natural that opposing opinions and arguments have been raised by publishers, academics, research managers, and even librarians. Some of the "risk factors" associated with open access journals are the author-pays business model, the quality and impact of these new journals, and preservation of their content. This chapter will address these issues in order to assess their validity and whether they present insuperable obstacles in a transition towards open access.

5.1 The question of economic efficiency

An investigation into the feasibility of open access journals would suggest their evaluation against an existing standard, namely traditional subscription journals. Prior to examining questions related to the economic viability of open access journals, a cursory overview of the economics of the present system reveals the inefficient use of public funds:

- Publicly-funded higher education institutions provide the infrastructure (salaries, equipment, laboratories, libraries) required to support research activity.

- The output of this expensive research process appears as formal publications in scholarly journals. In some cases, authors are required to pay page costs that can amount to $3,000 per article (Science and Technology Committee, 2004b:online). The publishers also require authors to sign over their copyright in return for dissemination of their work. This automatically introduces an exclusive monopoly on the content.

- Without financial reward, academics provide the expert peer review of articles submitted to the journals. This single activity is the linchpin on which the journal system rests; the scholarly ethos requires scrupulous external evaluation of reported findings. However, this voluntary activity also contains associated opportunity costs, ie, the loss of other productive work that might have been performed during the time given to the peer review activity.

- In South Africa, the Department of Education uses public funds to pay subsidies for publications in accredited journals to the author's host institution, in recognition of institutional support costs (Ministry of Education, 2003b).

- University libraries pay again for the right to access the research articles that were provided freely to the publisher. Access to this publicly-funded information is thus controlled for the most part by private enterprise.

- The result is that information and knowledge diffusion is limited to those institutions that can afford to pay, resulting in a poor return on public investment.

Understanding the market is an important basis for economic analysis. A recent economic study that compares the "author pays" and the "reader pays" models provides a useful explication. The report identifies two discrete markets within academic journal publishing: the academic market (those who write and read articles) and the commercial market (publishers that supply a product to a paying customer, predominantly libraries) (Wellcome Trust, 2004:6-7). The report finds that the criteria that would normally serve to regulate supply and demand between these two markets are incompatible. Within the academic market, the most important criterion is the impact value of published research findings that might unlock funding for further research. The commercial market (publishers and libraries) makes possible the dissemination of this output. The problem is that the criteria which drives the commercial market is price and profit and the pursuit of these concerns makes it unlikely that commercial publishers will be able to provide optimal dissemination of the output from the academic market.

The main issues relating to the economics of open access journals are presented below.

5.1.2 The rationale for author fees

Economic efficiency is achieved more effectively where the user of a product or service is the one who pays for that product or service (Wellcome Trust, 2004:18). In the toll access journal system, the library pays for the products and services, trying to meet the information needs of a wide range of users, who are not themselves responsible for meeting overall costs, ie, paying for the product and service. Shielded from the direct costs, faculty members insist upon having access to the leading journals in their field, which quite frequently are the most prestigious or expensive. In this way, libraries are unable to exercise their market power in containing publisher prices; the decision to purchase lies with academics (Science and Technology Committee, 2004a and 2004c:online).

Faculty members are simultaneously authors and readers. As authors, they require the services of a publisher to administer the peer review of their work and to disseminate their articles. In this way, authors may also be viewed as the users and beneficiaries of a service.

> Article processing fees are based on the premise that authors and their host institutions are the most direct beneficiaries of publication in a scholarly journals … Article processing charges thus distribute a journal's publication costs across those individuals and institutions that benefit most directly from a paper's publication (Open Society Institute, 2003:17).

Since it is the process of publishing the research that incurs most costs, with Internet distribution being very cheap in comparison, author charges are the most logical way to fund the publication process. The economics of open access focuses on costs at the production end of the publication cycle to free up costs on the distribution end so that journals are free for all readers (Morrison, 2005:online).

> The current situation, in which small universities effectively subsidise the cost of publishing the research carried out at relatively wealthy research centres, is far more inequitable and unsustainable (BioMed Central, 2004:online).

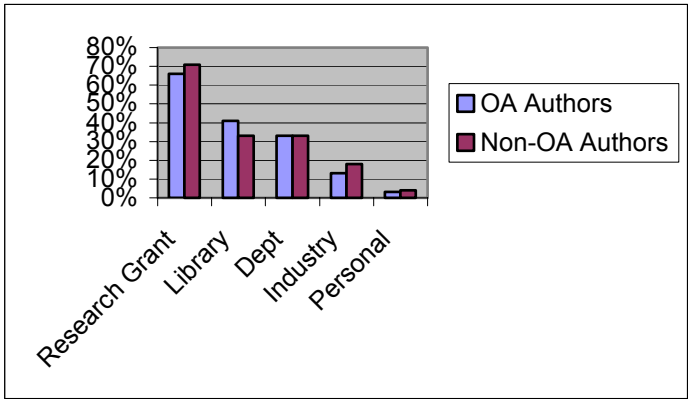
5.1.3 How will author fees be paid?

The main source for author fees is likely to be the research grant provided to scholars. It is anticipated that publication costs would be budgeted for as part of the

research proposal. While this would seem to reduce the overall pool of funds available (King and Tenopir, 2004:online), funding agencies would benefit from wider use of the research they fund (Friend, 2004:19; BioMed Central, 2004:online). An important question to consider is how scholars in less well-funded disciplines, or younger un-established researchers would pay for article charges. Firstly, many open access journals in the humanities and social sciences charge no processing fees at all (Suber, 2003b:online; Open Society Institute, 2003:15). A cross-disciplinary survey of 245 open access journals found that less than half of them charged fees to authors (Kaufman, 2004:online). Secondly, one of the outcomes of a widespread swing towards open access journals would be considerable savings from the demise of subscriptions. It is likely that libraries would administer a pool of funding available for institutional members who wish to publish their original work.

A survey of authors (Swan and Brown, 2004b:47) asked respondents who should be liable for author fees. The authors were selected from two camps: those that had chosen open access journals to publish their articles, and those that had not. The table below (**Fig 6)** shows that both groups concurred in their views of which agencies should bear the cost.

Figure 6: Where authors think Open access publication fees should come from (Swan and Brown, 2004b: 47)



The idea of libraries subsidising author fees is already operational in the case of BioMed Central. BioMed Central[46] is a commercial open access publisher producing 130 open access journals in the medical and allied health disciplines. In place of a standard article fee of $525 for publishing in any of these journals, BioMed Central offers institutional memberships at varying annual rates that are related to size of

[46] http://www.biomedcentral.com

the institution. Article charges for publishing in any BioMed Central journal are then waived for any author affiliated with a member institution. At present, 544 institutions across 35 countries have become members. In this case it would appear that membership fees (in lieu of individual article charges) are simply subscription fees in a different guise. Several points need to be considered to counter such a charge. Firstly, under open access, one author pays once so that everyone else may access the article freely. Secondly, unlike subscription-based journals that exclude readers that cannot pay, open access publishers waive charges for authors that are unable to pay. Thirdly, where article charges represent the main stream of income for publishers, it is important to recognise that these publishers will need to compete amongst themselves for authors' fees, thus creating a market brake on the level of article fees that each journal might charge. This is in sharp contrast to the uncontained escalation of subscription rates. Waltham (2005:28) writes:

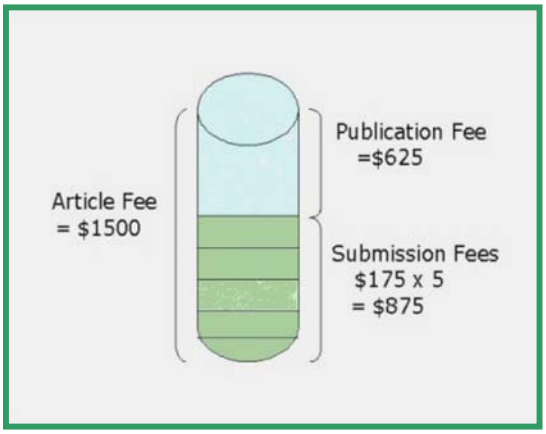
> A competitive market is emerging in the level of producer pays fees that publishers are charging authors. This is not a weakness within any market since value will be determined over time by the customer base, which in this OA model will be authors.

One can discern that author charges might act as a disincentive to authors, thereby affecting supply of articles. The upside mentioned above is that authors would be able to shop around for cheaper publication charges amongst competing open access journals that are reliant upon the author revenue (Wellcome Trust, 2004:19). This places academics back in control of the supply and demand tension.

One way of offsetting article fees could be via the mechanism of submission fees. Under the open access system of author charges, it is possible that prospective authors would pay an initial nominal *submission fee* to cover the costs of administering peer review. This submission fee would also serve to raise the general quality of submitted manuscripts. Authors of accepted articles would then be liable for a larger *publication fee* to cover production costs (Wellcome Trust, 2004:16; Science and Technology Committe, 2004b:online). Traditionally, a higher rejection rate (eg, the 90% rejection rate of *Nature*) signifies a high quality or prestigious title, which comes with an expensive price tag as it is subscribers that bear the cost for the editorial exclusivity of the journal. Under the open access system, this cost of exclusivity is spread amongst the submitting authors. Ironically, publication fees would be lower where there is a high level of rejection as they would be cross-subsidised by the increased number of submission fees. **Figure 7** illustrates this

principle. Where there is a 80% rejection rate, individual article charges that might have been set at $1500 are correspondingly reduced to $625 through the payment of 5 sets of submission fees of $175.

Fig. 7: Increased number of submission fees lowers the overall publication fee per article



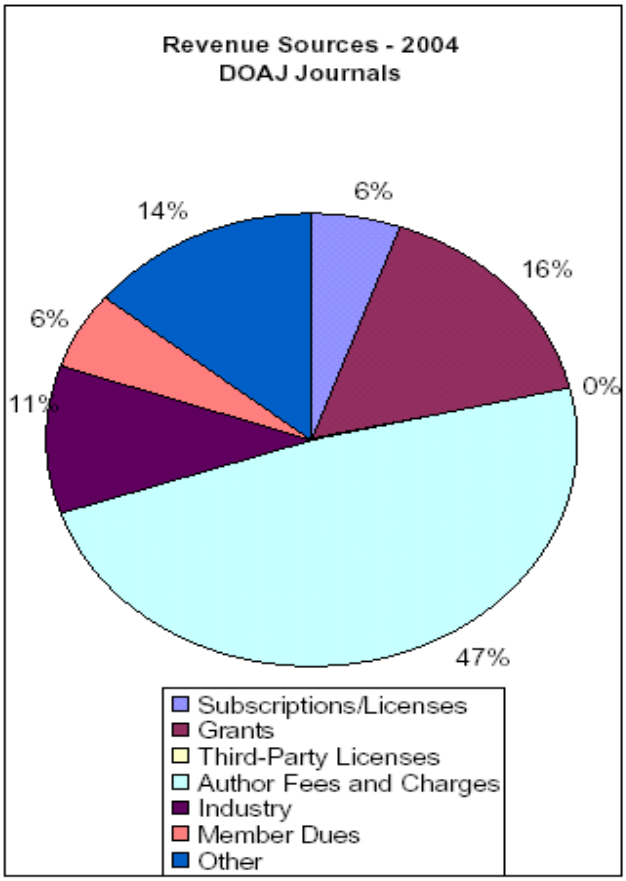
5.1.4 Are open access journals sustainable?

A consultant to the Joint Information Systems Committee (JISC) comments that one of the benefits of author charges is that journal publishers would experience a more secure income stream from up-front article fees (Friend, 2004:19). A survey conducted by the Association of Learned and Professional Society Publishers (Kaufman, 2004:online) asked open access publishers to indicate the distribution of the sources of income that make up their total revenue. Responding publishers of 245 open access journals provided data that is summarised in the pie chart overleaf at **Fig. 8**.

It is immediately apparent that author charges alone are not sufficient to cover operating costs and that the responding open access publishers rely on several sources of income. Publishers variously indicated that their projects are supported by means of grants (16% of total) and from revenue from industry, presumably sponsorships or for display advertisements (11% of total). Several foundations, for example, the Open Society Institute and the Wellcome Trust, and JISC (Science and Technology Committee, 2004c:online) have provided substantial grants to assist with

journal start-up costs[47]. Will these journals manage to establish themselves securely so that they can survive after the seed money is used? As these are new ventures it is difficult to predict their fortunes. King and Tenopir (2004:online) report that a new journal takes about six years to break even, and often requires substantial capital to keep up with advanced features such as linking citations and maintaining access to older articles.

Fig. 8: Revenue sources as percentage of total (reproduced from Kaufman, 2004:16)



The open access publishers were also asked to report on their financial performance over the previous year. Only 5% had achieved a surplus, 32% managed to break even, while 63% experienced a shortfall. While this does not present an optimistic outlook, the publishers also reported on their revenue expectations for the year: 3% answered that their performance had exceeded their expectation, 87% had met their

[47] The Open Society Institute has published details of its grants to open access journals at http://www.soros.org/openaccess/grants-journals.shtml

revenue expectations and 10% found that their revenue was below their expectations. In other words, they are realistic and experienced enough to understand the logistics of launching journals under a new business model.

Notwithstanding these initial lacklustre performances, several publishers of traditional subscription journals are experimenting with the author pays business model. In August 2003, Oxford University Press announced that, on a trial basis, it would adopt an author-funded publishing model for one of its premier journals, *Nucleic Acids Research* (voted as one of the ten most important journals in biology and biochemistry by Thomson ISI). The original press statement (Oxford University Press, 2003) anticipated that the journal would be fully converted to open access within 5 years. However, by June 2004, the publisher reported that *Nucleic Acids Research* (NAR) would be converted to a mandated Open access journal from January 2005. The Managing Director of Oxford Journals commented as follows in a press release (Oxford University Press, 2004):

> Our year-long experiments with a small part of *NAR* have allowed us to consult authors, readers, and librarians on their views and also to monitor results. So our decision to take *NAR* to a full Open Access model is based on solid research, and a clear desire for such a move by this part of the academic community.
>
> The OA model being adopted for *NAR* has been designed to address various concerns raised in the OA debate thus far, as well as to safeguard the quality and financial viability of the journal. The model, which includes a mixture of author charges, institutional memberships and print subscriptions, as well as significantly lower (or no) charges for authors in developing countries, will mean that no author is prevented from publishing in *NAR* for financial reasons.

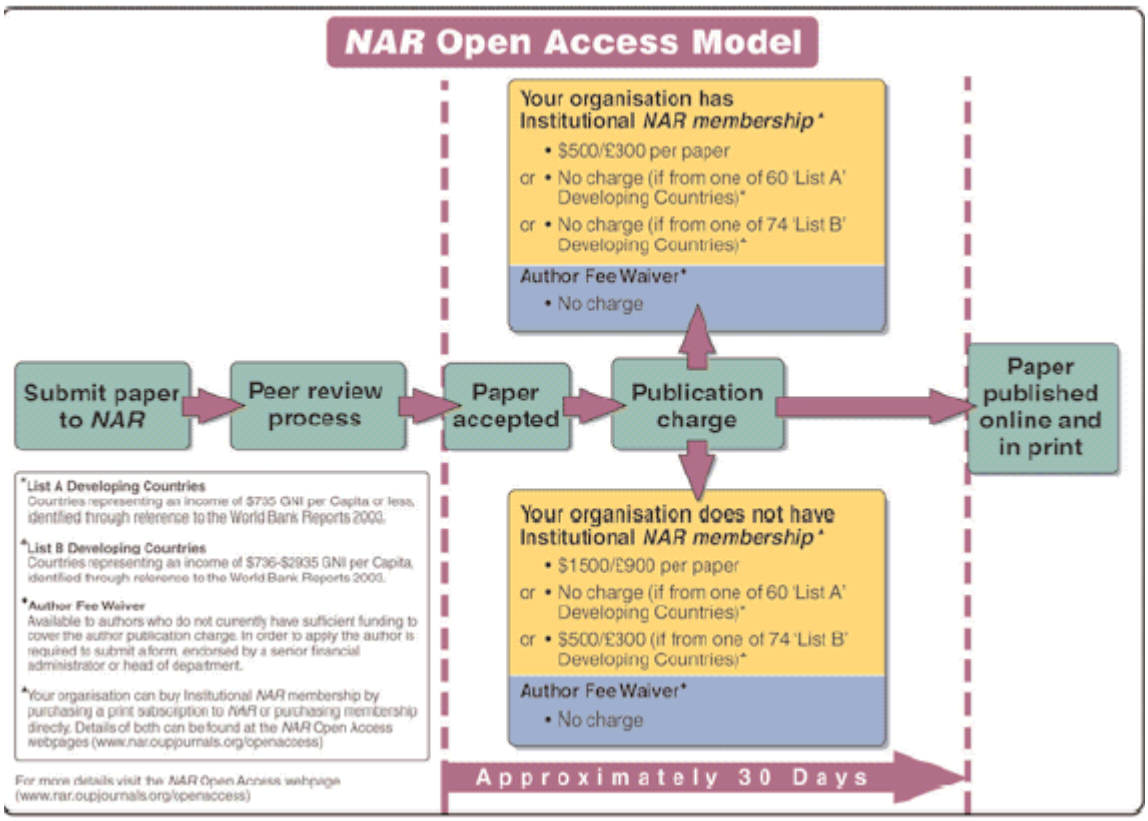
The chart at **Fig. 9** overleaf, reproduced from the OUP press statement, illustrates the options available for covering publishing costs[48].

Blackwell Publishing (750 journals) and Springer Online (1,369 journals) now also offer authors the option of paying article charges to make their articles open access within the regular issue. Readers that receive table of contents alerts would be able to access those articles immediately, even if they were not licensed to read other

[48] To overcome the strain of reading the small print in sections of the diagram, readers are referred to the original document which is available at http://www3.oup.co.uk/jnls/list/nar/narpressjun04.pdf

articles within the same issue. This hybrid model has become known as Authors' Choice.

Fig. 9 Oxford University Press system of author charges (OUP, 2004)



Nucleic Acids Research has the comparative advantage of belonging to a famous publishing house, has already been published for 32 years, and has a prestigious reputation and an established readership. For newer journals, the Open Society Institute has published a *Guide to Business Planning for Launching a New Open Access Journal* that presents a number of business funding approaches. It provides in-depth guidance to the use of supplementary funding mechanisms including "affinity relationships" (advertising, industry sponsorships, co-hosting conferences), value-added fee-based services (alert services, news articles, editorials, site customisation), grants, gifts and fundraising, and partnerships (between a learned society and an academic institution, for example) (Open Society Institute, 2003:15-35).

5.1.5 The position of not-for-profit publishers

These business guidelines would also be applicable to learned society and other non-profit publishers that consider converting their journals to become open access. This constituency has been identified as being at risk under an open access regime (Swan and Brown, 2004b:61; Science & Technology Committee, 2004b:online). Waltham's study of the business and pricing models of nine learned society publishers reveals that this sector is already experiencing subscription loss from institutions (2005:49). While individual society members represented 63% of the total number of subscriptions for this sample, their collective dues represented only 2% of total subscription revenue in 2004 (2005:8). It is understood that society membership dues have traditionally provided a free (or discounted) subscription to the society journal, while library subscriptions have supported the society's publishing costs. Learned societies also derive income from licensing their content to publishers of aggregated databases, eg, Ebsco. Willinsky has pointed out that this practice already makes individual memberships and institutional subscriptions to the society redundant as many libraries are obtaining this content from the aggregated database (2003:online).

Waltham reports that these not-for-profit publishers' experiments with author's choice (ie, author opts to pay article charges to make his/her article open access) have not demonstrated a strong "pull" from the author community, despite increased financial support from funding agencies (2005:4). Furthermore, learned societies are not able to lower author fees to compete with commercial publishers (2005:49).

In exhorting societies to view open access publishing as a means of fulfilling their mission to advance knowledge within the academic fields they represent and to further the professional well-being of their members, Willinsky (2003:online) recommends several measures to contain publishing costs under an open access business model. One of the main ways of doing this is to make use of available open source journal management software.

A widely used example is Open Journal Systems[49]. This initiative is based at the University of British Columbia and aims to assist journals to become online (and open access) by providing a journal management system that requires little or no

[49] http://pkp.ubc.ca/ojs

technical expertise but produces a professional online product. Some of the features of Open Journal Systems are designed to ease the burden of the publication process. There are facilities for online submission of articles or reviews, online management for each stage of publishing that allows editors to track the editorial and review process, and automatic emails for notification and acknowledgement. The system also has an automated system for creating metadata records that conform to the Open Archives Initiative protocol. In this way, all published articles are harvestable by disciplinary archives. Open Journal Systems also supports the kind of value-added features of electronic journals, such as the facility for readers to sign up to receive email notification of the table of contents for each issue. Readers may also post comments to articles and join in discussions.

It should be noted again that many open access journals (particularly non-profit ones) do not charge article fees. One such society journal is described by Rehmann (2003:online). *Documenta Mathematica*[50], founded in 1996 by the German Mathematical Society is rigorously peer-reviewed, edited by an international editorial board and produces 30 extensive articles each year. The journal relies on purely electronic production methods. The technical work for the production of the publication is automated by a professional software package. Authors, editors and referees are not paid, as is the case for practically all journals in mathematics. All correspondence concerning the publication process including article reviewing is done by email. Scientific quality is maintained by choosing expert referees from anywhere in the world, based on their expertise and the subject of the article. The journal has a "no frills" approach but loads quickly, is easily navigable and all back issues are available.

Subscription-based society journals might also be considered to be at risk as a result of members self-archiving their articles in open archives. However, the free availability of articles does not automatically infer that society journals cannot continue their operations. This is borne out by an informal study conducted by Swan. Since scientists have been posting their pre- and post-prints on the physics ArXiv (see Chapter 4) for over a decade, Swan wanted to investigate whether physics journals had experienced any falling off of subscriptions, given that around a third of all physics research articles appear not only in journals but also in the ArXiv.

[50] http://www.math.uiuc.edu/documenta/Welcome-eng.html

She questioned two of the main learned society publishers in physics, the American Physical Society in the U.S. and the Institute of Physics Publishing Ltd in the U.K. In a posting to the SPARC Open access Forum (Swan, 2005:online), she reports that neither can identify any loss of subscriptions to the journals that they publish as a result of the same material appearing in Arxiv. Where subscription attrition is occuring, it is the same in areas that match the coverage of the ArXiv as it is across any other areas of physics that these societies publish in. These two learned societies reported that they did not experience ArXiv to be a threat to their business.

Notwithstanding this initial finding that is limited to one field, it is likely that not-for-profit publishers will need to find creative ways of maintaining their support base and diversifying their activities, in the same way that corporate publishers are beginning to re-evaluate their position in the light of the shifts occurring within the scholarly publishing paradigm. Waltham concludes:

> There is no universal answer to the issues faced in funding publication of the research literature but alternatives need to be explored collaboratively and based on sound information. Solutions are likely to emerge on a case by case, discipline by discipline and market by market basis (2005:50)

5.1.6 Do open access journals save money?

As is clear from the above, open access is not going to be free. Skeptics have claimed that Open access merely changes who pays and does not address the real problem of scholarly publishing: the exorbitant prices charged by publishers (Ewing, 2004:online; Stern, 2005:online). As Okerson (2005:22) points out, "Someone, somewhere, somehow will need to pay for the process of managing, reviewing, editing, producing, electronically distributing and hosting the journals or articles – as well as delivering numerous value-adding features." Even if authors self-archive their peer-reviewed articles in institutional repositories, the quality control processes will already have been conducted and paid for, whether by author charges or subscription fees.

Open access advocates focus on the overall systemic efficiency of freeing up published research for advancing knowledge, with consequent vital gains for teaching, learning, progress in science, and innovation. While no-one contests these outcomes for the public good, stakeholders within the publishing enterprise also pay

attention to the more narrowly focused view of how this vision will impact on their own organisations.

Specifically, it is clear that under open access, institutions with high levels of research publications will encounter costs to a similar level as they have paid for subscriptions and licence fees. As an example, Willinsky (2003:online) points to the famous 20-80 rule used by ISI to rationalise their selection of journals in the *Web of Science Citation Index*: ISI maintains that 20 % of the journals produce 80% of citations. Willinsky applies this equation to the scholarly output of universities, attributing 80% of the most heavily cited articles to roughly 20% of universities. It is this constituency of research-intensive institutions that are apprehensive of bearing the cost of author fees. David Stern, the Science Librarian at Yale University, made a comparison of the current institutional costs for Yale to subscribe to OUP's *Nucleic Acids Research (NAR)* ($2,855) against projected author fees, using figures based on the number of *NAR* articles published by Yale faculty each year. Even at the reduced article fee of $500 for institutional members (as per the OUP chart at **Fig. 9** above), Yale would be paying $11,000 each year in author charges (Stern, 2005:online). Ann Okerson, Associate University Librarian at Yale, has also made a rough study. Estimating (from ISI *Web of Science*) Yale faculty output at 4,000 STM articles in one year, multiplied by a conservative figure of $1,000 for each author fee, she arrives at a figure of $4 million in article charges. She reports that Yale had spent $3.6-4 million for STM journals in 2003 (Okerson 2005:24). In this type of research setting, open access journals do not represent a savings.

When transposed to the global setting however, there are overall savings of up to 40% (Suber, 2003a:online; Walport, 2004:14). Suber reports on a financial analysis of the business model of author charges conducted by Sami Kassab for B N Paribus, a professional firm of financial experts. The B N Paribus study is quoted as follows:

> Open-access could prove a more cost-effective scientific communication system for universities and research institutions. We estimate that the global scientific research community could save more than 40% in costs by switching entirely to an open-access model. We have reached this figure by comparing current annual spending on scientific journals at Cornell, Yale and Princeton universities with estimate spending under Open access. Assuming current published article numbers of 3,900, 3,600 and 2,500 respectively, we estimate the corresponding cost savings at 20%, 35% and 40% (Suber, 2003a:online).

From the developing country point of view, there would appear to be immense gains to be made from unprecedented access to the journal literature. It is worth noting that, as a result of projects such as HINARI, AGORA (See Chapter 3) and eIFL (Electronic Information For Libraries) which aim to facilitate affordable access to electronic scholarly resources by libraries within developing countries, these countries may already be experiencing significant increases in access. Okerson, who participates in many international forums, writes of her experience:

> Some of the users who participate in those projects have told me that this looks and feels exactly like Open Access and they have said: 'You rich westerners should go away and solve your rich people's problems. We are now starting, thanks to the publishers and the web, to get the access we need' (Okerson, 2005:23).

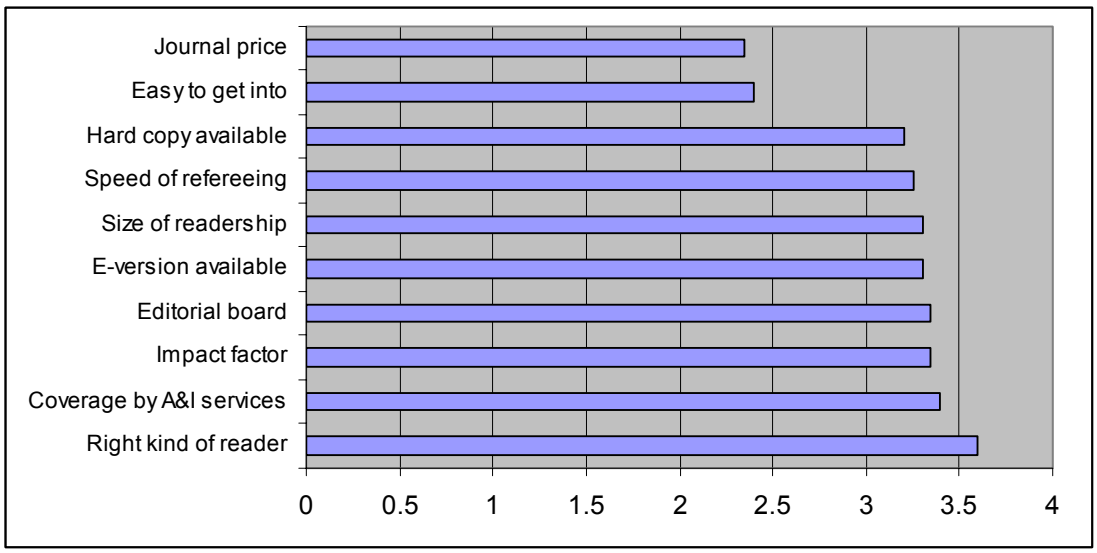
This comment might be translated more sanguinely as a statement that the matter of author charges is not one that can be entertained by institutions in poorer countries. It might also reflect the recognition that, within the existing academic reward system, economic returns to the top research institutions will not be disrupted by open access. Willinsky (2003:online) asserts that the prolific research institutions are the major beneficiaries of the academic knowledge economy with regard to grants, citations, salaries. While Stern (2005:online) appears to bridle at the idea of a few well-endowed institutions shouldering the costs for the rest of the world, it is those formerly excluded readers that will repay the favour through additional citations, the gold coin of scholarly research. The concluding finding of the Wellcome Trust report on the author pays model was that "[I]n terms of costs of production, system costs and the implications of those for levels of fee, the author-pays model is a viable option. Open access author-pays models appear to be less costly and to have the potential to serve the scientific community successfully." (Wellcome Trust, 2004: 22).

5.2 The quality and impact of open access journals

It is important to note that the aim is not to change the traditional standards used for evaluating the quality of scholarly publications, but to improve access to and the availability, distribution, visibility, usability and usefulness of the publications. New journals typically face a catch-22 challenge: to gain standing within a field, any new journal will need to publish high quality articles; in turn, submitting authors will want assurance about the reputation of the journal. Author surveys have been conducted

to establish which criteria are most important to researchers when they select a journal to publish their work. A survey of nearly 4,000 senior researchers from 97 countries produced the results charted at **Fig. 10** overleaf (Rowlands, Nicholas & Huntingdon, 2004:10-11).

Fig. 10: Factors influencing choice of where to publish
(Mean score (4=*very attractive*) n=3,787)
(Rowlands, Nicholas & Huntingdon, 2004:11)



It is significant that several of the top-ranking criteria are factors that will determine the size and character of the readership. Authors want to communicate with fellow researchers (in order to register priority of their findings) and they desire their work to be discoverable at all times, via the service of discipline-based abstracting and indexing services. These two criteria may be summarised as a desire for *visibility*, an essential property of open access journals that optimise readership.

Authors rated the perceived *quality* of the journal almost as highly as the readership, as measured by the criteria of the journal's impact factor and the reputation of the editorial board. These findings were confirmed by public evidence heard at the UK enquiry into scholarly publishing (Science & Technology Committee, 2004c:online). The motivation in this case may be two-fold: through the imprimatur of a high-quality journal, the likelihood of their article being cited by other scholars is increased; and their standing within an institutional setting is enhanced, increasing

their prospects for further research funding and for career advancement. In this way, association with a prestigious journal confers status on the author.

5.2.1 Journal impact as an index of quality

Citation is an established indicator of the usefulness of an academic article. Unless an article is cited negatively, it can be inferred that the cited article has quality. Where a journal is consistently able to attract high quality articles, this will generate a high impact figure for the journal. ISI bases its calculations of a journal's impact by dividing the number of citations to articles published within the two previous years by the total number of articles published in the same period.[51]. The Journal impact factor was first devised in the early 1960s by Eugene Garfield, then Chairman of ISI, as a means of assisting libraries to decide which journals to purchase and as a guide for authors when deciding where to publish. Garfield himself recognises that this constructive intent is open to abuse through the academic reward system (Garfield, 1999:979). The practice of evaluating an author's output by counting the impact factor of the journal (published in the annual ISI *Journal Citation Reports*), rather than an expert examination of the content of the actual article, is widespread but controversial (Seglen, 1997:online; Rey-Rocha, 2001; Lundberg, 2003:253-254). Seglen provides over 20 criticisms of ISI's *Journal Citation Reports*, mainly relating to biases or faults inherent to the calculations. He concludes that the increasing use of journal impact factors "is changing scientists' publication behaviour towards publishing in journals with maximum impact, often at the expense of specialist journals that might actually be more appropriate vehicles for the research in question" (Seglen, 1997:online). Because of the competitive funding environment, quality reviews such as the Research Assessment Exercise (RAE)[52], and the insecure contract arrangements for faculty within universities, as described in Chapter 2, researchers are increasingly driven to publish in prestigious journals. This practice heightens the rejection rate and drives up the cost of journals (Science & Technology Committee, 2004b and 2004c:online). From the open access perspective, this means that authors are less likely to publish in relatively new, unproven open access journals.

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[51] ISI Journal Citation Reports website http://jcrweb.com/www/help/hjcrgls2.htm

[52] In a recent announcement, Panel Chairs overseeing the forthcoming 2008 RAE announced that all types of research and journals would be treated equally across all subjects. The Chair of the biological sciences commented, " It is terribly important to break the link that publishing in a journal such as *Nature* is necessarily a measure of excellence." (Lipsett, A and Fazackerley, A (2005) "RAE shifts focus from prestige journals". *The Times Higher Education Supplement*, 22 July. This signal might begin to induce a culture shift amongst authors.

This was tested in the Swan and Brown survey of authors (2004b:34-36). When asked to rate their main concerns about publishing in open access journals, responses from both groups of authors reflect an overt concern with the official recognition and validation of publications in these journals, as expressed in terms of prospects for research funding, impact, promotion and career. Non-OA authors were also asked separately to rank the reasons that they had not chosen an open access journal. "The reason that scores highest (70%) was that authors were not familiar enough with OA journals in their field." (Swan and Brown, 2004a: 220). This shows that beyond a concern with the perceived quality of the journals, the journals are still relatively obscure.

This is not true of open access journals across the board. Some have begun counting *downloads* as an index of *usage* impact (Brody and Harnad, 2004:online). BioMed Central, the commercial publisher of over 130 open access journals, recently celebrated the 25 millionth download from its website since its launch in 2000. In the intervening five years, 15,491 articles have been submitted to its journals, of which 7,529 were published (ie, roughly a 50% rejection rate). Calculated on the basis of the 26,5 million downloads up to March 2005, BioMed Central finds that, averaging out these requests for texts of articles, each article has been downloaded more than 3,500 times. The report (BioMed Central, 2005: online) compares this with "published figures from a leading subscription based STM publisher that indicate that each article published in their journals was downloaded considerably less than 500 times (on average)."

Open access supporters claim that a larger reader group logically infers that the articles will be read more and consequently cited more often, providing greater impact for open access articles. While it is clear that open access journals have the potential to reach a much larger reader group, it does not immediately follow that the usage will increase or that readers will necessarily cite the articles. This is the position articulated by Pringle, Vice President of Thomson ISI, the publisher of the *Web of Science* citation indexes and the *Journal Citation Reports*. Thomson ISI conducted a small study of the nearly 200 open access journals that are indexed in the *Web of Science,* currently covering roughly 8,600 journals. In summary, the results showed that the open access journals can have similar impact to other journals and that authors should not be apprehensive of publishing in these journals.

Nevertheless, beyond an indication that these journals tend to accumulate citations slightly faster than other journals, no other observable difference in the number of citations could be accorded to these journals when compared with similar journals within the same disciplinary category (Pringle, 2004:online).

This finding is critiqued by Brody et al (2005:online). They contend that Thomson ISI's study studied only the impact factor of the *journal*, rather than the individual *article* citation counts. They are currently engaged in a substantial study that tests the open access citation advantage across all disciplines using a 10-year ISI sample of 14 million articles. "We are comparing the matched citation counts of OA versus TA (Toll Access) articles by trawling the web to find which of the 14 million articles within the same journal and year are or are not OA." In effect, they are examining the effect that open access self-archiving by authors has upon the citation performance. By comparing the citation history of open access and toll access articles from the same journal, they expect to show that self-archiving dramatically increases the citation impact over articles that have not been archived in an OAI archive. The tests are nearly complete; preliminary un-refereed results may be viewed in dynamic graphs indicating the citation advantage for the 143 sub-fields that have been calculated thus far[53]. In all but 25 sub-fields, the open access subset of the 14 million ISI articles generated a citation advantage over the subset that are not open access. While the results are as yet unevaluated, they reveal dramatic enhancement of citation. The table below uses the data presented for the parent disciplines of the 143 sub-fields. The second and third columns indicate the ratio of open access articles to toll access articles within the 14 million articles extracted from ISI from 1992 to 2001. The fourth and fifth columns indicate the higher rate of citation of the open access articles, as indexed by ISI.

Fig. 11 comparing the citation history of OA and TA (Toll Access) articles (Brody, et al, 2005)

Discipline	% OA articles vs TA articles		% OA citation advantage	
Biology	< 1%	4,117 / 640,100	49%	8.11 / 5.13
Biomedical Research	< 1%	8,106 / 1,345,207	218%	34.07 / 13.47
Chemistry	< 1%	2,506 / 1,039,817	136%	16.16 / 6.44
Clinical Medicine	< 1%	2,914 / 3,413,447	193%	25.69 / 7.19
Earth & Space	5,8%	24,668 / 372,413	217%	22.3 / 7.77
Engineering & Technology	< 1%	2,649 / 643,314	47%	4.06 / 2.95

[53] http://citebase.eprints.org/isi_study/

Mathematics	4,3%	6,656 / 135,012	46%	4.7 / 2.76
Physics	10,1 %	106,040 / 930,059	134%	13.95 / 6.16
Psychology	2,1%	1,120 / 49,865	84%	9.24 / 5.81
Administration & Management	< 1%	286 / 68,070	243%	4.54 / 1.04
Anthropology & Sociology	< 1%	238 / 65,496	852%	5.32 / 0.55
Communication	< 1%	39 / 14,334	136%	2.78 / 1.24
Economics	< 1%	365 / 49,027	391%	6.4 / 1.41
Education	< 1%	101 / 42250	291%	3.66 / 0.81

The Brody study is qualitatively different from the Thomson ISI one in that it does not address the intrinsic quality or impact of existing Open access journals, but rather tests the hypothesis that making articles open access (through self-archiving) will produce higher citations and usage.

While the Brody study is an important signpost pointing to the veracity of one of the major advantages of open access (greater impact), it falls to the open access journals themselves to prove their quality in order to establish themselves within the hierarchy of existing publication channels. This will require rigorous application of quality control mechanisms. These may include providing explicit information regarding evaluation of articles and striving to attract established researchers to serve on their editorial boards. It will also require journal promotion: working with widely used abstracting and indexing services to enhance retrieval and visibility; and providing the DOAJ with OAI metadata to enable article-level searching and their discovery by OAI harvesters.

These efforts will need to be sustained as there is a natural delay before articles are cited (ie, between the time that the original article is published, read, cited and the delay until the citing article is itself published). Despite their shortcomings, metrics such as the ISI products are likely to remain the 'industry standard'. Cockerill, an executive director with BioMed Central, has called for Thomson ISI to employ a more impartial policy with regard to which journals it tracks. Specifically this would mean that any peer-reviewed journal that meets basic quality standards and which can provide reference list data in an appropriate form to allow automated analysis should be automatically tracked for citations (Cockerill, 2004:95). This would provide an avenue for scholars to judge the citation performance (ie, impact factor) of open access journals. It is noted that Citebase (see p. 64 above) already provides citation tracking data for these journals.

5.3 Preservation

The problem of securing future access to digital material is a universal concern affecting all electronic output. An increasing amount of scientific information is being recorded digitally, both the text of research articles as well as the data underlying the research (Houghton et al, 2003:41-43; Arms, 1999:online). There is widespread concern that vast amounts of electronic information are not secure for future access (Hey and Trefethen, 2003:13-14; Science & Technology Committee, 2004c:online; Oltmans and van Wijgaarden, 2004:21). The CEO of the British Library testified to the Scientific Publications Committee:

> One inhibitor to moving faster on the all-digital front is the lack at the present time of a secure, long-term preservation of access infrastructure to give that reassurance to libraries and indeed publishers and science, that that record of science will be kept in perpetuity, and providing access to it (Science & Technology Committee, 2004c:online).

This requires both policy and financial commitment from inter-governmental agencies. Relatively few countries have passed legislation for legal deposit of digital materials. Where these exist, publishers may contribute on a voluntary basis (Ayre and Muir, 2004:online). The British Library is working with the Library of Congress and European national libraries to preserve digital research materials for access beyond a few hundred years (Science & Technology Committee, 2004c:online). The long-term storage costs are still unknown, require robust networks that can withstand hacking, as well as plans for disaster recovery. While a print document can be read after several hundred years, scientists are already finding it difficult, after just ten years, to support backup for software used to store data (Science & Technology Committee, 2004d:online).

Archiving of electronic materials is understood as both preservation of content and of providing perpetual access to that content. The problems of digital preservation are technical, legal and organisational (Arms, 1999:online). Organisational questions relate to who is responsible for ensuring long-term access. Previously, within the print domain, libraries were entrusted with the preservation of the scholarly record. Since they now do not physically own the content, but lease it electronically, their continued access to the material (within some indefinite future timescale) is insecure (see p.38-39 above). The following issues represent libraries' concerns: access to

publisher back files; access to materials after a subscription is cancelled; availability of content if publishers merge or cease operations (Ayre & Muir, 2004:online; Mischo, 1998:5-6). Libraries have to rely on publisher licence clauses that undertake to provide perpetual access and are cautious about making their own arrangements as these would likely exceed the terms of their legal contract with the publisher.

The legal problem concerns the digital rights embodied within recent legislation that is restrictive with regard to storage and copying of electronic content. A two-year Copyright and Licensing for Digital Preservation (CLDP) project investigated whether the provisions of copyright legislation and licensed access to digital content affect the ability of libraries to provide long-term access to that content. Reporting on the project, Ayre & Muir report that each of the several available preservation processes involve some degree of copying of material that is not allowed by law.

> It would seem that none of the (25) countries whose copyright laws were surveyed currently allow libraries to undertake all the copying that will be necessary for them to preserve their digital collections. Existing preservation exceptions have limited value because they do not permit any action to be taken until publications are already obsolete (Ayre & Muir,2004:online)

It is only through a formal partnership of the publisher with a third party that a separate archive could be maintained, with agreements about preservation that could not be waived in the event of the publisher merging or being taken over by another company. While Elsevier has entered into such an agreement with the Koninklijke Bibliotheek (Adams, 2004:online), most publishers of subscription journals maintain their own backup systems.

Publishers of online content are faced with the expense of providing persistent access. The rapid advance of technology poses an ongoing challenge for publishers to update and incorporate the latest technology within their online platforms. Within the House of Commons enquiry into scientific publication, the President of Blackwell Publishing frankly admitted that the costs of this are transferred to the subscribers. He made the point in order to question the feasibility of open access publishers meeting these technology costs from author fees.

> The concern over … Open access or the PAYS model is that if you need to shift your technology, as happens regularly, who pays? Does the new crop of authors that year pay for the huge investment in changing

> your background to suit modern technology? (Science & Technology Committee, 2004a:online).

The process of "refreshing" or migrating archived material occurs when old hardware or software is replaced and the material is transferred to the new equipment, software packages (operating systems and databases) are upgraded and tests run to ensure that new systems work with the old data (Arms, 1999:online). In 2001, Stanford University Library developed an innovative solution to ensure that remotely supplied digital journals are kept "refreshed" and intact over a period of time. Their programme, known as LOCKSS (Lots Of Copies Keeps Stuff Safe) [online] has been widely adopted by participating libraries and publishers.

The LOCKSS principle operates as follows: a) a copy of all digital journals the library has paid for is cached on a local proxy server and b) a network of collaborating library proxy servers performs constant audits of the stored content to ensure that faulty or missing files are repaired or supplied. Under the LOCKSS system, publishers grant a licence to subscribing libraries to allow the journal website to be crawled for content so that it may be stored on a local proxy LOCKSS server. The servers of libraries that have common subscriptions then constantly relay and compare the files they store, automatically repairing or replacing damaged files. This provides a constant local cache that can supply content should the publisher server fail for any reason. The LOCKSS servers store the files in the format in which they were created. Should that format become obsolete, the server will transparently convert the file into one the reader's browser can understand. In 2005 the LOCKSS programme has over 60 participating publishers and 80 libraries from 4 continents, including Stellenbosch and Rhodes University libraries. One third of participating publishers are open access.

The principle of using multiple copies as a tool for preservation fits comfortably with the principles of open access. The Chairman of BioMed Central points to the fact that usage preserves files and data, and conversely, non-usage loses data. He maintains "as long as data is available and used and appears in many places, it tends to be preserved. Formats change and users adapt and change their format. Usage is the key to preservation of data and open access encourages and preserves usage" (Science & Technology Committee, 2004b:online).

Open access journals that expose their articles' metadata for harvesting by OAI compliant archives also help to create multiple sites of storage. Disciplinary archives such as Arxiv make use of mirror sites across the globe. Suber (Awre, 2004:online) has advocated that open access journals should deposit their content in OAI-compliant repositories, thereby facilitating both retrieval and preservation. Guédon (2004:online) comments: "one of the more frustrating dimensions of the LOCKSS project has been the digital rights management issue. With open access journals, this issue is simplified to a very large extent. This tends to show that open access digital documents, because they can be preserved in easier, and/or more robust fashion than toll-gated documents, will tend to survive more as time goes on."

The lesson to be drawn from each of the options mentioned, is that open access publishers need to enter into partnerships with other agencies for adequate archiving. Arms draws attention to the need for organisational stability in determining the long-term security of the archived material. While by no means characterising all open access journals, a fair number are produced by enthusiasts with a high level of voluntary assistance. The prognosis for the survival of such projects is far from certain. He identifies two main phases: "a period of active management by the publisher followed by preservation independent of the original publisher" (1999:online) It is necessary for publishers of journals to develop strategies for the subsequent preservation of the material while the project is still active. He cites national libraries, scholarly societies or major academic libraries as natural candidates. To this could be added further additions such as LOCKSS or OA repositories.

5.4 Conclusion

This chapter has interrogated some of the arguments used against open access. The movement towards open access threatens a substantial restructuring of the market and its organisational frame (authors, publishers, libraries). While it would appear as though the model of author charges penalises research-intensive institutions (ie, those with a high publication rate), it does not interfere with the rewards of publication (further research grants, status), restores a more efficient supply and demand market tension, and secures the systemic and strategic advantage of unfettered access to the journal literature. The question of impact and quality has been seen to be largely a factor of the relatively new status of the journals that will require time and further sampling by a larger set of scholars until they become

more widely known and accepted. Each journal is unique and is published under different codes of practice that will determine their success or failure. Those that manage to attract well-known authors will gain impact rapidly. Continuing studies, such as that of Brody et al, will be useful in providing further substance to the claim that increasing access leads to greater impact. With regard to preservation of open access content, it has been shown that the relaxed freedom to copy, download, and store open access materials invites their ready availability in multiple sites over the long term. At root, the principle of the successful LOCKSS programme is an attempt to approach the security offered by the widespread availability of open access articles.

The following chapter will outline the objectives and methodology of the survey that was used to measure local opinion on some of the issues discussed here. The findings of the survey will also be presented and discussed.

Chapter 6: The Survey

The foregoing chapters have prepared the way for the empirical investigation to determine the likelihood of the uptake of open access journals in South Africa. The thesis has explored the social and economic environment within which researchers and scholars are working, the causes for the increasing dissatisfaction with the present mode of scholarly publishing, the alternative vision presented by open access together with a rationale for its providing a better return on public investment. The challenges associated with open access journals have been presented and it has been shown that where uncertainty remains, this is a factor of the newness of open access journals as a publishing platform.

6.1 Methodology

6.1.1 The survey respondents

The research question upon which this thesis is based can only be answered by means of interaction with various stakeholder groups within South Africa. These have been identified as scholars and researchers, research managers within higher education institutions, research councils that lead the way in innovative research methods, research funders, and official bodies charged with the responsibility of creating and implementing policies that determine how research is evaluated.

Biomedical authors

Academics and scientists are the prime change agents who will, through their reading and publishing behaviour, determine whether open access journals become widely accepted as a platform for publication. It is understood that, in order for libraries to obtain relief from escalating journal costs, there will need to be a significant swing towards open access as the predominant model, with a corresponding decline in the subscription or licensing model. At present, several large commercial publishers, including Oxford University Press, Springer and Blackwells are in an experimental phase, testing open access by means of hybrid journals that offer authors the option of paying article charges to make articles free to readers or by converting single titles to an author pays model. It is the authors' responses to these initial offerings that will create the condition for a subsequent 'tipping point' where the subscription model becomes the exception rather than the norm. Authors therefore form an important constituency in the transition towards open access. Their opinions and perceptions were canvassed via a questionnaire that explores their experiences as both readers and authors of peer reviewed

literature (see **Appendix 1**). For the purposes of this survey the sample of authors was limited to biomedical fields. This delimitation was chosen for three reasons. Firstly, biomedicine is one of the more richly endowed research areas, possibly because it represents one of the strategic frontiers of science within national systems of innovation. Since biomedicine tends to be well-funded, it is a field that is more easily able to accommodate the imposition of author fees. At this exploratory stage, it was considered more important to ascertain the response of authors towards the idea of author fees, rather than to probe their affordability. Secondly, BioMed Central already fields a portfolio of 130 reputable open access journals that span the breadth of biomedical specialties. It is likely that most of the authors selected for the sample are already familiar with several of these titles and therefore in a position to compare these with traditional subscription journals. Lastly, PubMed Central, the open archive of online biomedical articles hosted by the U.S. National Library of Medicine, is a well-known source of freely available peer-reviewed articles (Caelleigh, 2000:4). PubMed Central is valued as a strong example of a rich and well-functioning open archive. Journal publishers release their articles to PubMed Central within a period of 6-24 months after publication. Open Access journals deposit all articles at the point where decisions are made to publish them. Researchers in developing countries use this facility to access articles that their libraries cannot afford. In short, this field was chosen as it is one of the early adopters of open access publishing and is one of the critical research areas for developing countries, offering much scope for the promise of open access to advance science.

The ISI *Web of Science* was used as a tool for harvesting email addresses of South African biomedical authors. It was important to capture authors from all specialty areas. A list of all such areas was borrowed from a recent study of the performance of biomedical journals across a range of publishers (White & Creaser, 2004:80) *Web of Science* provides the search facility to limit to authors from a specific country. The searches were also limited to a time frame between January 2004 to June 2005. This was done in order to minimise the possibility of outdated email addresses which would automatically diminish the size of the sample. As it is accepted that postal or email surveys typically provide only a 30% response rate, it was important to obtain a reasonably large sample. A total of 500 email addresses was obtained in the hope of receiving at least 150 responses.

Research managers

Although it is authors who will provide the momentum for overall change, they are unlikely to act in sufficiently large numbers without other corresponding changes within the academic reward system. While authors give away their research articles without expectation of payment or royalties, their publication record is used as a measure of their achievement when they are evaluated for research grants, appointments or promotion. In other words, their published output offers scope for deferred rewards in terms of their careers. As has been described in Chapter 5, the impact factor of a journal is widely used as a ready indicator of the weight of a researcher's standing within his or her specialty (D'Haeze, 2005:online).

Without some adjustment of the criteria used to evaluate researchers, it is unlikely that there will be any change in the status quo. While open access does not seek to change the system of quality control, it has been seen that the relatively immature open access journals have not yet garnered impact within all fields. It is important to know how research managers and official agencies are responding to the open access movement. If they should seek to endorse or promote open access within the research community this will enhance opportunities for it to flourish. Various levels of endorsement are possible. A low level of endorsement might be the simple promotion of awareness of open access as a publishing alternative. Accreditation or recognition of open access journals would represent a mid-level endorsement, while mandating that publicly funded research be made open access would serve as a strong incentive to researchers.

Because research is one of the core functions of a university, each institution fields a research office managed by a Dean of Research or that operates under the stewardship of a deputy Vice-Chancellor responsible for academic affairs. The institutional research office works in committee with selected senior academics who represent individual faculty interests. Beyond the publish or perish impetus that is present within all disciplines, the new funding framework introduced by the Department of Education has created additional pressure to produce publications as one of the two main avenues for attracting subsidy (Ministry of Education, 2003a:7-8). The imperative to produce research outputs may prove to stimulate fresh thinking about ways to advance scholarship in all departments. In this way, research managers might be open to new ideas, including the movement towards open access publication. The questionnaire aims to discover their knowledge of open access

journals and open archives and whether the universities are developing policies or strategies that incorporate open access. The questionnaire was sent to 22 of the 23 public universities[54] and appears at **Appendix 2**.

Government departments and science councils

Since it is government departments that are driving the new funding policy, they are the key opinion leaders. The Department of Science & Technology (DST) and the Department of Education (DoE) were specifically targeted for the survey. The National Research Foundation (NRF) was also included as it is the largest public funder of research. Its statutory advisory body, the National Advisory Council on Innovation (NACI), has the function of evaluating the efficiency of the research system and strategising ways of increasing technology transfer for optimum national socio-economic development. It too was canvassed. Although the 12 science councils are not policy makers, their status as dedicated research agencies sets them apart from university-based scholars who have teaching and supervision functions. These premier research bodies hold status as innovative exemplars and are influential research leaders. For this reason they were incorporated within the questionnaire aimed at government departments. They have the power to determine protocols for their own research output and for the work they commission.

Although not mentioned within the questionnaire, the Human Sciences Research Council has a well-established publishing department that already practices an open access philosophy. All HSRC books and reports are freely available from its website while printed copies are sold. Eve Gray, the publishing consultant hired to reorganise the publishing arm of the HSRC has described how the organisation came to be persuaded that open access represents both a logical and economically sound model (Gray, 2004:online). To what extent this example is being followed by the other science councils will emerge from the survey. After studying the missions and programmes of each of the science councils, 8 were selected for the survey[55]. Together with representatives from the DST, NACI, the DOE, and NRF the questionnaire was sent to 13 organisations. This questionnaire appears at **Appendix 3**.

[54] I was not able to establish an accurate email address for the Univ. of Fort Hare.

[55] Human Sciences Research Council, Agricultural Research Council, Council for Geoscience, Council for Scientific and Industrial Research, Medical Research Council, SA Astronomical Observatory, Academy of Science of South Africa, and the Africa Institute

6.1.2 The questionnaires

To distinguish amongst the different questionnaires and stakeholder groups, they are referred to as follows: *Researchers* (individual biomedical researchers), *Managers* (university-based research managers), and *Organisations* (government agencies and science councils). While each questionnaire was customised for each group of stakeholders, there is significant overlap amongst them. Identical questions appear in all three questionnaires. This was done in order to be able to integrate the data for the survey findings. These questions aim to discover the level of awareness of open access, its terminology and its benefits. Other common objectives were to establish each group's opinions on the quality of open access journals, the author pays business model, as well as issues to do with copyright and preservation. These were identified as potential barriers for the uptake of open access journals in Chapter 5. All three surveys also presented the issue of the academic reward system as a significant catalyst for determining the acceptance of open access and sought to discover the policy responses that might be possible to encourage uptake of this philosophy.

Two recent author surveys (Swan & Brown, 2004b; Rowlands, Nicholas & Huntingdon, 2004) served as useful models for the Researchers questionnaire, though only three questions were directly sourced from these. The Researcher survey was much longer than the other two as it gathered demographic information from individuals, not asked of the other groups. This data offers the potential to establish whether there are significant differences of opinion between different specialty areas, working environments, age or gender groups. Another important difference appears within the Organisation questionnaire. Three questions ask whether these official bodies are aware of identified international developments that represent significant support for open access by prestigious research institutes and foundations. It seemed appropriate to establish whether these public organisations are following current events that have potential to disrupt norms that have existed for generations. Since the Manager and Organisation respondents represent organisationally based opinions, as opposed to the individual opinions invited from the Researchers, it was also appropriate to try to gauge the level of organisational policy support for open access.

Style and methodology of the questions

The questionnaires feature different types of questions. Many offer the respondents the possibility of checking off an appropriate response from a range of specified responses. This device enables the collection of standardised responses that may be analysed and compared. Quite a few questions employ the Likert scale, asking respondents to choose between a number of categories that give an indication of how closely they agree or disagree with a set of statements. Numerical values are allotted to the different categories so that the respondent's attitude may be measured by the total of these numerical values. Schnetler et al (1989:70) has pointed out that a disadvantage of the Likert scale is that an identical score may be arrived at through entirely different sets of answers. For example, a respondent who selected "not sure" for 10 statements might achieve the same score as a respondent that selected 5 concurring and 5 disagreeing responses. Although assigning a numerical score to a set of statements would thus appear to be a blunt instrument, it is possible to evaluate and compare the scores for each statement separately.

Beyond the selection of standardised answers, many questions invite alternative responses or provide space for the respondent's comments which may be more revealing than the fixed responses. These voluntary responses function to reveal additional concerns about open access that this study has not addressed, or they serve to identify further advantages for the local research community that have been missed by this study. Occasional open-ended questions give respondents the opportunity to motivate their answer.

It was important that respondents were given a range of response options, that allowed them to respond both positively and negatively. The literature on open access is not neutral and reflects strong feelings and opinions so it is likely that the respondents would be similarly orientated. Beyond the gathering of information, the survey was seen as an opportunity to spread knowledge about open access. For this reason, some questions were introduced in a way that briefs the different groups about the issue under consideration. These information clips might be perceived as an attempt to advocate for the uptake of open access, leading to feelings of irritation or annoyance that could be captured or revealed through supplementary comments. As a last question, respondents were invited to express any concerns regarding scholarly publication, open access or the questionnaire itself.

Format of the questionnaire and submission

Since open access is a manifestation of the influence of the Internet on scholarly publishing, it was appropriate that the respondents complete and submit the questionnaire online. As far as possible, the intention was also to create an attractive layout that facilitated reading and easy navigation between screens and provided respondents with a sense of their progress through the questionnaire. Once completed questionnaires were submitted, the webpage form was sent to a scripted page which extracted the values and filed them as variables. The variables were then sent to a database via a System Query Language (SQL) statement. Tables held within the database stored the responses which were then extracted into an Excel spreadsheet for review. Lastly, the data was then formatted to present a graphical representation of the results of the survey.

6.2 Survey Findings

Working with the survey responses proved fascinating and stimulating. The findings are presented and discussed below.

6.2.1 Who are the respondents and what do they know about open access?

The questionnaire aimed at **policy makers and opinion leaders** (hereafter referred to as "Organisations") was distributed to CEOs or designated office bearers from the following agencies:

National Research Foundation
Dept of Science & Technology
Dept of Education
SA University Vice-Chancellors Association
Academy of Science of South Africa
National Council on Innovation
Council for Scientific & Industrial Research
Africa Institute
Human Sciences Research Council
Agricultural Research Council
Council for Geoscience
SA Astronomical Observatory
Medical Research Council

Of these 13, only 8 submissions were received (61,54% response rate). In the interests of obtaining fuller disclosure, respondents were not asked to identify their organisations. The only indication of the type of organisation is their response to the question asking the primary function of their organization:

Fig. 12 Primary functions of the 8 responding organisations	
Manage national research functions	1 of 8
Fund research	0 of 8
Produce research	6 of 8
Oversee institutions that train researchers	0 of 8
Combination of all of these	1 of 8

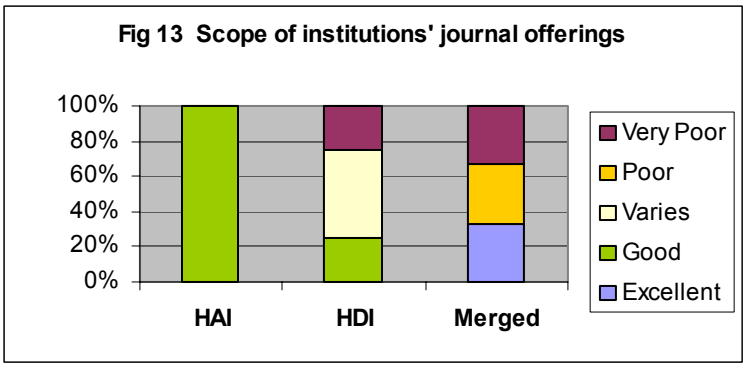
It appears that the bulk of the responses emanated from producers of research and that just 2 submissions were received from bodies that are directly responsible for making policy. This is regrettable. Nevertheless, each of these organisations represents the cream of South African science and has a strong voice within the research system. As a result, the responses of this group, though small in number, should be viewed as influential.

Given that these respondents form the keystone of South Africa's research, it is noteworthy that only half replied that they know anything about open access publishing, the lowest response across all three groups. To jog their memory, they were presented with a range of well-publicised public declarations endorsing open access. Again, half responded that none of these had come to their attention. Eight international research bodies that have policies favouring open access were then named; three quarters of the respondents declared that they were unaware of these agencies' policies. When asked whether they were aware of mandates of four very large research funders requiring that funded research be made freely available, there was a better response: all eight knew of at least one instance, mainly the recent UK Research Council position, but also that of the Open Society Institute.

Of the half that confirmed they know something about open access, one respondent was clearly mistaken about its purpose: "Open access is not necessarily free access but rather access to at least the bibliographical information of publications …". Nevertheless, only one of the eight was not familiar with the terms *self-archiving*, *open access journals*, *institutional repositories*.

The questionnaire distributed to the **Deputy Vice Chancellors** responsible for academic affairs or to **Deans of Research** of the 22 public higher education institutions was returned by 11 institutions (50%). Again, respondents in this group were not asked to identify their host institution. There was a good spread of

responses across the profile of historically advantaged (HAI) (4), historically disadvantaged (HDI) (4), and newly-merged institutions (3). Remaining within this institutional categorisation, **Fig 13** charts each sub-group's evaluation of the access to journal literature offered by their institution



While these ratings represent subjective opinions, on the basis of this sample of roughly half of South Africa's universities, it seems that present university library holdings could be described at best, adequate, and overall, as mediocre and in need of some additional support or remedy. For this reason it could be anticipated that this group, hereafter termed "Managers", would be open to the promise of open access.

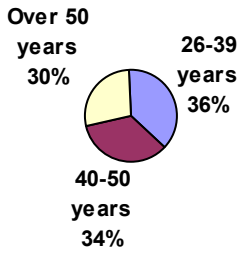
The Managers are better informed about open access. Only two of the eleven confirmed that they did not know anything about it. Of the nine that did, only one reflected an incorrect understanding, responding simply that open access meant "on-line journals". Again, only one respondent was unfamiliar with the terms *self-archiving*, *open access journals*, *institutional repositories*.

The questionnaire distributed to 507 **biomedical researchers** (hereafter termed "Researchers") received 145 responses. As 38 emails bounced back undelivered, the original sample was 469 researchers, representing a 30,92% response rate. Researchers' emails were harvested directly from ISI Thompson's *Web of Science* with the only condition that the researcher had published within the biomedical domain after December 2003. It is instructive to find that only 14 researchers of the original 507 authors captured in this way are located at historically disadvantaged institutions. The remaining 493 work in historically advantaged universities or

research institutes, confirming the NACI finding reported in Chapter 2, viz, that 90% of publications is produced by historically advantaged institutions. This subset was also distributed unevenly with heavy representation from the Universities of Cape Town, Stellenbosch and KwaZulu-Natal. The gender division of the respondents (64,79% males to 35,21% females) coincides with that of researchers in South Africa more broadly. The National Survey of Research and Experimental Development for 2003/04 found that women make up 35% of the researcher population (Dept of Science & Technology, 2005:17).

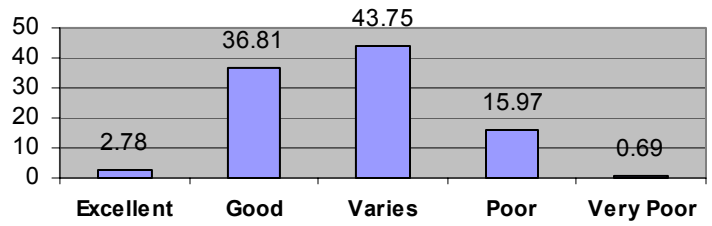
It was found that 16% of respondents conduct research exclusively, with the remainder describing their role with varying levels of teaching and research. Researchers of all ages responded with roughly one third reporting in each age range:

Fig. 14 Age range of the Researcher respondents



While 3.45% are satisfied with a 6-12 month delay in access to journal articles, for the remainder immediate access is "crucial" (51.72%) or "important" (44.83%). Although the researchers are almost universally based at historically advantaged institutions, they do not rate their present levels of access very highly. The position at the less well-endowed university libraries is likely to be far worse than these reported levels of access:

Fig. 15 Researchers' rating of their current access to journal literature



More than two thirds (68.97%) of these researchers confirm that they know about open access publishing. It was interesting to note the emphasis in some replies, showing that this group has picked up on the ramifications of open access. Some excerpts:

Fig. 16 Researchers' understanding of open access publishing (excerpts)

ensuring that access is not limited to an elite group..

at the moment there is considerable cost in subscribing to biomedical journals..

A model based on retention of copyright by the author..

in submission process, knowledge of reviewers, record of reviewers' comments to original drafts, accessible to all..

the articles are available immediately so that the long delay in publication is avoided..

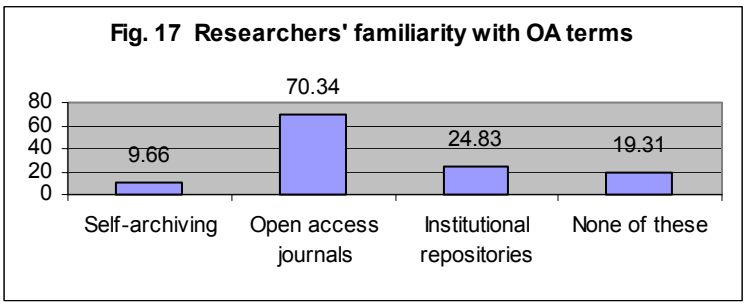
they tend to have a favourable policy towards researchers in resource-constrained countries..

the cost of publishing is considered as part of the research, but access is free ..

access to additional data in some instances..

copyright doesn't rest with a publishing company.

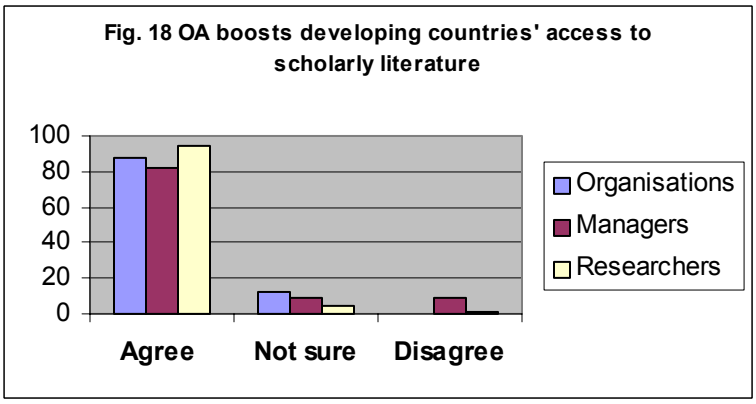
Given the richness of the responses above, this group's familiarity with the terms *self-archiving*, *open access journals*, and *institutional repositories* is uneven:



The group reports that they have learned about open access journals predominantly through direct publicity from the journal publisher (42.76%), by chance while searching the Internet (31.72%), or through word of mouth or from an associate (31.03%). Only 15.17% had learned about them from a faculty librarian or the online catalogue of the library. This finding has produced one of the recommendations appearing in the following chapter.

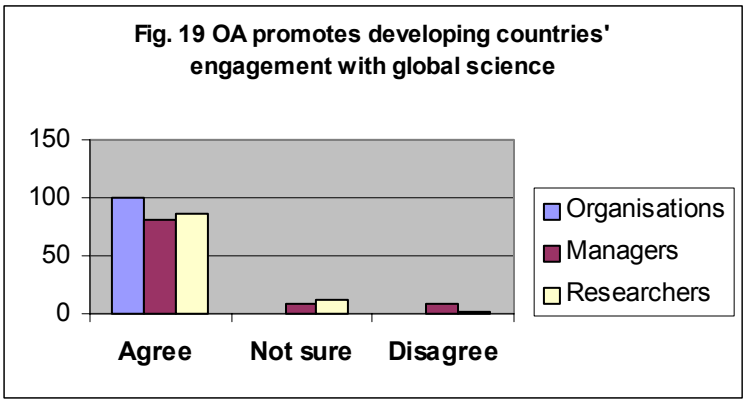
6.2.2 Do these groups believe in the promise of open access?

Before confronting the separate groups with the challenges that open access journals appear to present, I wanted to discover to what extent there is "buy-in" to its benefits. Each group was presented with a series of 8 statements, to which they could indicate the extent of their agreement or disagreement. The following charts report the results of this question:



Agree strongly = 101
Agree = 50
Not sure = 9
Disagree = 2
Disagree strongly = 0

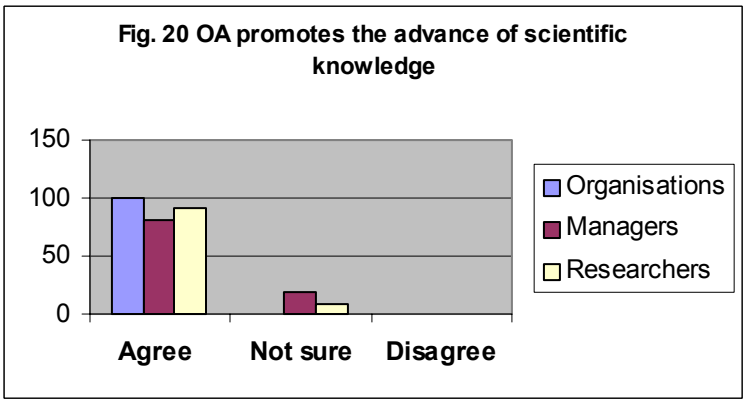
Total: 162



Agree strongly = 88
Agree = 53
Not sure = 17
Disagree = 3
Disagree strongly = 1

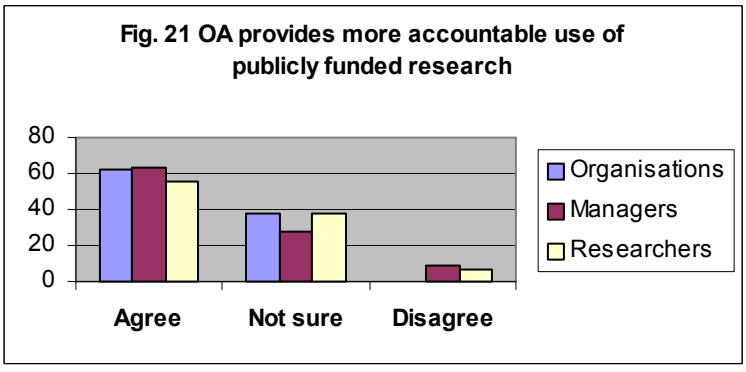
Total: 162

While all groups strongly support the idea that open access creates better access for developing countries' scholars, slightly fewer are certain that this necessarily leads to opportunities for improved networks, collaboration and scientific methods.



Agree strongly = 91
Agree = 58
Not sure = 12
Disagree = 1
Disagree strongly = 0

Total: 162



Agree strongly = 55
Agree = 38
Not sure = 59
Disagree = 9
Disagree strongly = 1

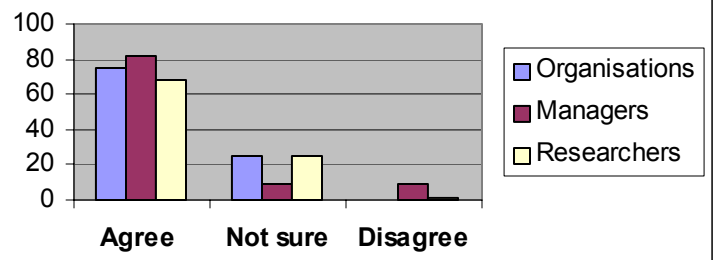
Total: 162

After high levels of agreement, there is a sudden rise in the level of uncertainty regarding the question of whether open access necessarily ensures greater accountability for publicly funded research. There may be some reluctance on the

respondents' part to accept that they might be answerable to a wider sector than their own reference groups. Alternatively, there may be a particular sensitivity within the medical fraternity that is associated with the high levels of health-related information on the Internet available to lay persons. Would they have more readily accepted that open access provides more *efficient* use of publicly funded research?

The following statement restores higher levels of agreement and appears to be less contestable in the groups' opinion. They are open to the suggestion that open access offers greater visibility. In their view, more readers could certainly lead to higher citation levels, a highly desirable outcome for these groups of stakeholders.

Fig. 22 OA articles will be read by more people, and probably cited more often

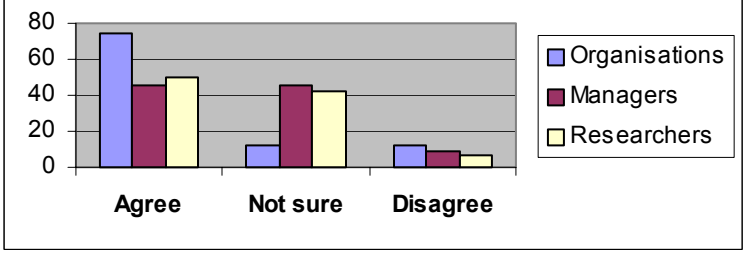


Agree strongly = 61
Agree = 53
Not sure = 37
Disagree = 11
Disagree strongly = 0

Total: 162

Issues of copyright regularly seem to present difficulties for academics. The following result reflects the uncertainty or caution that many exercise regarding the vexed question of permissible use or re-use of materials. They are so schooled in viewing copyright as publishers' property that it appears they are not easily able to imagine a different regimen under open access.

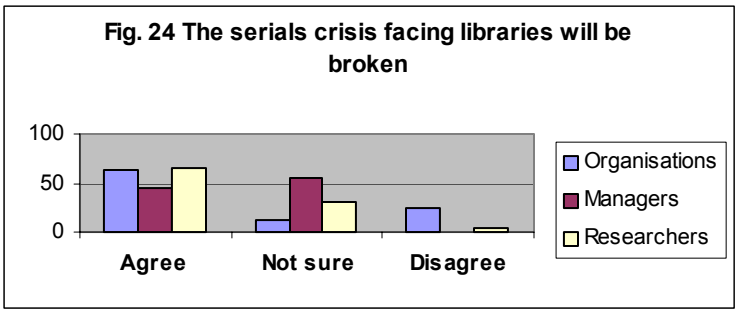
Fig. 23 Authors retain copyright and are free to use it as they wish



Agree strongly = 39
Agree = 45
Not sure = 66
Disagree = 10
Disagree strongly = 1

Total: 161

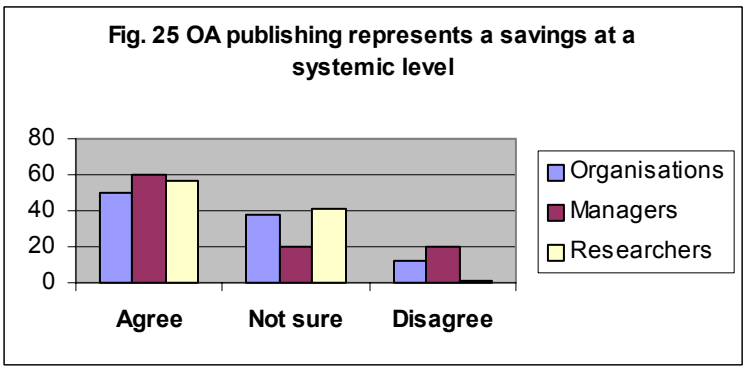
Relatively high levels of confusion also exist in the response to the statement regarding the effect of open access on the chronic serials crisis facing university libraries. This may be due to a level of insularity since these groups have not been directly confronted with the problem of escalating journal prices. As pointed out in Chapter 3 and 5, this separation from actual cost is partly why normal market forces fail to operate within the nexus of publishers/librarians/academics. One might have expected Managers to be more fully appraised of the situation, however.



Agree strongly = 39
Agree = 67
Not sure = 49
Disagree = 7
Disagree strongly = 0

Total: 162

Given the incomplete information available to these groups, the last statement intended to discover their impressions rather than any actual assessment of whether open access represents overall economic savings. It is perhaps overly ambitious to expect any informed answers.



Agree strongly = 37
Agree = 55
Not sure = 60
Disagree = 6
Disagree strongly = 1

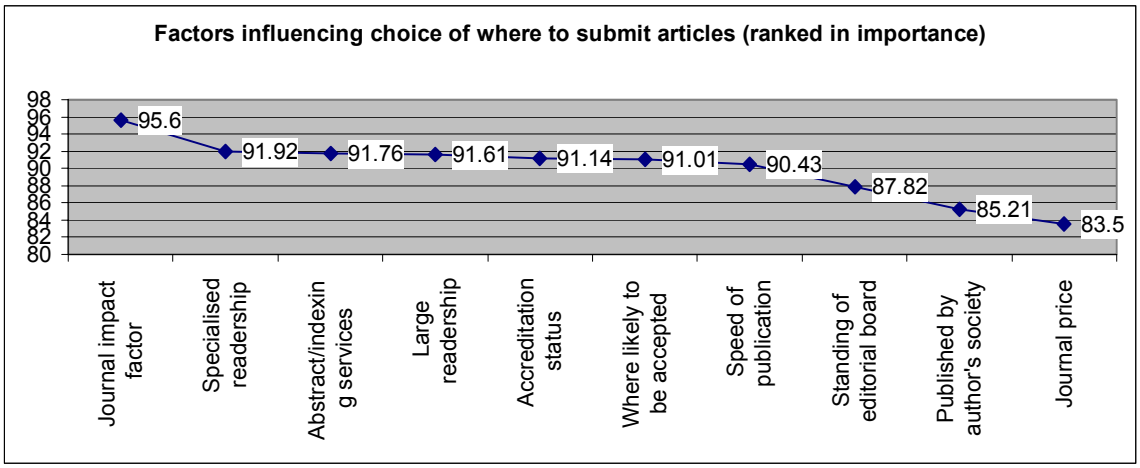
Total: 159

Looking back at the responses to the 8 statements overall, if the "Not sure" responses are excluded, thereby limiting the results to respondents who felt confident enough to forward a positive or negative answer, it may be posited that, within this small sample, there is a significantly strong belief in the advantages of open access. The highest number of "disagree" responses was never more than 11.

6.2.3 How do authors choose where to submit their articles?

Wherever there was an opportunity to register comments, respondents tended to underline the importance of quality as the most important criterion for research publication. This was also tested when the author group was asked which factors influenced their choice of a journal to publish their work. This question was borrowed from the Rowlands (2004:11) author survey, with the addition of one further factor (accreditation status). Authors ranked the 10 criteria in order of importance. The following table charts the relative position of these criteria overall:

Fig. 26 Factors influencing choice of where to submit articles (ranked in importance)

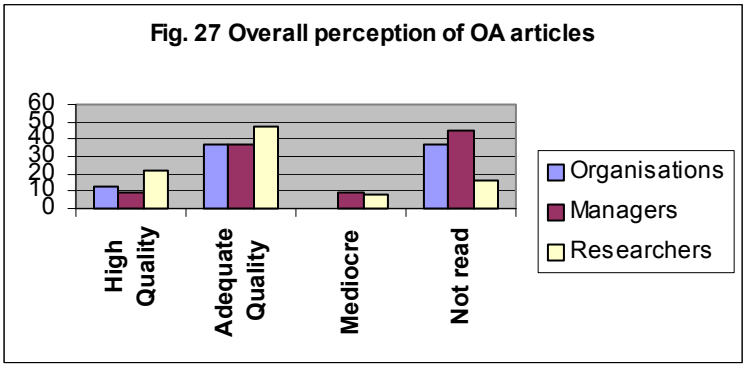


It is clear that, for this group of authors, the impact factor of a journal represents its quality. These are the journal titles that will promote their standing amongst their peers and provide evidence of the value of their work to review committees. The culture of the high impact journal is fully embedded within their practices. It is worth noting that one of the policy-making Organisations commented at the end of the survey: "It is about time the so-called high impact journal died, it is so detrimental to the majority of scientists/researchers in preferential publication and research area". In other words, the high impact journal is seen to be the last word of authority, but this has become restrictive to both the scientists and to the research field. From the open access point of view, the high impact journal also carries an inflated price that restricts access to the high quality work published within it. This is borne out by the lowest rating given to the price of a journal by the authors as a consideration for their publication choice. The cost of a journal for prospective readers is of relatively low importance within their quest for recognition.

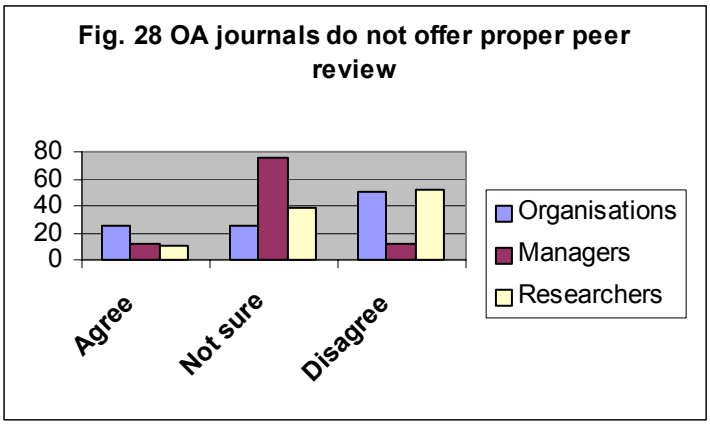
This is ironic, since free open access will provide the widest possible audience for their work. That authors seek readers is clear from their high ratings for "specialised readers", "large readership" and "abstracting and indexing services", which rank even marginally higher than the journal's accreditation status (ie, the Dept of Education's list of approved journals that bear subsidy for the author's institution).

6.2.4 How respondents view open access journals

The questionnaire asked for views on the quality of articles that appear in open access journals. It stated clearly that this depends on the standards applied by editorial boards and that open access journals are frequently newer publication channels that have not yet achieved an impact factor. This response was marked by a high level of "Not (yet) read" responses. They may have followed published debates about the journals, but not yet sampled the articles directly.



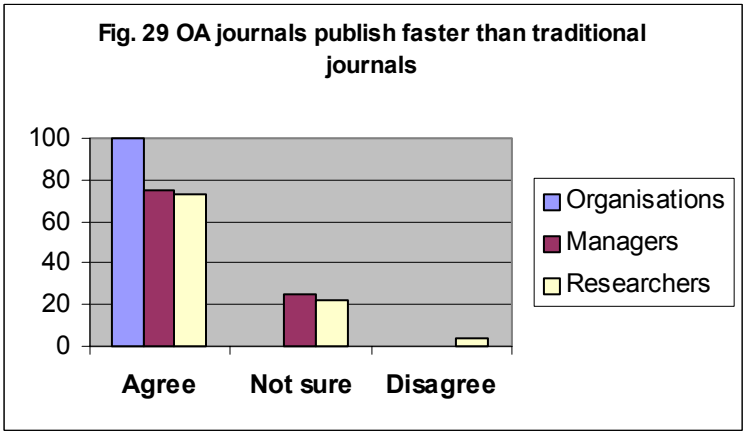
Specific questions regarding the properties of open access journals: peer review, publication speed, visibility and impact were then directed to the respondents. Again, lower levels of responses were achieved for these questions, dependent upon the groups' level of experience with open access journals. Here they do not seem too skeptical about the rigour of the peer review process:



Agree strongly = 1
Agree = 12
Not sure = 50
Disagree = 47
Disagree strongly = 13

Total = 123

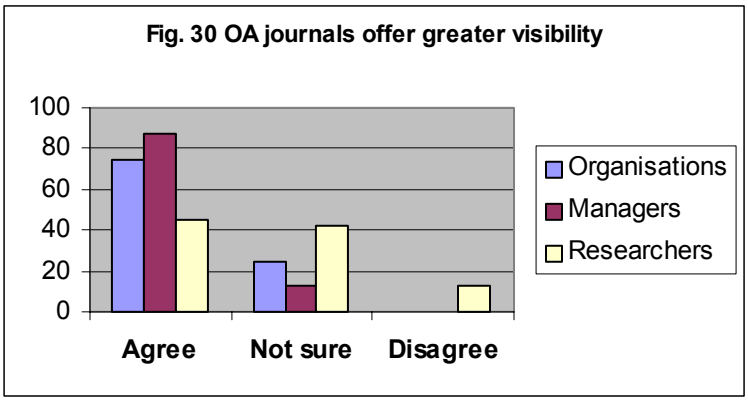
Although speed of publication was not rated very highly in importance, it is a factor that is strongly associated with these journals.



Agree strongly = 25
Agree = 65
Not sure = 28
Disagree = 5
Disagree strongly = 0

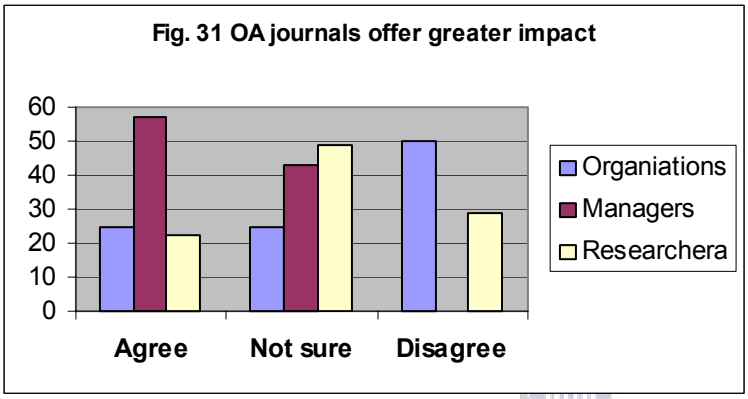
Total = 123

Since visibility and impact are rated highly amongst Researchers, it is interesting to see that their initial enthusiasm for this benefit of open access (accorded 75%: 81% and 69% by Organisations, Managers and Researchers respectively, see **Fig 22** above) has markedly diminished under closer questioning, particularly on the question of impact. The other groups also display greater levels of uncertainty on this question.



Agree strongly = 15
Agree = 44
Not sure = 48
Disagree = 14
Disagree strongly = 0

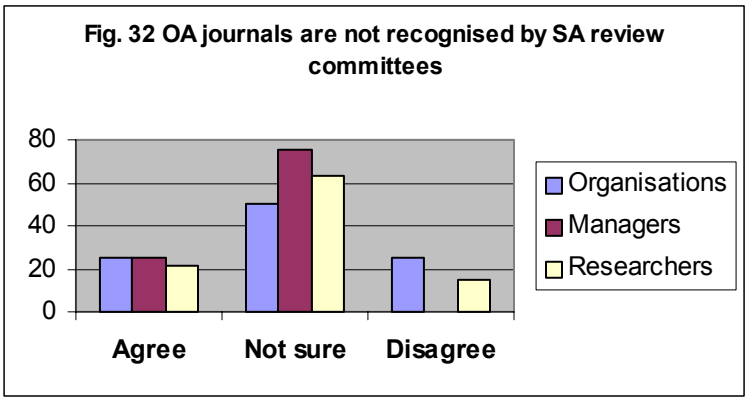
Total = 121



Agree strongly = 9
Agree = 21
Not sure = 58
Disagree = 31
Disagree strongly =

Total = 119

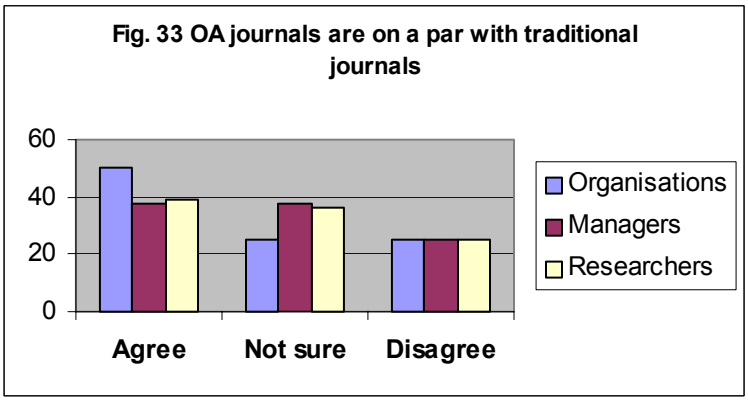
Their uncertainty grows when they are asked about the accreditation status of open access journals (**Fig 32** overleaf). This is certainly a factor of the newness of these publications. Defining their status will place an important seal upon their recognition (where warranted) and so increase their uptake as publications of choice. As a respondent pointed out: "Quality and standards reflect the credibility and quality of individual journals – rather than whether the research is open access or not". Several others remarked on the difficulty of generalising when each journal varied in its offerings. One noted: "until 6 months ago I would have said that the articles are usually ones that couldn't be published easily elsewhere and of little interest but journals such as the *Lancet* are becoming semi open access", referring to an Elsevier hybrid journal that offers authors the choice of making their articles open access. Another says: "Established journals that have converted to open access retain their high levels of quality and originality. In general I find that the "younger" journals have lower standards of quality". Others drew attention to the impeccable standards of *Public Library of Science (PLOS) Biology*, an open access journal that is just 2 years old.



Agree strongly = 9
Agree = 18
Not sure = 78
Disagree = 15
Disagree strongly = 2

Total = 122

Overall, however, the groups did not seem ready to accord open access journals equal status with traditional subscription journals. One Organisation respondent commented: " Open access journals must still prove their value, especially in terms of impact and sustainability".

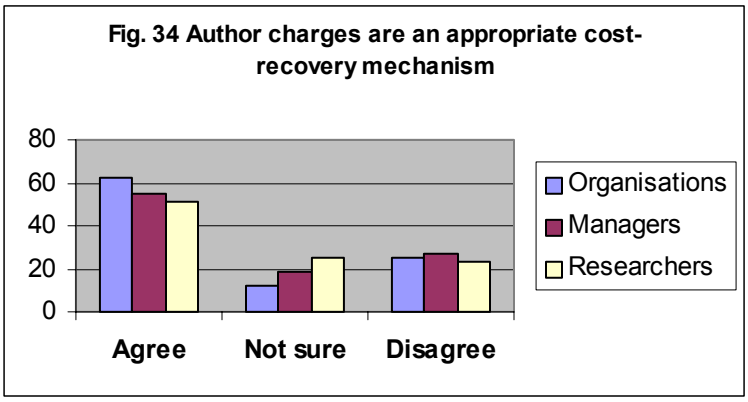


Agree strongly = 4
Agree = 44
Not sure = 44
Disagree = 31
Disagree strongly = 0

Total = 123

6.2.5 How do the groups respond to the idea of article charges?

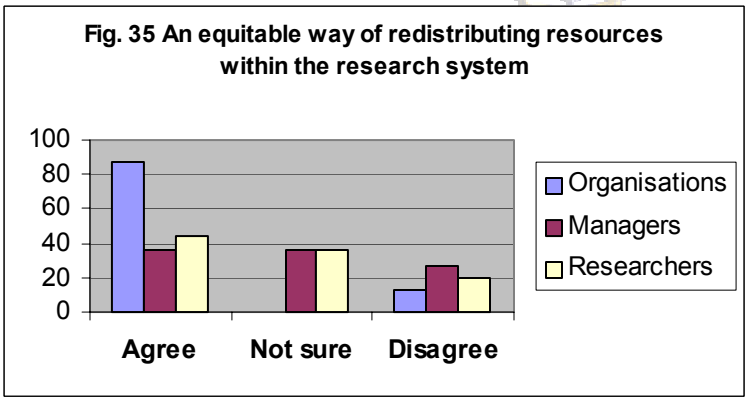
The questionnaire provided information regarding the author pays model, indicating that a common range is $1500-$2500 per article and that this is invariably waived for authors from developing countries. The following sentence opened the way for a series of statements, to which individuals could agree or disagree: "It is clear that 'net reader' institutions gain while research-intensive institutions will shoulder the costs of making their publications free for everyone else." The charts below reflect the range of responses received:



Agree strongly = 15
Agree = 70
Not sure = 39
Disagree = 34
Disagree strongly = 5

Total = 163

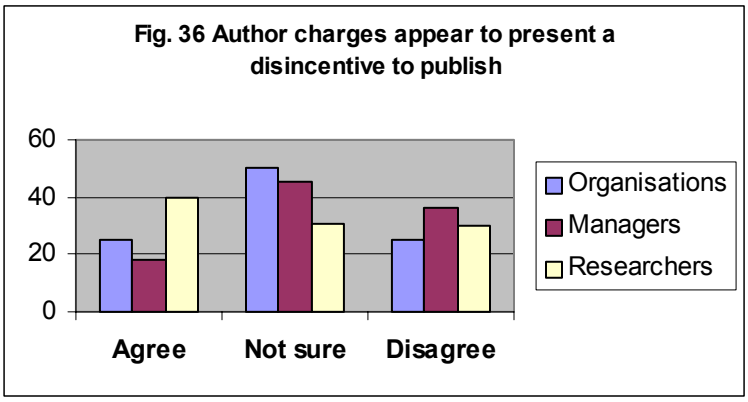
The use of the qualifier "appropriate" (**Fig. 34**) was in the context of a suggestion that authors and their institutions benefit from successful publication and that the imposition of author charges is therefore not unreasonable. The next statement developed this idea further, explicitly referring to "haves and have-nots" (ie, resource-rich and under-resourced institutions). Since respondents probably see themselves as working within a developing country and therefore exempted from author charges, it is likely that they view themselves as the "have-nots" and therefore the suggestion is not as provocative as it might appear.



Agree strongly = 7
Agree = 67
Not sure = 56
Disagree = 27
Disagree strongly = 6

Total = 163

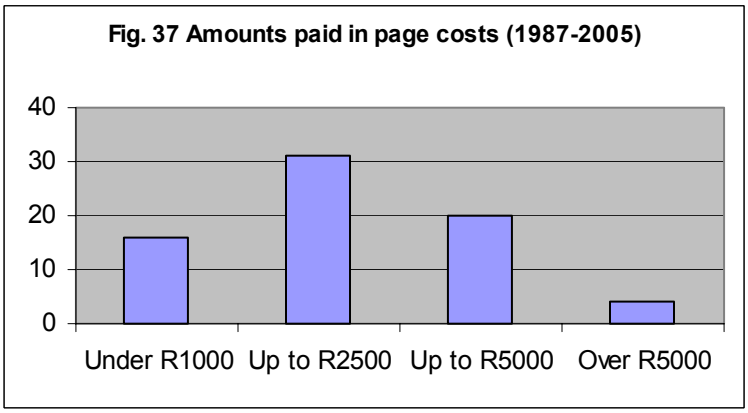
Because the Researcher group was earlier asked about their experience of paying page costs when publishing in regular subscription journals (and provided details of amounts previously paid), the authors are better able to hypothesise about the prospect of facing author charges and thus register a higher level of concern (ie, all the "Agree strongly" responses come from Researchers) than the other groups for the following statement:



Agree strongly = 12
Agree = 49
Not sure = 53
Disagree = 47
Disagree strongly = 2

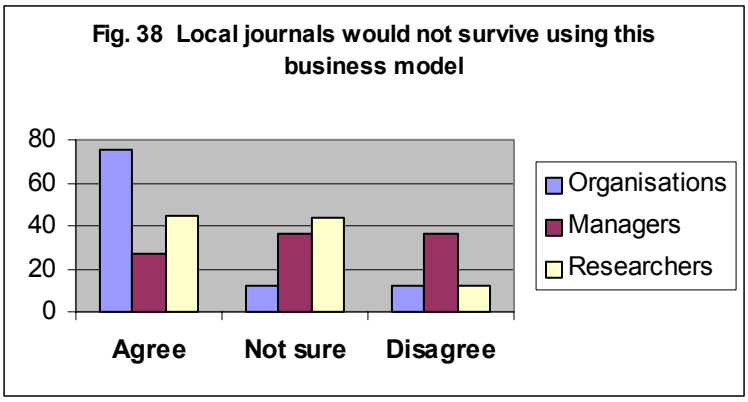
Total = 163

Of this group, 83 had previously paid page costs while 59 had not (two did not respond to the question). I was interested to learn how widespread this practice is and the extent of the costs. The researchers were asked to specify the amount they had paid on the most recent occasion and to say when this was.



Of course, none of these amounts, save the R10,000 paid by one author in 2000, approaches the figures they would hypothetically face under the author pays business model for some open access journals.

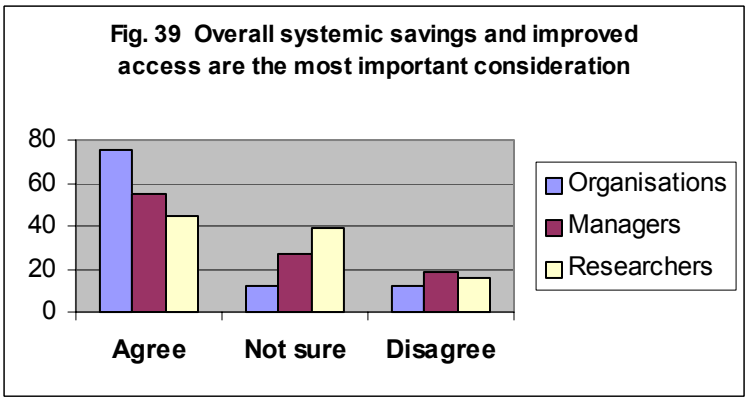
While international open access journals might be in a position to exempt developing country authors from article charges, local journals would not. The groups were asked about this scenario (**Fig.38**). Although they were given the opportunity to make comments, none expressed concern about the difficult situation that local non-profit journal publishers might face under open access.



Agree strongly = 10
Agree = 63
Not sure = 67
Disagree = 16
Disagree strongly = 6

Total = 162

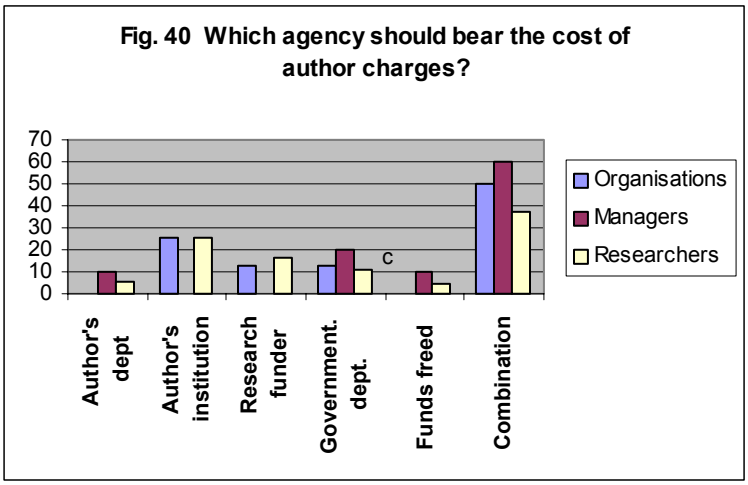
After confronting the groups with some uncomfortable propositions, they were asked finally whether, overall, they felt that these could be accommodated in order to achieve the goals of open access.



Agree strongly = 15
Agree = 61
Not sure = 60
Disagree = 22
Disagree strongly = 3

Total = 161

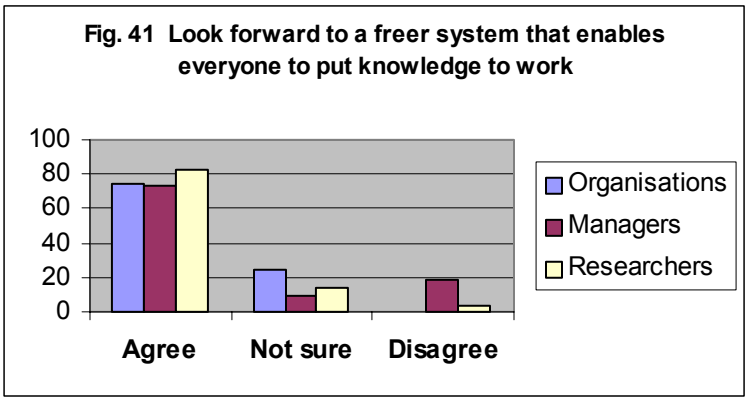
Overall, it was surprising to find that the notion of "paying to publish" was not seen as an insurmountable problem for these groups. It may be that they understand how much it costs to produce research and that the imposition of article charges is a relatively low barrier for the larger prize of universally accessible dissemination of this cost-intensive activity. They were also asked which of the following agencies they believed should bear the cost (**Fig. 40**). One Researcher commented: "This is a minor issue".



The "Funds freed" option referred to "institutional funds freed up from the demise or cancellation of journals charging traditional subscription or licence fees". The "Government dept" option represents a suggestion that article charges might be claimed from the relevant government department corresponding to the subject matter of the article, eg, Health, Trade & Industry, Arts & Culture, etc. This idea was not rejected out of hand though one Researcher commented that this "would be too difficult and bureaucratic to work with". One Organisational policy maker wrote: "The authors' department and more so the institution. Costs should be built in to a project, library costs will diminish with time and government departments are already providing financial incentives to institutions on publication". Another Researcher appeared to concur: "If researchers plan their work and are adequately funded, then you should ask for funding for publications in your grants". These responses imply a higher level of planning for provision at publication stage.

6.2.6 Questions of copyright, sharing and trust

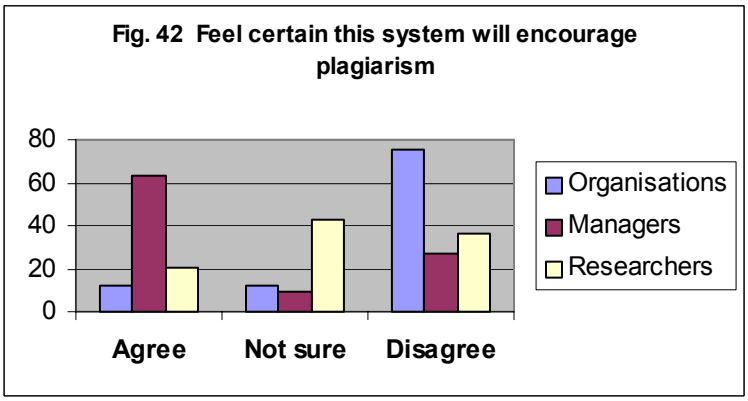
Since open access offers readers fairly unlimited freedom to print, save, distribute and use articles, it is important to ascertain how willing authors are to extend this kind of freedom. The limits on this freedom are those associated with the attribution non-commercial licence of the Creative Commons, which, in addition to the uses mentioned above, allows readers to build upon the ideas of the work. In all cases full attribution of the original author is required. Nearly 94% of Researchers welcome any use of their work providing it is acknowledged. In fact, there was a general longing for more open sharing across all groups (**Fig. 41**):



Agree strongly = 57
Agree = 78
Not sure = 21
Disagree = 6
Disagree strongly = 1

Total = 123

Unfortunately, this apparent generosity of spirit is not free of suspicion. It is reported that student plagiarism from the Internet has become a problem, such that software programmes are being developed to detect this. Perhaps because they are sensitised to this problem, 63% of Managers fear that that such an unregulated environment could very well lead to increased plagiarism. Seventy-five percent of the Organisations disagree. It may be they recognise that within an environment where all scientific information is available, such dishonesty would also be more easily visible and detectable. Several researchers also recognised that "plagiarism is no more likely than with regular journals".



Agree strongly = 10
Agree = 28
Not sure = 64
Disagree = 50
Disagree strongly = 11

Total = 123

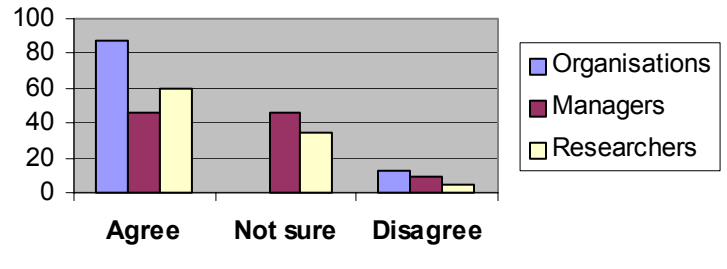
For the same reason, fears that unscrupulous persons might try to exploit others' work for financial gain (Organisations: 50%; Managers: 64%; Researchers: 26%) appear unfounded, since there would be ample evidence of prior publication. Insofar as commercial application of someone else's idea is concerned, an Organisation manager declared: "Research work is supposed to be honest at its peak and plagiarists and unscrupulous commercial exploiters of others' work should be

BLACKLISTED [*sic*]. However if a researcher overlooks a benefit from his/her work and someone else puts it to profit, that person has greater insight and should be rewarded". Here is an oblique reference to the possibility that open access provides wider opportunities for technology transfer for socio-economic development.

6.2.7 Preservation of the online scholarly record

Responding to the proposition that "as long as information is available, used and appears in many places, it tends to be preserved", the groups collectively reported the following: Agree (61,49%), Not sure (27,33%), Disagree (11,18%). This question attempted to test the acceptability of the LOCKSS principle as a means of ensuring long-term accessibility of electronic resources. It was not intended that the respondents should view this as the only avenue for preservation. They were also asked to indicate their confidence in open disciplinary or institutional repositories as reliable sites for providing persistent access. Some Researcher comments indicate that they would prefer more formal arrangements put in place: "Preservation has to be systematic. You cannot rely on 'self-preservation' (sic, presumably means 'self-archiving'); "There would need to be consensus on how the system of open access is to be organized internationally. There must be rules and responsibilities for governments to look after, much like nature conservation". Perhaps they are answering with a degree of self-knowledge, understanding that unless there is a degree of coercion for the deposit of scholarly work (and accompanying rewards/sanctions), that open archives will never reflect the entire body of published work. The reported experiences of institutional repositories that rely on voluntary self-archiving show this to be the case.

Fig. 43 Confident that open archives can provide persistent access to digital materials for future users



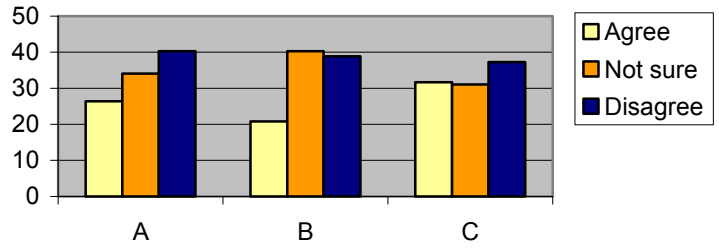
Agree strongly = 12
Agree = 85
Not sure = 54
Disagree = 5
Disagree strongly = 4

Total = 160

6.2.8 Open access journals within the academic reward system

A researcher's publication record plays a vital role in consideration of academic rating, promotion and in the award of grants. Does publication within open access journals jeopardise a researcher's career opportunities and would the Researchers want to see explicit endorsement of the open access philosophy by research managers and organizations such as the NRF and the Dept of Education?

Fig. 44 Concerns about publishing in OA journals



A = May adversely affect my career opportunities

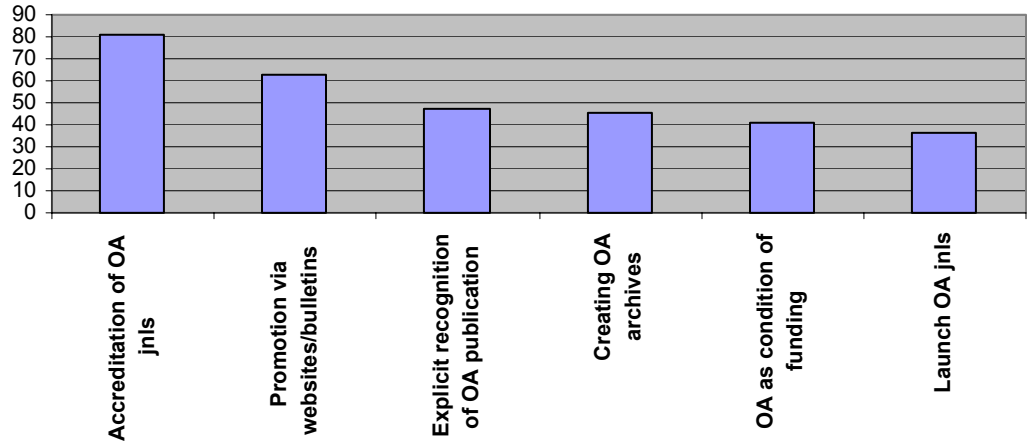
B = May adversely affect the career opportunities of my co-authors

C = May adversely affect the potential impact of my published work

While they express more confidence than reservation in each category, the high level of uncertainty across the board is indicative that these questions remain largely untested in reality. Of the 145 researchers, only 32 (22%) have already published in open access journals, a further 19 are not sure whether they have, and 94 have not. While 79% express a desire for greater recognition of the open access journal, 8.5% would not want this and 10.8% had other comments to make. The comments range from uncertainty ("too early to say"; "would need to know more"), provisos ("only for those which have a rigorous review process and maintain high standards of quality"; "only if this became the norm internationally"), skepticism ("not if it is going to cost so much") and support ("It is essential that consideration be given to including appropriate open access journals in the list of subsidy earning journals").

The following chart (**Fig. 45**) shows ways that open access could be fostered, according to the Researchers. They could tick as many options as they believed feasible and applicable to the local system.

Fig. 45 How Researchers believe that OA could feasibly be endorsed by Managers/Policy Makers



The Manager questionnaire alerted the group to studies that show that most senior researchers know very little about open access publishing and that the problem in uptake of open access is not opposition but researcher ignorance and inertia. They were asked how their institution might bring about greater awareness of open access. Some strategies were suggested and these were supported as follows (respondents could tick several options):

Fig. 46 How Institutions could spread awareness of OA on campus

Via communications distributed to the research networks on campus = 10 of 11
Library-led awareness campaign = 10 of 11
Postgraduate or professional development workshops = 7 of 11
Cross-departmental workgroup = 5 of 11
Via the research ethics structure = 3 of 11

The Organisations group was also asked to provide an explicit indication of whether they believed that open access publishing better serves the needs of South African researchers as both readers and authors. Because these involve different considerations, the group was faced with 4 introductory statements and asked to complete the sentences in a way that concurred with their opinions. It appears that some of the group would not be drawn into providing a definitive answer, and this question was left unanswered by several individuals. Seven of the 8 respondents responded as follows:

Fig. 47 Does OA better serve the needs of SA Researchers as readers?

Yes, open access better serves the needs of SA researchers as READERS, because:

"it gives them access to all relevant research material"
"of readily available published research"
"international research reports will be more freely accessible"
"the articles are available to readers free of charge. The only problem I can bring forward is that, in Africa, not so many people have access to the Internet, which is the vehicle for Open Access articles and journals"
"cheaper and all easily accessed"
"as long as journals publish in this realm, if they don't publish there one would not find the publication"
"access creates awareness and knowledge sharing and relationship building"

No, open access does not serve the needs of SA researchers as READERS, because "not all people (especially in most African states) have access to the Open Internet, which is the vehicle for this Open Access publishing".

Just four Organisations were prepared to answer the other half of the question.

Fig. 48 Does OA better serve the needs of SA Researchers as authors?

Yes, open access better serves the needs of SA researchers as AUTHORS, because:
"it provides an affordable platform to publish their work and to gain and maintain a reputation amongst their peers"
"journals used to check as to whether the author /institution's library subscribed before seriously undertaking review"
"their research will be exposed to a global forum"

No, open access does not better serve the needs of SA researchers as AUTHORS, because:
"not all people (especially in most African states) have access to the Open Internet, which is the vehicle for this Open Access publishing"

The dissenting voice raises a valid concern but considering that the question is framed directly towards South African readers and authors, I believe that this response does not adequately address the matter. Does this individual believe that South Africa should refrain from participating in a worldwide move towards open access in order to demonstrate its solidarity with the rest of the Continent?

An earlier question had requested the representatives of the Organisations group to identify specific programme areas within their organisations that would benefit from the outcomes of open access publishing. The answers that were prompted appear at **Fig. 49**.

Fig. 49 Programme areas that would benefit through open access publishing

- Training, mentoring, projects in Africa, continued development of scientists

- All research fields would get access to more literature

- Astronomical research is already self-archived and has been for more than a decade. Our programme areas do involve postgraduate training and we hope to involve students and scientists from elsewhere in Southern Africa from institutes that would greatly benefit from increased access to research materials

- Enhancing research capacity at a national systems level in relation to the science & technology needs of SA.

- Research and higher degree studies generally.

- All activities

- As an organisation we will benefit, however it is difficult at this time to identify individual areas that will benefit the most. It is anticipated that Open Access publishing will motivate the individual researcher to publish more than he did in the past.

- Basic research and application of latest research techniques

6.2.9 Progress towards policies for open access publishing in SA

This chapter has already argued that while it is the actions of researchers that will influence the sway towards widespread uptake of open access publication channels (both journals and open archives), this can be hastened or impeded by the official stance taken by those in positions of authority. The following table presents the current situation within the respondents' institutions: (Note: individuals could respond to as many options as were applicable to them)

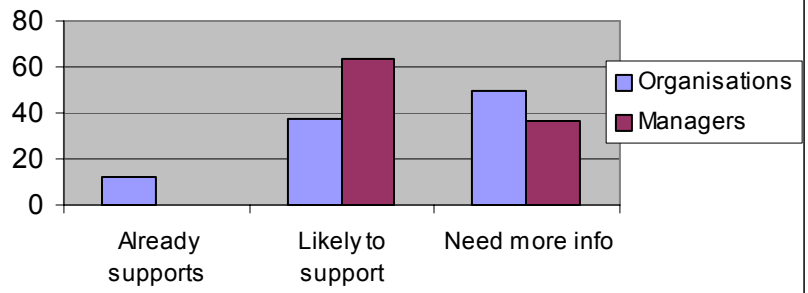
Fig 50: Current status of OA policies

Current Progress	Managers	Organisations
OA publishing has not yet been discussed at business meetings	7 of 11	6 of 8
OA publishing has been raised, but not yet taken forward	4 of 11	0
Is developing a policy on OA publishing with regard to the research it funds	1 of 11	1 of 8
Is developing a policy with regard to recognising OA publications as part of its academic review or grants making processes	1 of 11	1 of 8
The university is developing an open online archive that will collect and preserve its digital research outputs / The organisation is developing an OA policy with regard to its own output	6 of 11	1 of 8

It is not clear how progress could have been made with respect to the last option without explicit approval via the first option. It is possible that institutional archives are being established as part of an overall preservation strategy or as a showcase of the institution's research activities, independently of any official stance on open access.

Notwithstanding the present status, respondents within the Manager and Organisation groups were asked to rate the chances of several strategic interventions being supported within their organisations. Since these issues of advocacy are important, they are reported in full below:

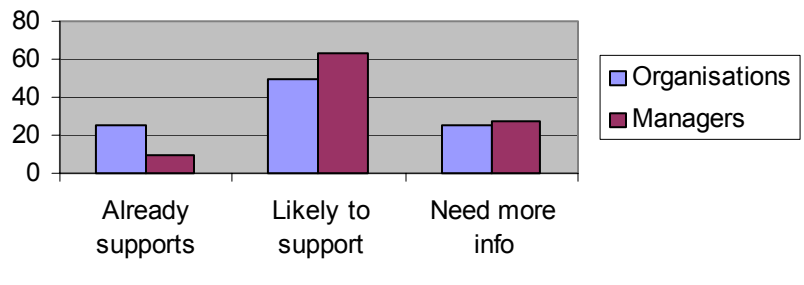
Fig. 51 Explicitly reward open publication as a service to science



Already supports = 1
Likely to support = 11
Need more info = 7
Would not support = 0

Total = 19

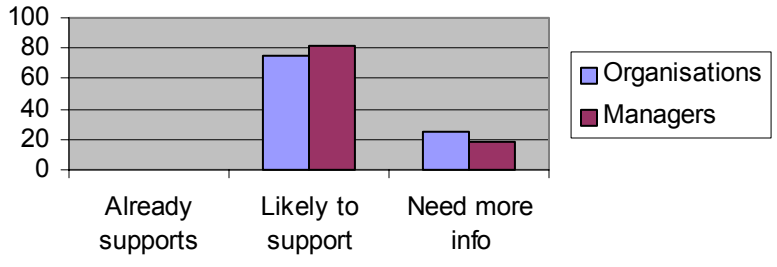
Fig. 52 Urge researchers to retain copyright over their work to enable subsequent self-archiving



Already supports = 3
Likely to support = 11
Need more info = 5
Would not support = 0

Total = 19

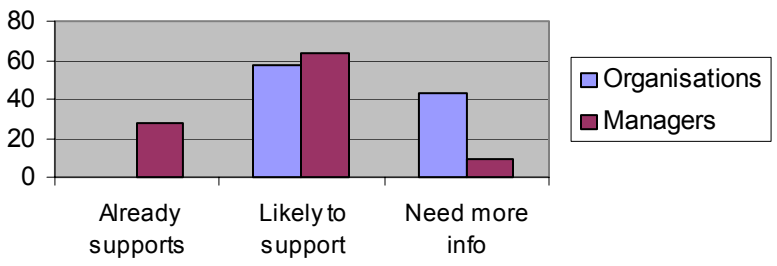
Fig. 53 Requiring prompt self archiving within Open archives as a condition of funding



Already supports = 0
Likely to support = 15
Need more info = 4
Would not support = 0

Total = 19

Fig. 54 Establish Open access archives for research output



Already supports = 3
Likely to support = 11
Need more info = 4
Would not support = 0

Total = 18

Groups were given the opportunity to respond "Would not support", but this option was not used by anyone. This is encouraging for envisaging a scenario where strong, supportive policies have been put into place, allowing open access to take root. For this to occur, further lobbying and advocacy initiatives would need to be pursued, especially given the high levels of "more information needed" responses. This requirement is addressed under Recommendations in Chapter 7.

6.2.10 Concluding comments

It may be enlightening to allow the respondents the last word. They were offered space to include their final comments, concerns or suggestions regarding open access publishing or the survey itself. Twenty took the opportunity to express their views. The following remarks in **Fig. 55** were selected as representative of the main issues communicated:

Fig. 55 Respondents' concluding comments

Open access publishing is very much still in its infancy in SA and the scholarly world. It pursues lofty ideals, but does not remotely provide answers to the problems of scholarly publication in the globalised world.

It's a good idea - may be teething problems along the way.

Concerned at possible cost of publication. If government/institution funded, they will try to influence where I publish, while I feel I should make that decision. If costs of research increase, research will decrease.

I agree with the basic philosophy of openly available research articles, but feel that the reputation of established journals is such that nothing is likely to come of it unless the world's leading scientists decide to support this initiative by exclusively publishing via open access.

I believe open access is the future, one way or another. I just hope it happens sooner rather than later. But how do we ensure quality???

The answer to many questions will vary with the kind of article, its topic and the targeted audience.

I don't think the move to making published material widely available through open access serves science usefully unless the peer review process can be maintained at a high enough standard. Otherwise flawed science may be widely available.

I have massively benefited from open access publishing, being an author of the most widely read Public Library of Science's *Biology* article, with over 20 000 accesses. I cannot stress highly enough how positive it is to be able to access information quickly.

The only concern is that journals need to make money so how are they supposed to make a business if access if free?

The issue is who is going to pay. I do not believe that the current peer review system is fair and have good evidence that it can easily be manipulated by commercial interests. Thus an open publishing system is better but there is a legacy that has to be overcome.

Open access publishing is in its infancy. I hope with time it will develop and become as important as regular journals are at present.

Well done on initiating this survey. It is refreshing to see that steps are being taken to move beyond traditional routes of the dissemination of scholarly knowledge. I think open access journals are a positive to all scientists, but only if current standards are maintained.

Five individuals emailed me independently of their submission to let me know that they were impressed with the quality of the survey or that they had found it interesting and hoped that a high response rate would provide a "robust set of data".

The survey allowed me to test the reaction of local stakeholders to the challenges that were presented in Chapter 5: quality, economics, copyright, and preservation. I was also able to gather their impressions about current levels of access, what they understand by open access and how open access journals could be accommodated

within the academic reward system. The concluding chapter will make recommendations based on the findings of the survey.

Chapter 7: Conclusion

7.1 Overview

The purpose of this study has been to explore the emergence of open access publishing and to examine its potential for improving problems that are currently being experienced within scholarly publishing. The main research question centres on the feasibility of widespread uptake of open access journals (as one manifestation of open access publication). It was considered that this problem could best be answered by examining recent and current developments in a number of related areas. In this way, I arrived at the four broad objectives for this study:

1. to analyse the environmental and operating context of academic research and publication in the light of the possibilities offered by open access;
2. to examine the motivations for introducing a new model of publishing;
3. to investigate the challenges facing open access journals; and
4. to explore the possibility of their uptake within South Africa.

The first three objectives were accomplished by means of a wide-ranging literature review that provided a theoretical and case history approach. Chapter 2 reviewed developments within the broader socio-economic context that are affecting universities and the production of knowledge. It argued that open access provides optimal conditions for communication of research findings in an information society that places a high premium on knowledge and skills. The free availability of published research offers greater opportunities for its discovery and subsequent application in contexts that may advance knowledge, facilitate problem solving and enhance technology transfer. These are the foundations for innovation which is key to remaining globally competitive. While these outcomes of open access are applicable to all nations, they answer particularly to the needs of those in developing or transitional stages, such as South Africa.

The motivations for introducing a new model of publishing were addressed in Chapter 3, which examined the causes, extent and results of the serials crisis. Publishers' price hikes have alienated their most important customer base, academic librarians and their associations. The failure of the online journal and the "big deal" to deliver budgetary relief has caused Library associations to become an important pressure group for open access. Librarians, wanting to fulfill their charge to aid learning

through provision of information, are frustrated by the ever-narrower limits of their collections that cannot be stretched to meet the needs of a larger number and more diverse range of students. The unfavourable exchange rate between the South African Rand and the U.S. dollar means that academic libraries in this country are doubly penalised within the ongoing serials crisis.

Chapter 4 also answered the same objective, arguing that open access provides a more appropriate alignment with the norms of science and better exploits the underlying economic characteristics of information. The academic community, that provides both the original research and the critical peer review process, has recognised that they have the tools to produce their own journals. The best of these follow the traditional norms of science: they apply "organised skepticism" through transparent peer review; they do not require the exclusive assignment of copyright, recognising that knowledge is a public good; and they do not apply cost as an artificial boundary and so open the way for universal consumption and participation.

The third objective was treated in Chapter 5 by means of an investigation of recent studies that have attempted to answer the problems that have been raised in connection with a move to open access: economics, quality and preservation. Finally, Chapter 6 described and presented findings of an empirical survey conducted to provide data that would guide towards reaching an understanding for the fourth objective which explores the prospects for open access journals within South Africa.

Chapter 2 considered the promise of open access in relation to the research system in South Africa and found that there are several cogent reasons why it should be pursued. By comparing progress in other developing countries, Chapter 4 indicated that only sparse initiatives have been introduced so far in South Africa. The remainder of this chapter will try to deduce the feasibility of further progress in the immediate future, based on the survey undertaken. By integrating the empirical data from the survey with the theoretical approaches of the earlier chapters, the following section will present the evidence to reach a conclusion for the last objective which coincides with the overall research question for this study. Thereafter, recommendations will be presented.

7.2 Feasibility for widespread uptake of open access journals

It would appear that there are several logical pre-conditions necessary for this to occur. These are: an awareness of and dissatisfaction with the current problems in scholarly publishing; an informed understanding of the principles and benefits of open access; an active interest in furthering the development of open access; the availability of a comprehensive spread of open access journals in which to publish; the recognition of these by review committees; and, possibly, the ability to pay article charges.

The survey focused on the attitudes and perceptions of a small number of influential research organizations/government agencies, research managers at universities and just one broad division of the life sciences. For the reasons outlined in Chapter 6, biomedical researchers are more likely to have direct experience of open access journals. This is an important consideration to remember when extending any inferences about potential reactions and the future publishing behaviour of researchers in other fields. The following discussion of the pre-conditions mentioned above will draw from the survey and from my own working experience with academics across several disciplines.

7.2.1 Awareness of problems with the present system

It is not doubted that all scholars would want to see an improvement in their access to published articles. Over the past fifteen years, academic departments have routinely been required to cut back their subscriptions to specialised journals and regularly face the 12 month embargo imposed by publishers to access specific publications within electronic databases. It is fair to say that there is a general awareness that journals are very expensive though it is unlikely that any individual would be able to provide informed estimates of the actual cost or the scale of the annual increases in subscription prices. Since the advent of online journals and correspondingly less need to make physical visits to the library, it is possible that there may have grown a greater complacency regarding the library's dilemma in meeting the needs of all of the academic community. Desktop delivery, supplemented by *Google* searches, inter-library loans or requests for documents from colleagues based in well-resourced institutions overseas may provide adequate access in their view. My experience has been that academics express a weary resignation and acceptance of the offerings available to them. This is not surprising, given that isolated individuals feel they are not able to change the reality of their

given circumstances. In fact, older researchers might feel that their present overall access and connectivity represents a vast improvement on the offerings and networking opportunities that were previously available under the conditions of the academic boycott of South Africa before 1990.

The survey found that 43% of the researchers described their access as uneven, 40% felt it was good and only 16% found it poor. It is worth emphasising that 97% of the sample represented researchers in historically advantaged institutions where the scope of library offerings is far superior to that found in historically disadvantaged institutions (Muthayan, 2004:135). Nevertheless, it is *publishing authors* that will make the decisive difference with regard to publishing in open access journals. As shown in Chapter 6, 90% of these come from historically advantaged institutions where the access problem is less severe. Since the survey researchers indicated that the cost of the journals had the least influence in their decision about where to publish, it is reasonably certain that others' access to their published articles has not been thought of or considered important, even though this may affect the overall visibility or impact of their work. Two-thirds of them agreed that open access would end the decades-long serials crisis (3.45% disagreed) and 30% were not sure about this prospect. Even with this majority, it appears unlikely that this would provide sufficient incentive to mobilise researchers to change their publishing habits. The impetus towards open access will need to be driven from research funders and research managers.

7.2.2 Informed awareness of the benefits of open access

It is logical that researchers must first be aware of the principles and promise of open access in order to subscribe to these actively through their publishing behaviour (Hedlund et al, 2004:208). Similarly, research managers and policy makers would need to be informed about open access in order to endorse it. A study of nearly 4,000 senior researchers from 97 countries by Rowlands, Nicholas & Huntingdon (2004:2) showed that 82% claimed to know nothing or very little about open access. This is confirmed by an as-yet unpublished study by the German Research Society which finds that three of four scientists surveyed and more than 85% of social scientists and professors of the humanities are not aware that open access is one possibility for publication (Seitmann, 2005:online). Amongst the South African biomedical researchers surveyed, 69% reported knowing something about open access and 31% did not. Of the 88 free text definitions offered, only 3

were mistaken, confusing open access with open source or conflating open access with online journals. This high level of awareness is an indicator that this particular research area has been an early adopter of open access. It is reasonably certain that most South African scholars in other disciplines conform to the findings of the international studies cited above. A recent survey of South African information professionals across the fields of computer science, information science, information technology and library sectors was recently conducted by De Beer (2005). There is one point of overlap between that study and the present one. In the following result reported by De Beer, the figures in brackets represent the corresponding position of the biomedical researchers in this study. She found that 55% of information professionals know about *open access journals* (70%); 34% of information professionals knew about *institutional repositories* (25%) and 22% of them knew about *self-archiving* (10%). De Beer points out that her respondents were presented with a glossary of terms as a preliminary to advancing to the survey. This may account for higher levels of familiarity with open access terminology.

Seventy-two percent of the Research Managers (representing 50% of South African public universities) know something about open access while a markedly lower level of awareness is reported by the representatives from government-led research organisations (50%). The latter finding is unexpected and indicates that overt targeting of information is needed at this level. This group also expressed a need for further information when they were asked about the likelihood of their organisations creating open access policies for the funding, recognition or publication of research. This need for information is addressed under Recommendations below.

Once the questionnaire probed each group's acceptance of the outcomes of open access, however, all respondents felt confident about registering their agreement or disagreement. The high levels of agreement on the advantages that open access would secure (with occasional mild levels of uncertainty) signals their understanding of what could be achieved through widespread application of open access publishing.

7.2.3 Active interest in furthering open access

Whether this appreciation of the benefits would be translated into active choice for open access is a different matter. A recent JISC survey of 780 UK academics, (Sparks, 2005) was undertaken to determine the needs and preferences of researchers in different disciplines for information resources and for publishing their

work. While each of the 4 broad disciplinary groups registered between 60-72% levels of awareness of open access debates, only 8% of researchers in the physical and life sciences and 6% in social sciences and arts and humanities currently "prefer to publish in open access journals". This shows that knowledge of open access does not equate to changes in publishing behaviour. One explanation for this gap could be researchers' reliance upon the ratings of recognised journals that represent more status within the academic reward system. Nevertheless, 22% of the biomedical researchers in my study have already published in an open access journal while a further 13% were not sure whether the journals they had published with were open access or not.

Thirty-nine percent of them were prepared to accord open access journals equal status with subscription journals, 25% were not, while the remainder were unsure. De Beer's structured record review of academic departments at Stellenbosch University (2005) found that it was academics within humanities and social sciences departments that were actively engaged in hosting or promoting open access journals within their fields. She points out that these disciplines have a slower publication cycle than the natural sciences, suggesting that the faster publication associated with open access journals might be a drawcard for researchers in humanities and social sciences.

The perception that open access journals lack scientific rigour appears to linger. Swan (2004:63) reports that her survey elicited comments that suggested that some respondents viewed open access journals as a form of the vanity publishing that exists within book publishing: ie, if the author pays, the work will be published regardless of quality. Within the present study, only 50% of researchers and research organisations' representatives and a mere 12.5% of research managers believe that open access journals employ proper peer review processes.

My feeling is that the reluctance to commit to open access journals rests upon the unproven status of these publishing channels. Publications represent an immense amount of research work and decisions affecting this are not lightly taken. Across all groups, there were repeated comments concerning quality, reflecting the importance that branded journals holds for the academic community. However, each journal should be evaluated on its own merits and there is no consistent evidence for the generalisation that persists. As one respondent suggested, well-established authors,

for whom less risk is attached in experimental publication, are the ones that should take the lead in publishing in open access journals. This would lift their status and give the signal for younger career-oriented researchers to follow.

The conclusion is that, overall, these findings cannot be said to constitute an active interest in furthering open access publishing.

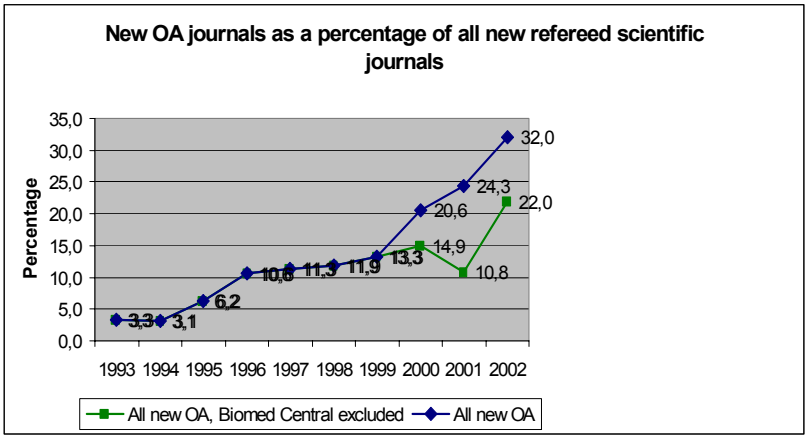
7.2.4 Sufficient availability of open access journals

Where researchers are conscious of the advantages of a widespread system of open access, they might be curious to investigate appropriate open access journals relevant to their fields. In order to be selected as a publication channel by researchers broadly, open access journals must have sufficient presence within the landscape of available journals. Providing an accurate count of these is not straightforward. Searching across *Ulrich's*, the most comprehensive periodicals directory, for scholarly, refereed open access journals returned a figure of 1,116 out of a total of 23,995 refereed scholarly journals. The Directory of Open Access Journals currently reflects 1,784 peer reviewed open access titles. Jan Szczepanski, a librarian at Goteberg University who has collected links and information on open access journals for years, provides a linked list of around 4,000 current open access journals[56].

When their growth rate is compared with that of subscription journals (see **Fig. 56** overleaf, reproduced from Hedlund et al, 2004), it can be seen that by 2002 nearly one third of all new journal titles were open access. The chart demonstrates both the upward rise in the prevalence of these journals over a ten year period as well the dramatic effect of the launch of BioMed Central.

[56] http://www.his.se/templates/vanligwebbsida1.aspx?id=20709

Fig. 56 OA journals as a % of all new refereed scientific journals reproduced from Hedlund et al (2005: 204)

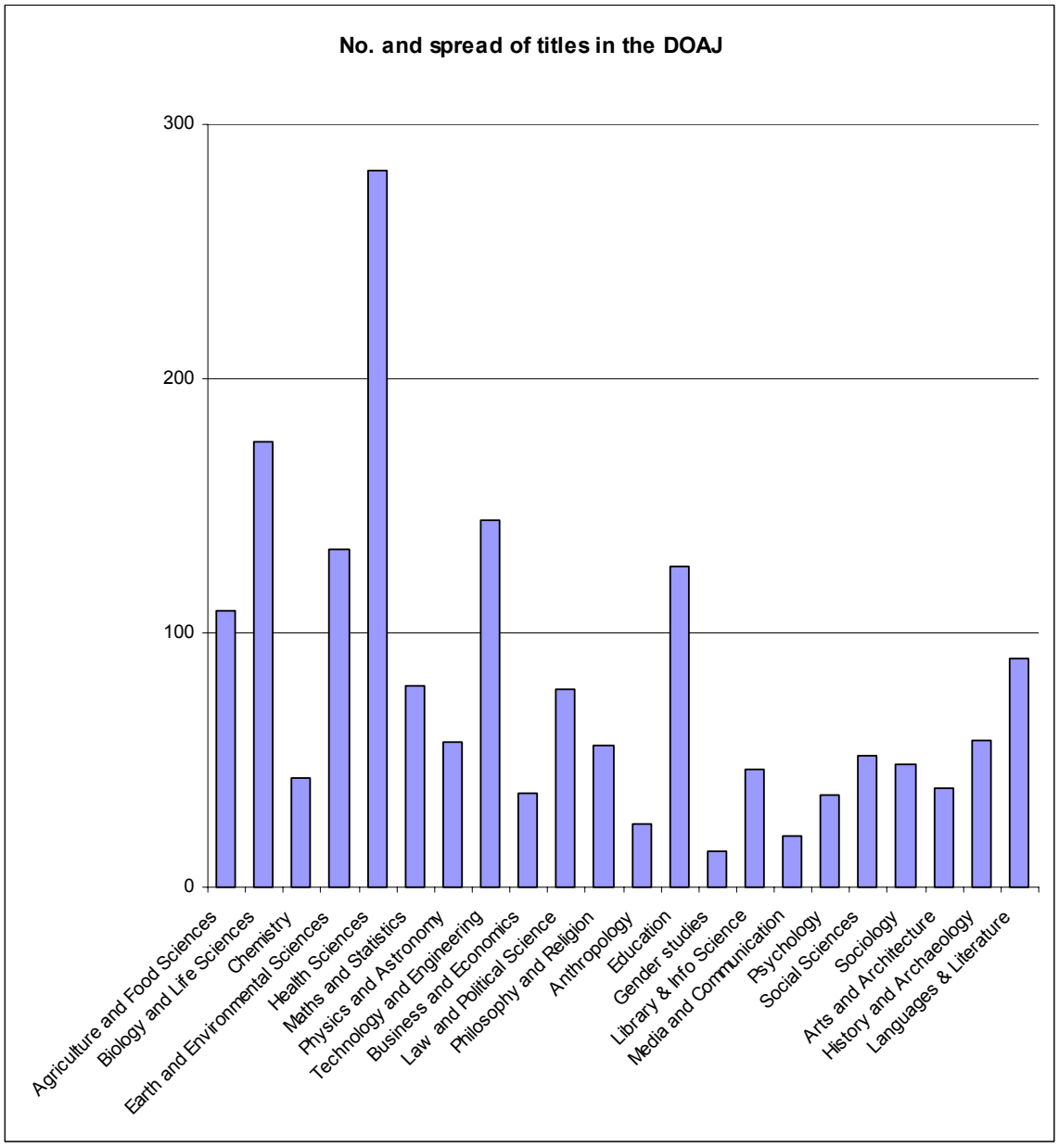


The chart overleaf (**Fig. 57**) provides a graphical representation of the number and spread of open access journals across disciplines and fields of study. The chart was created using information available from the Directory of Open Access Journals. The disproportionately high number of health sciences journals in relation to other fields creates an artificial impression. In the interests of displaying the range of social science fields represented, these journals were not collapsed under a broad social sciences heading. The total number of social sciences journals in the DOAJ is over 500, and hence represents the strongest showing of open access journals across the disciplines.

Swan's author survey (2004b: 63) found that the main reason that authors had not yet published in open access journals is that they were not familiar with any in their field. This is very likely to be the case for South African researchers too. Hedlund, Gustafsson & Bjork (2005:209) remarks that marketing of open access journals has largely been neglected. The success of BioMed Central and the Public Library of Science may partly be attributed to the massive publicity that surrounded their launch and the sophisticated information services they offer. The founders of both these publishing houses had extensive prior experience within the publishing industry. Such expertise is not easily matched within the bulk of open access journals that are equally not able to draw upon large capital investments. Greater penetration and awareness could be achieved by proper indexing within existing subject-based indexing services, by implementing the OAI protocol for harvesting metadata, so that articles are discovered independently (Hedlund, Gustafsson &

Bjork, 2005:209) and by employing marketing strategies that target individual authors.

Fig. 57 Number and spread of titles in the Directory of Open Access Journals (DOAJ)



Since South African researchers in most disciplines find it easier to be published within local journals, a key consideration is how many of these are open access. De Beer reports 20 Africa-related titles within DOAJ of which just 4 are produced in South Africa (2 within science fields, 2 within social sciences). To this may be added

Water SA, a journal that contains original work in all branches of water science, technology and engineering. This field is vitally important for improving the quality of people's lives. *Water SA,* the *South African Journal of Animal Science* and the *South African Journal of Information Management* are also accredited journals, the former two being indexed by the ISI Science Citation Index. South African journals are predominantly produced by learned societies and professional associations and many of these are becoming online journals. As with many open access journals, these titles depend upon the voluntary services of academics who face the challenges of producing issues on time, attracting quality submissions, as well as securing paying members and subscribing institutions.

While local journals might be wary of undertaking a switch to an 'author pays' business model, it is likely that they would find their financial situation more secure as a result of upfront payments to cover production costs, particularly should they decide to discontinue print editions (Friend, 2004). Individual academic departments that subsidise such article charges would be able to recover these costs from the Dept of Education subsidy, where these costs arise from publication within an accredited journal. To the survey respondents, the idea of article charges did not appear to constitute an insurmountable obstacle to publishing in open access journals. Many local journals already levy page fees and the local article charges would not begin to approach the levels for international journals discussed in Chapter 5. I contend that where local journals receive government subsidies, these have an obligation to convert to open access.

7.2.5 Accreditation levels

Journals that attract Dept of Education subsidy are those included within ISI databases, or the International Bibliography of Social Sciences or the Department's own list of recognised South African journals. It takes several years for new journals to achieve official impact factors through Thomson ISI (Cockerill, 2004:93). A search of *Ulrichs* finds only 210 open access journals currently included within ISI citation database. As reported in the presentation of findings, 79% of researchers expressed a desire for greater recognition of open access journals where these met the requisite criteria. The requirements for proposing the inclusion of a South African journal in the accredited list are not arduous and are as follows:

- submission of 3 consecutive issues for a quarterly or higher frequency journal and one issue for annual publications;
- submission of information about the status of the members of the editorial board;
- submission of editorial policy, including evidence of the peer review process;
- indication of library holdings and the journal's ISSN number (Ministry of Education, 2003:11)

Only 2 of the 5 identified South African open access journals are currently included on the list of 220 approved South African journals.

7.3 Answering the research question

Based on the discussion above, it is possible to forecast with some certainty that, *within the prevailing framework*, there is little likelihood of South African researchers choosing to publish in open access journals. There are several obstacles, the most important being: lack of incentive to pursue open access as a course of action; the enduring perception that open access journals lack rigour; insufficient information about appropriate open access journals within a given field; and the relatively small number of accredited open access journals available. The combination of these factors presents an unpromising prospect for open access journals locally.

Fortunately, this discouraging outlook may be averted by means of several direct and indirect interventions. The indirect interventions will occur as a result of developments within the movement towards open access itself, as it gains further momentum. For example, many mainstream publishers have established 'author choice' options or are converting existing journals to open access. These experiments will filter through to increase local researchers' consciousness of the drive towards open access. Additionally, with the growing number of open access articles discoverable through *Google*, (both self-archived and from open access journals themselves), they will increasingly become direct beneficiaries of open access. Through their use of the material they should recognise that open access does not inherently bring about a loss of quality. Academics serving on editorial boards of local journals may begin to push for these to experiment with variations on the existing subscription model. At policy level, virtually every month there are reports of open access being endorsed or mandated by research funders, research

organisations themselves or government-led agencies. This advancing threshold is likely to become more pervasive until it reaches some 'tipping point', after which local research managers and policy makers can no longer not act in a decisive way. Similarly, it is possible that the success of local institutional repositories may send a signal to authorities that it is possible to harness technology to promote the visibility, accessibility and impact of local research.

While these developments arising out of indirect interventions are positive and desirable, and seem inevitable, they are insufficient to create a widespread swing within the South African research system. For this to occur several overt actions are necessary. The following section presents recommended courses of action.

7.4 Recommendations

Proactive direct interventions are preferable to the passive response implied by the indirect interventions above. In order to bring about the benefits of open access as soon as possible, the following courses of action are proposed.

There is evidence that a much more active role should be adopted by academic librarians. Only 15% of Researchers have learned about open access from a librarian. Faculty librarians can act as change agents by informing and advocating for open access within the departments they serve. Ninety percent of the university-based Research Managers felt that a library-led campaign was a promising strategy for bringing about wider awareness on campus. A promotional brochure of the open access movement, *Create Change*, urges scholars and librarians to actively pursue and promote open access channels within their institutions and lists concrete measures they may take to promote the rapid and efficient transition to open access publishing. The Create Change website[57] provides tools and an advocacy kit as well as a Powerpoint presentation that may be adapted for local use. Because the website site is sponsored by the Association of Research Libraries, there is a heavy emphasis on educating librarians on how to run an advocacy campaign. The objectives of such a campaign are to make faculty and administrators fully aware of the developing crisis in the scholarly communication system, to provide information on journal costs, journal use and cost-effectiveness, and foster understanding of library decision processes and to engage their support in those processes (eg, large-scale journal

[57] http://www.createchange.org/

cancellations), and to stimulate informed discussion on issues such as copyright. The library sector should be teaching users about the benefits of open access publishing and listing and highlighting open access journals in catalogues and databases. The BioMed Central website also offers a variety of open access advocacy resources.

To overcome the identified gap in awareness of open access at policy level (see p.131 above), more organised campaigns are necessary. LIASA, the South African library professional organisation, should lobby government departments (in particular, the Dept of Science & Technology and the Dept of Education), as well as government-led research agencies to alert them to the advantages of open access for research and learning. As an example, when the National Research Foundation undertook its strategic review this year, I attended one of the public sessions arranged by the international review panel and was able to deliver a motivation that the NRF consider open access as one of its policy objectives. How much more effective this would have been if it had been submitted under the auspices of a professional library association. It is therefore recommended that LIASA formulates nuanced position papers that address the opportunities that open access presents for the different functions of each government agency. These should be presented via formal channels, for example through appropriate Parliamentary Portfolio Committees, so that open access is inserted onto official agendas.

Other arenas for organised advocacy include organisations within the higher education sector, starting with Higher Education South Africa (HESA), the newly constituted merger of the South African University Vice Chancellors Association and the Committee of Technikon Principals. The main thrust of the lobby to this group would be towards the importance of creating institutional repositories at all universities, with a view to universalising the practice of self-archiving, both to increase visibility of and access to institutional research output. The strength of support for establishing such repositories indicated by university research managers within the survey suggests that this recommendation is achievable. The notional acceptance of the principle by this group would need to be followed up by practical training, for example, repeats of the successful workshop organized by SASLI.

The avenues for advocacy mentioned above are preliminary steps towards the actual objective: the promulgation of a legislated policy statement that mandates open access. De Beer's MPhil dissertation focuses on the importance of open access for

South Africa's national system of innovation. She draws attention to openings within existing national information, science and technology, and innovation policies that provide "an enabling policy environment" for the introduction of open access (De Beer, 2005: 136-7). I strongly second her recommendation that government mandate open access so as to require researchers to deposit e-prints of all articles arising out of publicly-funded research within open access repositories, or to publish these in open access journals (De Beer: 139). Again, the level of positive response from respondents to the survey's proposal that prompt self-archiving should become a condition of research funding indicates that this recommendation is within reach. Seventy-five percent of the government-led organiations and 82% of the research managers indicated that this would be likely to be supported by their institutions.

The inclusion of open access journals within such a mandate requires additional policy provision. Firstly, the Dept of Education should understand and accept that authors may be liable for article charges. In many cases, open access journals do not apply these and international open access journals would be likely to waive them for South African authors; but South African open access journals would rely upon such income to meet their production costs. The mandate should thus also require researchers to plan for such an eventuality within their research grant budget. Where researchers do not receive direct funding, publication fees should be recoverable from government subsidy.

Secondly, the fact that most accredited local journals are not open access is problematic for the terms of this government mandate. Such journals provide an essential platform for many fields of study, particularly for younger researchers. In line with the experience of Bioline International reported above, I maintain that operating within an open access paradigm would increase their visibility and circulation, with corresponding improvement in reach and impact. Since page costs are already common practice amongst many local journals, increasing these to meet all production costs plus a small margin for journal marketing would not be disruptive to the operation of the journal, especially if print editions were discontinued.

It is important that independently-constituted learned societies should shape their own policies and it is not implied that government policy should impinge on this autonomy. However, through explicit policy communication, it should be widely

understood that, where local journals choose to become open access, article charges would be recoverable from government subsidy. Editorial boards might welcome the security of guaranteed income for each successive issue. Furthermore, in the interests of enhancing the usability and visibility of South African publications, official support should be provided to assist accredited print journals to transfer to online production and content.

7.5 Further research

It would be both interesting and useful if several studies were to track "before" and "after" scenarios of journals that had converted to open access. Different studies would be required for the separate categories of publishers: commercial, society, and university press. The interest value lies in measuring the changes in submission rates, profit margin and impact factor. The use value would be for providing comparable and useful business information and data for journals that have not yet become open access.

7.6 Concluding comments

Open access is a very new, dynamic, yet disruptive force that is compelling actors within the scholarly communication cycle (scholars, research funders, research evaluators, publishers, libraries) to reconsider their positions and strategies. Its fiercely attractive benefits cannot be won without considerable wrestling and reconfiguration of existing processes, protocols and mindsets. Notwithstanding the rapid growth of open access journals across all fields, it will take some time to achieve widespread changes to longstanding publishing models. Within the South African setting, it appears that more rapid advances will be made through efforts to mainstream the practice of self-archiving within institutional repositories, as these have recently made positive gains. The important long-term objective is universal 100% open access to publicly funded research and all progress towards this goal is to be celebrated.

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Appendix 1: Questionnaire sent to Researchers on 18 June 2005

Dear Biomedical Researcher
You are part of a sample of 500 South African scientists that have published an article in an international or accredited biomedical journal within the last 18 months. Your email address was obtained from ISI Web of Science.

You are invited to participate in a survey that is being addressed to representative stakeholders with an interest in improving research communication and dissemination. Other opinion leaders within the research network are being approached for their input. These include the NRF, Science and Research Councils, the Dept of Science & Technology, the Dept of Education and Deans of Research at South African universities.

The survey concerns the phenomenon of open access publishing, which enables the widest possible dissemination of reported advances in scientific knowledge by removing copyright and financial barriers that prevent access to peer-reviewed journal articles. Open access has garnered significant support from scholarly/research bodies throughout the world and has received high-level attention from several governments.

The online questionnaire asks for information from you as a reader and author of scientific literature. It aims to ascertain whether you have any previous knowledge of this development within scholarly publishing, and to invite your views on several aspects of open access journals.

The survey forms a crucial component of my Masters research thesis. The main objective of my study is to establish the likelihood of the widespread uptake of open access journals as a publishing platform in South Africa.

The online questionnaire contains 27 short questions, most requiring only a tick, while offering opportunities for additional comments, if desired. The submission of your response is completely anonymous and cannot be linked to any participating individual.

I appreciate the value of your time and ideas and thank you for voluntarily contributing to improving the validity of the survey. The questionnaire should take little more than 20 minutes and may prove informative for you too. I will distribute a digest of the responses within a few months. The cut-off submission date is **22 July**.

Please click on this link to advance to the questionnaire:

http://www.cshe.uwc.ac.za/questionaire/questions_researcher.asp

Thank you
Allison Möller

AUTHOR QUESTIONNAIRE

The following questions explore your experience and views as a reader of biomedical articles

Access to Journal Literature

Question 1 **How would you describe your current level of access to the journal literature?**

- ☐ Very poor: I always have great difficulty getting the journals I need
- ☐ Poor: I frequently have difficulty getting the journals I need
- ☐ Varies: I sometimes have difficulty getting the journals I need
- ☐ Good: I have access to most of the journals I need
- ☐ Excellent: I have access to all the journals I need

[Rowlands, 2004]

Question 2 **Within your field of specialization, how important is immediate access to newly published articles?**

- ☐ Crucial
- ☐ Important
- ☐ A six to twelve month delay is acceptable
- ☐ Other response (fill in below)

Awareness of Open access

You may have followed recent debates about open access publishing.

Question 3. **Do you know anything about open access publishing?**

- ☐ Yes
- ☐ No

Question 4 **If Yes, please explain what you understand by this term**

Routes to Open access

Question 5. **Please place a tick alongside the terms that are familiar to you**

- ☐ Self-archiving
- ☐ Open access journals
- ☐ Institutional repositories
- ☐ None of these

Benefits of Open access

Question 6. **Please place a tick in the relevant block for each of the following statements:**

6A Open access boosts developing countries' access to scholarly literature

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6B Open access promotes developing countries' engagement with global science

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6C Open access promotes the advance of scientific knowledge (research, teaching)

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6D Open access provides more accountable use of publicly funded research

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6E Open access articles will be read by more people, and hence probably cited more often

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6F Authors retain copyright over their work and are free to use it as they wish

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6G The decades-long serials crisis (escalating costs of subscriptions/licence fees) facing libraries will be broken

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6H Open access publishing represents a savings at a systemic level

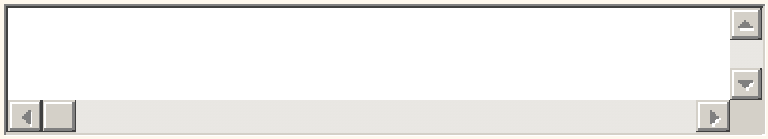
Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

Open access Journals

Open access journals are generally relatively new titles that have been launched within the past 3-4 years. They may be published by small groups of specialists, by societies, or by commercial publishers.

Question 7. **How have you learned about these titles?**

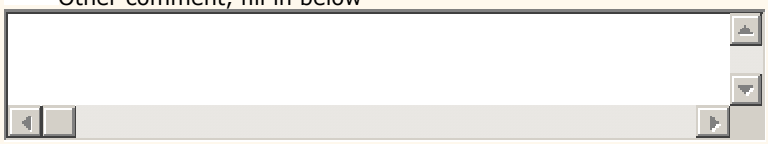
- [ ] Direct publicity from the journal publisher
- [ ] Notices posted on listservs I belong to
- [ ] My society newsletter or bulletin
- [ ] Through word of mouth or from an associate
- [ ] Through a faculty librarian or the online catalogue
- [ ] By chance (eg, while looking for information on the Web)
- [ ] I have not come across any open access journals
- [ ] Other, fill in below



Obviously, each journal is unique and reflects the policy of its editorial board. Many open access journals are relatively young while others are more established titles that have converted to open access.

Question 8. **Where you have sampled articles from open access journals, what has been your overall perception of this material?**

- [ ] The articles are original and represent high quality research
- [ ] The articles represent adequate standards of quality and have scientific merit
- [ ] The articles generally are quite mediocre or of little scientific worth
- [ ] I have not read any articles from an open access journal
- [ ] Other comment, fill in below



The following questions explore your experience and views as a published author of biomedical articles.

Publishing experience

Question 9. **Have you ever published a paper in an open access journal?**

- [ ] Yes
- [ ] No
- [ ] I?m not sure

Question 10. **Where you have published in traditional (ie, subscription-based) journals, have you ever had to pay publishers? page costs/illustration fees?**

☐ Yes

☐ No

Question 11. **Please specify how much was paid (the most recent occasion)**

Approximately (Rands or equivalent if foreign currency) R Year:
OR

☐ I have not paid publishing costs

Question 12. **What funds were used to cover these expenses?**

☐ Research grant

☐ Institutional funds

☐ Departmental funds

☐ Personal funds

☐ Co-authors paid

Question 13. **Have you ever had to negotiate with a publisher to re-use your own work for teaching, presentations, subsequent publication?**

☐ Yes, I have

☐ No, I have not (ie, I opted to re-use the material without permission)

☐ No, I have not needed to

Question 14. **Which factors influence your choice of where to submit an article? Please rank the following in order of importance (where 1 = most important and 10 = least important):**

1 Specialised readership

1 Large readership

1 The reputation of the journal (impact factor)

1 The standing of the editorial board

1 Journal is published by your society

1 Journal is indexed by abstracting/indexing services

1 Where I think it will be accepted

1 Speed of publication process

1 Price of the journal

1 Accreditation status

[Rowlands, 2004]

Open access journals

Question 15. **From the perspective of an author, what is your perception of Open access journals?**

15A. I don't know anything about these journals

OR:

Place a tick in the relevant block for each of the following statements:

15B. They are better than traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

15C. They are on a par with traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

15D. They do not offer proper peer review

Agree strongly Agree Not sure Disagree Disagree strongly

15E. They publish faster than traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

15F. They provide greater visibility for one's work

Agree strongly Agree Not sure Disagree Disagree strongly

15G.They offer greater impact for one's work

Agree strongly Agree Not sure Disagree Disagree strongly

15H. They are not recognised by South African review committees/research funders

Agree strongly Agree Not sure Disagree Disagree strongly

15I. Other comment, if desired, fill in below

[Rowlands, 2004]

Open Access Author Charges

While many Open Access journals do not charge authors, several publishers require authors to pay **article processing fees** to publish in their open access journals. A range that is common is $1500 - $2500 per article. International publishers waive

research-intensive institutions will shoulder the costs of making their publications free for everyone else.

Question 16. **Please place a tick in the relevant block for each of the following statements:**

16A. Authors and their institutions benefit from successful publication ? this is an appropriate cost-recovery mechanism

Agree strongly Agree Not sure Disagree Disagree strongly

16B. Represents an equitable way of redistributing resources within the research system (haves and have-nots)

Agree strongly Agree Not sure Disagree Disagree strongly

16C. Appears to present a disincentive to publication

Agree strongly Agree Not sure Disagree Disagree strongly

16D. Standards of quality might fall if publishers were to accept articles merely to generate more income

Agree strongly Agree Not sure Disagree Disagree strongly

16E. Local journals would not survive within this business model

Agree strongly Agree Not sure Disagree Disagree strongly

16F. The overall systemic financial savings and improved access are the most important considerations

Agree strongly Agree Not sure Disagree Disagree strongly

16G. Any additional comment you may wish to register, fill in below

Question 17. Supposing that Open access journals became the norm**, which agency do you think should bear the cost of author fees, where these cannot be waived?**

The author's department

The author's institution

Research funder

Corresponding government department (Health, Education, Science & Technology, Trade & Industry, Arts and Culture, Finance, etc)

Institutional funds freed up from the demise or cancellation of journals charging traditional subscription or access fees

Some combination of the above sources

Other suggestion or comment, fill in below

Other issues : Copyright

Under open access, readers may freely read, print, store and use your work, on condition that full attribution to the author and the citation is provided.

Question 18. **What is your response to such an unregulated environment? Please place a tick in the relevant block for each of the following statements:**

18A. I look forward to a freer system that enables everyone to put knowledge to work

Agree strongly Agree Not sure Disagree Disagree strongly

18B. I welcome any use of my work, providing that it is properly acknowledged

Agree strongly Agree Not sure Disagree Disagree strongly

18C. I feel certain that this system will encourage plagiarism

Agree strongly Agree Not sure Disagree Disagree strongly

18D. I feel uneasy that others might seek to profit financially from my work

Agree strongly Agree Not sure Disagree Disagree strongly

18E. I feel concerned that the integrity of my article might not be assured

Agree strongly Agree Not sure Disagree Disagree strongly

18F. Any additional comment? (fill in below)

Other issues: Preservation

Question 19. **Please place a tick in the relevant block for each of the following statements:**

19A. Universities, learned organizations or national bodies offer more stability than commercial publishers as sites for the preservation of scholarly materials

Agree strongly Agree Not sure Disagree Disagree strongly

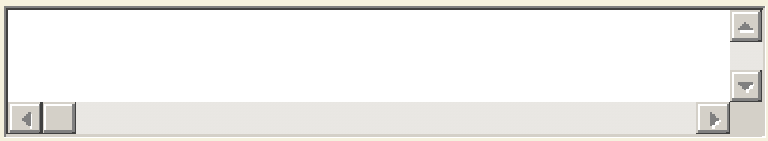
19B. As long as information is available, used and appears in many places, it tends to be preserved.

Agree strongly Agree Not sure Disagree Disagree strongly

19C. I feel confident that open disciplinary or institutional repositories can provide persistent access to digital materials for future users

Agree strongly Agree Not sure Disagree Disagree strongly

19D. Any additional comment?



Other issues: Academic reward system

Publication plays a vital role in consideration of academic rating, promotion or grants.

Question 20. **Please place a tick in the relevant block for each of the following statements:**

Publishing my work in open access journals:

20A. may adversely affect my chances of appointment/promotion/winning research grants

Agree strongly Agree Not sure Disagree Disagree strongly

20B. may adversely affect the careers of my co-authors

Agree strongly Agree Not sure Disagree Disagree strongly

20C. may adversely affect the potential impact of my published work

Agree strongly Agree Not sure Disagree Disagree strongly

20D. may adversely affect the economic viability of scholarly society journals

Agree strongly Agree Not sure Disagree Disagree strongly

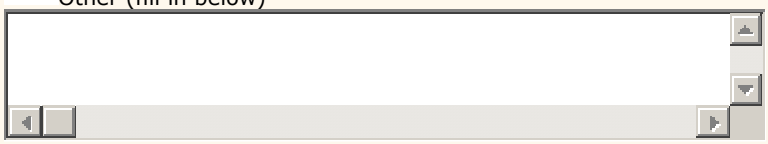
[JISC/OSI, 2004]

Question 21. **Would you want to see greater explicit endorsement for the Open access philosophy by South African research managers or organisations such as the NRF or the Department of Education?**

Yes

No

Other (fill in below)



Question 22. **How could this be best achieved, in your opinion? Tick as many as you think applicable and feasible**

Promotion of awareness of Open access as an alternative possibility for publication, through newsletters or information on websites

Pursuing accreditation of Open access journals

Explicitly recognising or rewarding open publication as a service to science

☐ Requiring the prompt (within 6 months) deposit of peer-reviewed articles within Open archives (disciplinary/institutional) as a condition of funding

☐ Creating an Open access archive

☐ Launching Open access journal/s

☐ Other (please specify below)

About You

Question 23. **Which of these broad subjects best describes your main speciality?**

☐ Biochemistry, genetics and molecular biology

☐ Biological sciences

☐ Ecology

☐ Immunology and microbiology

☐ Medicine/ allied health

☐ Neuroscience

☐ Pharmacology, toxicology and pharmaceutics

☐ Psychiatry and psychology

☐ Veterinary science

☐ Other (specify below)

Question 24. **What kind of organisation do you work for?**

☐ Government

☐ Hospital

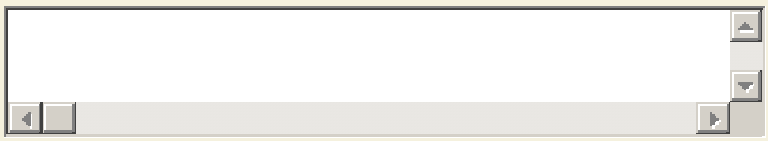
☐ Medical school

☐ University

☐ Research institute

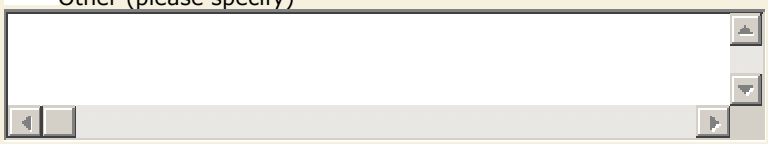
☐ Self-employed (consultant)

☐ Other (specify below)



Question 25. **Please specify your primary role**

- conduct research
- conduct research with some teaching
- conduct both research and teaching
- Mostly teach, with some research
- Teach
- Other (please specify)



Question 26. **What is your age range?**

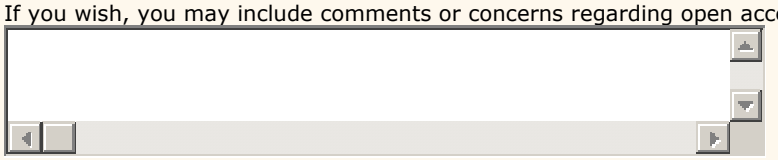
- Under 26
- 26-39
- 40-50
- Over 50
- Refused

Question 27. **Your sex:**

- Female
- Male

Comments or Suggestions

If you wish, you may include comments or concerns regarding open access, scholarly publishing or this questionnaire.



STATEMENT OF VOLUNTARY CONSENT

I give permission for the anonymous processing of my responses for this survey on Open access publishing

Please tick the Yes block. If it is not marked your responses cannot be processed.

☐ Yes

Thank you very much for your contribution. A summary of the results will be posted to the group within a few months.

References

- Swan, A.& Brown, S.N. (2004) JISC/OSI Journal Authors Survey Report. www.jisc.ac.uk/uploaded_documents/JISCOAreport1.pdf
- Rowlands I, Nicholas D, Huntingdon P. (2004) Scholarly communication in the digital environment: what do authors want? Findings of an international survey of author opinion: project report. London: Centre for Information Behaviour and Evaluation of Research, Department of Information Science, City University. http://ciber.soi.city.ac.uk./ciber-pa-report.pdf

Appendix 2: Questionnaire sent to Research Managers on 20 June 2005

As manager of the Research division of your university, you are invited to participate in a survey that is being addressed to representative stakeholders with an interest in improving research communication and dissemination. Other opinion leaders within the research network are being approached for their input. These include the Dept of Science & Technology, The Dept of Education, the NRF, Science and Research Councils, and a sample of recently published authors in the biomedical fields.

The survey concerns the phenomenon of open access publishing, which enables the widest possible dissemination of reported advances in scientific knowledge by removing copyright and financial barriers that prevent access to peer-reviewed journal articles. Open access has garnered significant support from scholarly/research bodies throughout the world and has received high-level attention from several governments.

The online questionnaire aims to ascertain your awareness of this development within scholarly publishing, and to invite your views on several aspects of open access journals and institutional repositories. Lastly the survey aims to discover whether your institution might play a role in fostering the uptake of open access in South Africa.

The survey forms a crucial component of my Masters research thesis. The main objective of my study is to establish the likelihood of the widespread adoption of this particular publishing platform in South Africa.

There are just 15 questions, most requiring only a tick, while offering opportunities for additional comments, if desired. The submission of your response is completely anonymous and cannot be linked to any participating individual.

I appreciate the value of your views and your time. The questionnaire should take little more than 20 minutes and may prove informative for you too. I will distribute a digest of the responses within a few months. The cut-off submission date is **22 July**.

Please click on this link to advance to the questionnaire:

http://www.cshe.uwc.ac.za/questionaire/questions_manager.asp

Thank you
Allison Möller

Research Manager Questionnaire

Your institution

***Question 1*. Would you characterise the nature of your institution as**

- ☐ Historically advantaged
- ☐ Historically disadvantaged
- ☐ Newly merged institution
- ☐ Other preferred category

Access to Journal Literature

Under the present subscription/licensing system, the journal literature that researchers may access is generally limited to what can be afforded by their institution. This may be through subscriptions to individual journal titles, or through licenced access to bundles of aggregated content (electronic databases).

***Question 2* How would you describe the scope of your institution's offerings at present?**

- ☐ Very poor: researchers always have great difficulty getting the journals they need
- ☐ Poor: they frequently have difficulty getting the journals they need
- ☐ Varies: they sometimes have difficulty getting the journals they need
- ☐ Good: they have access to most of the journals they need
- ☐ Excellent: they have access to all the journals they need

[Rowlands, 2004]

Awareness of Open access

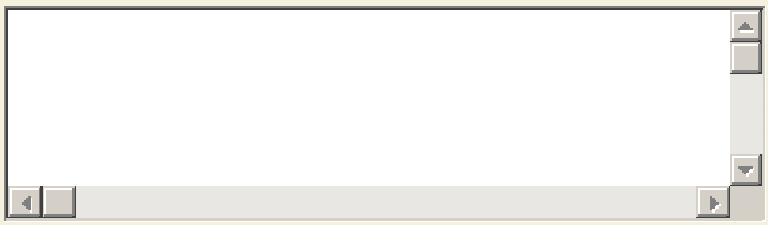
You may have followed recent debates about open access publishing.

***Question 3.* Do you know anything about open access publishing?**

- ☐ Yes
- ☐ No

Question 4

If Yes, please explain what you understand by this term



Routes to Open access

Question 5. **Please place a tick alongside the terms that are familiar to you**

- ☐ Self-archiving
- ☐ Open access journals
- ☐ Institutional repositories
- ☐ None of these

Benefits of Open access

Question 6. **Please place a tick in the relevant block for each of the following statements:**

6A Open access boosts developing countries' access to scholarly literature

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6B Open access promotes developing countries' engagement with global science

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6C Open access promotes the advance of scientific knowledge (research, teaching)

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6D Open access provides more accountable use of publicly funded research

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6E Open access articles will be read by more people, and hence probably cited more often

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6F Authors retain copyright over their work and are free to use it as they wish

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6G The decades-long serials crisis (escalating costs of subscriptions/licence fees) facing libraries will be broken

Agree strongly ☐ Agree ☐ Not sure ☐ Disagree ☐ Disagree strongly ☐

6H Open access publishing [illegible]

Agree strongly Agree Not sure Disagree Disagree strongly

Obviously, each journal is unique and reflects the policy of its editorial board. Many open access journals are relatively young while others are more established titles that have converted to open access.

Question 7. **Where you have sampled articles from open access journals, what has been your overall perception of this material?**

The articles are original and represent high quality research

The articles represent adequate standards of quality and have scientific merit

The articles generally are quite mediocre or of little scientific worth

I have not read any articles from an open access journal

Other comment, fill in below

Question 8. **What is your perception of Open access journals?**

8A. I don't know anything about these journals

OR:

Place a tick in the relevant block for each of the following statements:

8B. They are better than traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

8C. They are on a par with traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

8D. They do not offer proper peer review

Agree strongly Agree Not sure Disagree Disagree strongly

8E. They publish faster than traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

8F. They provide greater visibility for one's work

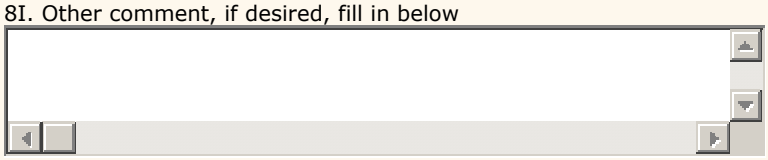
Agree strongly Agree Not sure Disagree Disagree strongly

Agree strongly Agree Not sure Disagree Disagree strongly

8H. They are not recognised by South African review committees/research funders

Agree strongly Agree Not sure Disagree Disagree strongly

8I. Other comment, if desired, fill in below



[Rowlands, 2004]

Economic considerations

While many Open Access journals do not charge authors, several publishers require authors to pay **article processing fees** to publish in their open access journals. A range that is common is $1500 - $2500 per article. International publishers waive these for authors from developing countries or for authors unable to pay. It is clear that 'net reader' institutions gain while research-intensive institutions will shoulder the costs of making their publications free for everyone else.

Question 9. **Please place a tick in the relevant block alongside each of the following statements:**

9A. Authors and their institutions benefit from successful publication ? this is an appropriate cost-recovery mechanism

Agree strongly Agree Not sure Disagree Disagree strongly

9B. Represents an equitable way of redistributing resources within the research system (haves and have-nots)

Agree strongly Agree Not sure Disagree Disagree strongly

9C. Appears to present a disincentive to publication

Agree strongly Agree Not sure Disagree Disagree strongly

9D. Standards of quality might fall if publishers were to accept articles merely to generate more income

Agree strongly Agree Not sure Disagree Disagree strongly

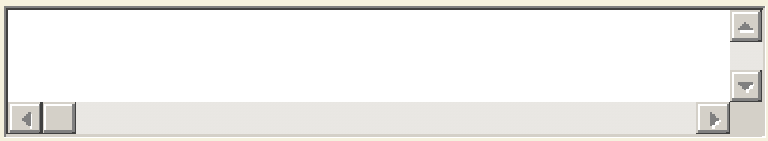
9E. Local journals would not survive within this business model

Agree strongly Agree Not sure Disagree Disagree strongly

9F. The overall systemic financial savings and improved access are the most mportant considerations

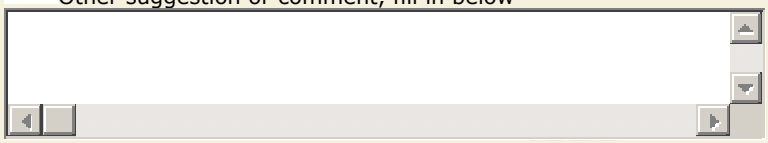
Agree strongly Agree Not sure Disagree Disagree strongly

9G. Any additional comment you may wish to register, fill in below



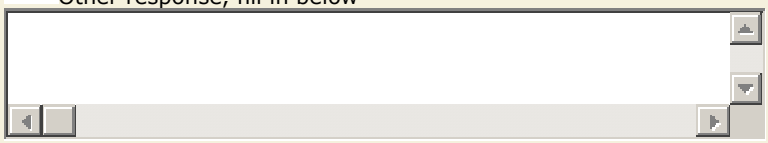
Question 10. **Supposing that Open access journals became the norm, which agency do you think should principally bear the cost of author fees, where these cannot be waived?**

- ☐ The author's institution
- ☐ The author's department
- ☐ Research funder
- ☐ Corresponding government department (Health, Education, Science & Technology, Trade & Industry, Arts and Culture, Finance, etc)
- ☐ Institutional funds freed up from the demise or cancellation of journals charging traditional subscription or access fees
- ☐ Some combination of the above sources
- ☐ Other suggestion or comment, fill in below



Question 11. **Some subscription journals also charge page costs or illustration fees. Has your office been approached as a sponsor for these costs?**

- ☐ No, these costs are usually built into funding proposals
- ☐ No, individual departments cover such costs
- ☐ *Yes,* **non-funded** authors have requested sponsorship for these costs
- ☐ Other response, fill in below



Other issues : Copyright

Under open access, readers may freely read, print, store and use articles, on condition that full attribution to the author and the citation is provided.

Question 12. **What is your response to such an unregulated environment? Please place a tick in the relevant block for each of the following statements:**

Agree strongly Agree Not sure Disagree Disagree strongly

12B. I feel certain that this system will encourage plagiarism

Agree strongly Agree Not sure Disagree Disagree strongly

12C. Unscrupulous persons might seek to profit financially from others' work

Agree strongly Agree Not sure Disagree Disagree strongly

12D. Any additional comment? (fill in below)

Other issues: Preservation

Unlike paper journals, the content of subscription-based online journals is leased rather than owned by libraries. Only some large commercial publishers that own the content can guarantee permanent access to this
material over the long term.

By contrast. the relaxed freedom to copy, download, and store open access materials invites their ready availability in multiple sites over the long term.

Question 13. **Please place a tick in the relevant block for each of the following statements:**

13A. Universities, learned organizations or national bodies offer more stability than commercial firms as sites for the preservation of scholarly materials

Agree strongly Agree Not sure Disagree Disagree strongly

13B. As long as information is available, used and appears in many places, it tends to be preserved.

Agree strongly Agree Not sure Disagree Disagree strongly

13C. I feel confident that open disciplinary or institutional respositories can provide persistent access to digital materials for future users

Agree strongly Agree Not sure Disagree Disagree strongly

13D. Any additional comment?

Advocacy and Promotion of Open Access

A study by CIBER (Rowlands, 2004) showed that most senior researchers knew very little about open access. Another study commissioned by the UK's Joint Information Systems Committee (JISC) and the Open Society Institute (Swan & Brown, 2004) showed that when researchers do know about open access, they support it in large majorities. So the problem is not researcher opposition, but researcher ignorance and inertia.

Question 14. **How might your institution bring about greater awareness of open access? Tick as many as you think applicable and feasible**

- ☐ Via communications distributed to the research networks on campus
- ☐ Via the research ethics committee or structure
- ☐ Library-led awareness campaign
- ☐ Post-graduate/professional development workshops
- ☐ Cross-departmental workgroup
- ☐ Other response, fill in below

University support for Open Access

Several universities (or national groups of universities) have introduced policies that urge university staff to play a role in strengthening open access initiatives.

The following measures are representative of the strategies included in these institutional statements.

Question 15. **Please indicate, in your opinion, which of these measures your institution would support.**

15A. Explicit recognition or reward for open publication as a service to science

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

15B. Encourage efforts of scholars to support open access journals in their capacity as editors, referees and members of scientific boards and learned associations.

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

15C. Recommend that researchers retain copyright over their articles, granting publishers a licence to publish so as to enable subsequent self-archiving in open archives

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

15D. Urge faculty to contribute to the growing body of open access peer-reviewed literature available in disciplinary or institutional digital archives through self-archiving.

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

15E. Requiring the prompt (within 6 months) deposit of peer-reviewed articles within open archives as a

condition of institutional funding, subject to the copyright and licencing arrangement of the journal publishing the paper*.

Already supports Would be likely to support Would need more information Would not support

15F. Encourage the University's libraries to reallocate resources away from high-priced publishers

Already supports Would be likely to support Would need more information Would not support

15G. Sponsor author charges in Open Access journals, where necessary

Already supports Would be likely to support Would need more information Would not support

15H. Establish infrastructure such as an institutional repository for the scholarly output of the university, including theses.

Already supports Would be likely to support Would need more information Would not support

** 72% of academic publishers already permit self archiving to departmental or institutional archives.*

Question 16. **Please indicate the response that most closely matches the current status of your institution's response to open access publishing. If appropriate, more than one option may be selected.**

- To my knowledge, open access publishing has not yet been discussed at strategic or business meetings
- Open access publishing has been raised, but not yet taken forward
- The university is in the process of developing a policy on open access publishing with regard to the research it funds
- The university is in the process of developing a policy with regard to recognising open access publications as part of its academic review or grants making processes
- The university intends, or has already begun, to institute an open online archive that will collect and preserve the digital research outputs (peer-reviewed or other papers, teaching resources, data) produced by the university. This may be a consortial project
- Launching Open access journal/s
- Other (please specify below)

Comments or Suggestions

If you wish, you may include comments or concerns regarding open access, scholarly publishing or this questionnaire.

STATEMENT OF VOLUNTARY CONSENT

I give permission for the anonymous processing of my responses for this survey on Open access publishing

Please tick the Yes block. If it is not marked your responses cannot be processed.

☐ Yes

Thank you very much for your contribution. A summary of the results will be posted to the group within a few months.

References

- Swan, A.& Brown, S.N. (2004) JISC/OSI Journal Authors Survey Report. www.jisc.ac.uk/uploaded_documents/JISCOAreport1.pdf
- Rowlands I, Nicholas D, Huntingdon P. (2004) Scholarly communication in the digital environment: what do authors want? Findings of an international survey of author opinion: project report. London: Centre for Information Behaviour and Evaluation of Research, Department of Information Science, City University. http://ciber.soi.city.ac.uk./ciber-pa-report.pdf

Appendix 3: Questionnaire sent to Government Agencies on 20 June 2005

The organisation that you lead or help to lead is one of the premier research agencies within the South African science system, or is one of the major role-players charged with responsibility for developing South Africa's research strategy or capacity. As an opinion leader, you are invited to participate in a survey that is being addressed to representative stakeholders that hold a strong interest in improving research communication and dissemination.

The survey concerns the phenomenon of open access publishing, which enables the widest possible dissemination of reported advances in scientific knowledge by removing copyright and financial barriers that prevent access to peer-reviewed journal articles.

The online questionnaire aims to ascertain whether you have any previous knowledge of this development within scholarly publishing, whether it holds any scope for the furthering of your organisation's goals and objectives, and to gather specific information in this regard. Lastly, the survey aims to discover whether your organisation might play a role in fostering the uptake of open access in South Africa.

The survey forms a crucial component of my Masters research thesis. Different questionnaires have been sent to university research managers and to a sample of 500 recently published authors in the biomedical field. The group of policy makers and opinion leaders in the national research system is a small one and it is important that I capture as many responses as possible. I appreciate the value of your time and thank you for contributing to improving the survey's validity.

There are just 18 questions, most requiring only a tick, while offering opportunities for additional comments, if desired. The submission of your response is completely anonymous and cannot be linked to any participating individual.

The questionnaire should take less than 20 minutes and may prove informative for you too. I will distribute a digest of the responses within a few months. The cut-off submission date is **20 July**.

Please click on this link to advance to the questionnaire:
http://www.cshe.uwc.ac.za/questionaire/questions_organisation.asp

With thanks

Allison Möller

Questionnaire: Policy Makers and Opinion Leaders

About your organisation

Question 1 **The primary function of my organisation is**

- ☐ To produce research
- ☐ To fund research
- ☐ To manage national research functions
- ☐ To oversee institutions that train researchers
- ☐ A combination of some of these (please specify below)
- ☐ Other, please specify below

Awareness of Open access

You may have followed recent debates about open access publishing.

Question 2. **Do you know anything about open access publishing?**

- ☐ Yes
- ☐ No

Question 3 **If Yes, please explain what you understand by this term**

Routes to Open access

Please place a tick alongside the terms that are familiar to you

- ☐ Self-archiving
- ☐ Open access journals
- ☐ Institutional repositories

☐ None of these

Public Statements on Open Access

The increasing importance of open access has been underlined by several public statements endorsing the open access philosophy.

Question 5 **Please place a tick alongside any of the following that have come to your attention:**

☐ Public Library of Science Open Letter

☐ Bethesda Statement on Open Access Publishing

☐ Berlin Declaration on Open Acess to Knowledge in the Sciences and Humanities

☐ Statement on Access to Scientific Information (InterAcademy Panel on International Affairs)

☐ The UK House of Commons Inquiry into Scientific Publications

☐ OECD Declaration On Access To Research Data From Public Funding

☐ The National Institutes of Health policy on Enhancing Public Access to Archived Publications

☐ I know about some of these but can?t distinguish amongst them

☐ These public declarations on open access have not come to my attention.

Question 6. **Please place a tick alongside any of the following institutions or associations, where you are aware of their policies favouring Open Access publication:**

☐ Max Planck Society (2003)

☐ CERN: European Organization for Nuclear Research (2005)

☐ CNRS (Centre National de la Recherche Scientifique) (2005)

☐ Australian Research Information Infrastructure Committee (ARIIC) (2004)

☐ Scottish Universities Declaration on Open Access (2005)

☐ JISC (Joint Information Systems Committee, UK) (2005)

☐ Swedish Research Council (2005)

☐ Finnish Ministry of Education (2005)

☐ I was not aware of any these agencies? policies concerning Open Access publishing

Some research funders have mandated that articles based on the research they fund be made freely available (either immediately or within a period of 6-12 months) via either of the two avenues of self archiving or open access journals.

Question 7. **Please indicate whether you are aware of such mandates from any of the following research funders:**

☐ Wellcome Trust

☐ National Institutes of Health

☐ Open Society Institute

☐ Research Councils UK (requires all council-funded papers be deposited in an open-access archive "as soon as possible" after publication, subject to the copyright and licensing arrangement of the journal publishing the paper*(Giles, 2005))

☐ I was unaware of the mandates of these funders, regarding open access publishing

** 72% of academic publishers already permit self archiving to departmental or institutional websites.*

Benefits of Open access

Question 8. **Please place a tick in the relevant block for each of the following statements:**

8A Open access boosts developing countries? access to scholarly literature

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

8B Open access promotes developing countries? engagement with global science

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

8C Open access promotes the advance of scientific knowledge (research, teaching)

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

8D Open access provides more accountable use of publicly funded research

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

8E Open access articles will be read by more people, and hence probably cited more often

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

8F Authors retain copyright over their work and are free to use it as they wish

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

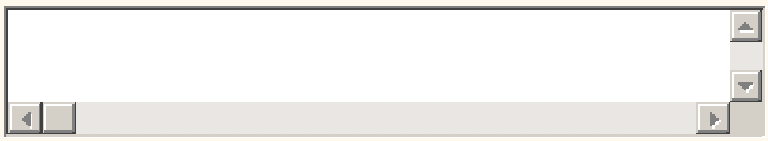
8G The decades-long serials crisis (escalating costs of subscriptions/licence fees) facing libraries will be broken

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

8H Open access publishing represents a savings at a systemic level

Agree strongly☐ Agree☐ Not sure☐ Disagree☐ Disagree strongly☐

Question 9. **Please identify the specific programme area(s) of your organisation (eg, postgraduate training, collaborative projects within Africa, etc.) that would benefit from the outcomes of Open Access publishing. Detailed entries welcomed**

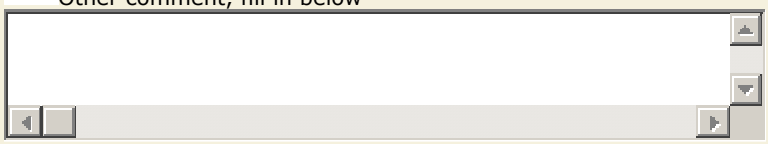


Open access journals

Obviously, each journal is unique and reflects the policy of its editorial board. Many open access journals are relatively young while others are more established titles that have converted to open access.

Question 10. **Where you have sampled articles from open access journals, what has been your overall perception of this material?**

- The articles are original and represent high quality research
- The articles represent adequate standards of quality and have scientific merit
- The articles generally are quite mediocre or of little scientific worth
- I have not read any articles from an open access journal
- Other comment, fill in below



Question 11. **What is your perception of Open access journals?**

11A. I don't know anything about these journals

OR:

Place a tick in the relevant block alongside each of the following statements:

11B. They are better than traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

11C. They are on a par with traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

11D. They do not offer proper peer review

Agree strongly Agree Not sure Disagree Disagree strongly

11E. They publish faster than traditional journals

Agree strongly Agree Not sure Disagree Disagree strongly

11F. They provide greater visibility for one's work

Agree strongly Agree Not sure Disagree Disagree strongly

11G.They offer greater impact for one's work

Agree strongly Agree Not sure Disagree Disagree strongly

11H. They are not recognised by South African review committees/research funders

Agree strongly Agree Not sure Disagree Disagree strongly

11I. Other comment, if desired, fill in below

[Rowlands, 2004]

Open Access Author Charges

While many Open Access journals do not charge authors, several publishers require authors to pay **article processing fees** to publish in their open access journals. A range that is common is $1500 - $2500 per article. International publishers waive these for authors from developing countries or for authors unable to pay. It is clear that 'net reader' institutions gain while research-intensive institutions will shoulder the costs of making their publications free for everyone else.

Question 12. **Please place a tick in the relevant block alongside each of the following statements:**

12A. Authors and their institutions benefit from successful publication ? this is an appropriate cost-recovery mechanism

Agree strongly Agree Not sure Disagree Disagree strongly

12B. Represents an equitable way of redistributing resources within the research system (haves and have-nots)

Agree strongly Agree Not sure Disagree Disagree strongly

12C. Appears to present a disincentive to publication

Agree strongly Agree Not sure Disagree Disagree strongly

12D. Standards of quality might fall as publishers might accept articles merely to generate more income

Agree strongly Agree Not sure Disagree Disagree strongly

12E. Local journals would not survive within this business model

Agree strongly Agree Not sure Disagree Disagree strongly

12F. The overall systemic financial savings and improved access are the most mportant considerations

Agree strongly Agree Not sure Disagree Disagree strongly

12G. Any additional comment you may wish to register, fill in below

Question 13. **Supposing that Open access journals became the norm, which agency do you think should principally bear the cost of author fees, where these cannot be waived?**

- The author's department
- The author's institution
- Research funder
- Corresponding government department (Health, Education, Science & Technology, Trade & Industry, Arts and Culture, Finance, etc)
- Institutional funds freed up from the demise or cancellation of journals charging traditional subscription or access fees
- Some combination of the above sources
- Other suggestion or comment, fill in below

Other issues : Copyright

Under open access, readers may freely read, print, store and use articles, on condition that full attribution to the author and the citation is provided.

Question 14. **What is your response to such an unregulated environment? Please place a tick in the relevant block for each of the following statements:**

14A. I look forward to a freer system that enables everyone to put knowledge to work

Agree strongly Agree Not sure Disagree Disagree strongly

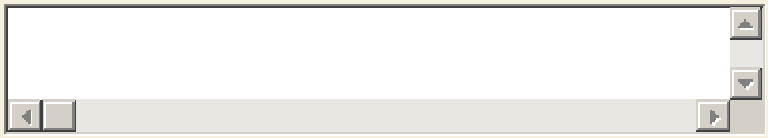
14B. I feel certain that this system will encourage plagiarism

Agree strongly Agree Not sure Disagree Disagree strongly

14C.Unscrupulous persons might seek to profit financially from others' work

Agree strongly Agree Not sure Disagree Disagree strongly

14D. Any additional comment? (fill in below)



Other issues: Preservation

Unlike paper journals, the content of subscription-based online journals is leased rather than owned by libraries. Only some large commercial publishers that own the content can guarantee permanent access to this material over the long term.

By contrast. the relaxed freedom to copy, download, and store open access materials invites their ready availability in multiple sites over the long term.

Question 15. **Please place a tick in the relevant block alongside each of the following statements:**

15A. Universities, learned organizations or national bodies offer more stability than commercial publishers as sites for the preservation of scholarly materials

Agree strongly Agree Not sure Disagree Disagree strongly

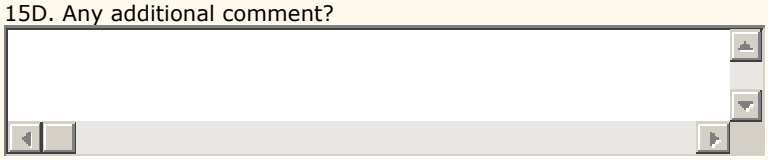
15B. As long as information is available, used and appears in many places, it tends to be preserved.

Agree strongly Agree Not sure Disagree Disagree strongly

15C. I feel confident that open disciplinary or institutional respositories can provide persistent access to digital materials for future users

Agree strongly Agree Not sure Disagree Disagree strongly

15D. Any additional comment?



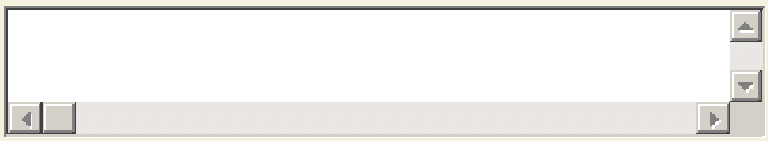
Advocacy and Promotion of Open Access

"An as-yet unpublished study by the German Research Society finds that three of four scientists surveyed and more than 85% of social scientists and professors of the humanities are not aware that open access is one possibility for publication."
"Open access is practically unknown among scientists as an alternative for publications" (Seitmann, 2005)

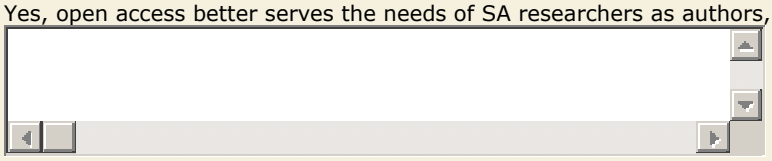
Question 16. **Do you believe that open access publishing better serves the needs of South African researchers as both authors and readers?**

Please complete only the sentences that reflect your view:

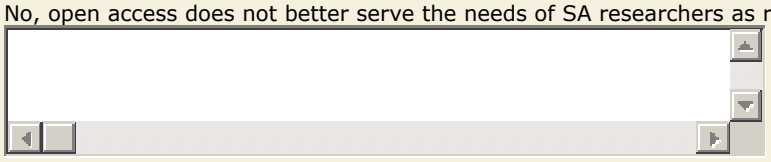
Yes, open access better serves the needs of SA researchers as readers, because



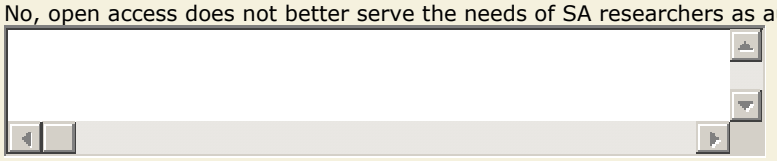
Yes, open access better serves the needs of SA researchers as authors, because



No, open access does not better serve the needs of SA researchers as readers, because



No, open access does not better serve the needs of SA researchers as authors, because



The academic reward system gives weight to publication in high impact journals. Academic or researchers will not easily be persuaded to pursue alternative publication platforms that are still relatively new.

Question 17. **Please indicate which of these measures your organization would support.**

17A. Publicity through newsletters

Already supports Would be likely to support Would need more information Would not support

17B.Information on its website

Already supports Would be likely to support Would need more information Would not support

17C.Recommend that researchers retain copyright over their articles, granting publishers a licence to publish their work so as to enable subsequent self-archiving

Already supports Would be likely to support Would need more information Would not support

17D.Pursuing accreditation of open access journals

Already supports Would be likely to support Would need more information Would not support

17E. Explicitly recognising or rewarding open publication as a service to science

Already supports Would be likely to support Would need more information Would not support

17F. Requiring the prompt (within 6 months) deposit of peer-reviewed articles within open archives as a condition of funding

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

17G. Creating open access repositories/archives (disciplinary/institutional)

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

17H. Launching open access journals

Already supports ☐ Would be likely to support ☐ Would need more information ☐ Would not support ☐

17F. Any additional comment? (fill in below)

Question 18. **Please indicate the response that most closely matches the current status of your organisation's response to open access publishing. If appropriate, more than one option may be selected.**

☐ To my knowledge, open access publishing has not yet been discussed at strategic or business meetings

☐ Open access publishing has been raised, but not yet taken forward

☐ The organisation is in the process of developing a policy on open access publishing with regard to its own output

☐ The organisation is in the process of developing a policy on open access publishing with regard to the research it funds

☐ The organisation is in the process of developing a policy with regard to recognising open access publications as part of its academic review or grants making processes

☐ Other status (fill in below)

Comments or Suggestions

If you wish, you may include comments or concerns regarding open access, scholarly publishing or this questionnaire.

STATEMENT OF VOLUNTARY CONSENT

I give permission for the anonymous processing of my responses for this survey on Open access publishing

Please tick the Yes block. If it is not marked your responses cannot be processed.

☐ Yes

Thank you very much for your contribution. A summary of the results will be posted to the group within a few months.

References

- Giles, J. (2005) "UK Councils claim success for open-access publishing plan", Nature, June 2.
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