

Costs and Benefits of Open Access: A Guide for Managers in Southern African Higher Education

Alma Swan, Michelle Willmers & Thomas King

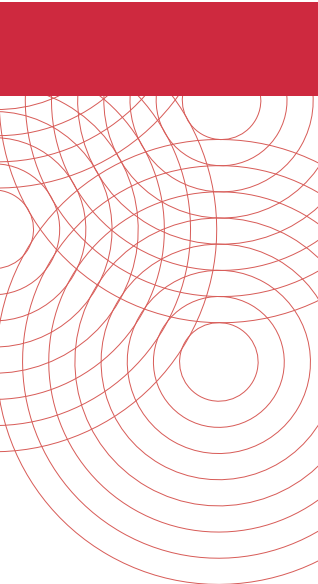
Getting Started: Foundational principles of institutional engagement with scholarly communication

In most institutions, researchers will typically enter into a wide range of publishing relationships with commercial and other publishing entities, depending on disciplinary dynamics, considerations around journal reach and impact, likelihood of acceptance, cost of publication, and other factors. It is important that researchers feel empowered to make independent decisions on what and where to publish, but institutional support is required to manage payment and other logistical issues entailed in the publishing process. Institutional support is also needed in the form of one or more “champions” to take a decisive lead on delivering change.

Who pays? The changing role of the author and institution in scholarly communication practice

One of the core underpinnings of the contemporary open access publishing movement is public access to publicly funded research. This shift is premised largely on the assumption of

“ It is important that researchers feel empowered to make independent decisions on what and where to publish, but institutional support is required to manage payment and other logistical issues entailed in the publishing process.



knowledge as a public good and on the expectation that a significant proportion of global research production is funded by government through taxpayer funds, as well as income streams from other civil society-based organisations. While this shift has taken place, it is generally not the case that authors are expected to fund publication out of their own pockets.

The 21st-century, globally networked scholar is called upon to take on a host of new roles and responsibilities in professionalising academic practice. Engagement in new forms of scholarly communication and publication mechanisms is one component of this expanded responsibility sphere – as is the need for strategic engagement with securing research funding. In this new framework, scholarly communication is recognised as an intrinsic component of the knowledge production process. What’s more, scholarly communication is acknowledged as taking place throughout the process in the production of data, informal communications and a wide range of output genres; it is no longer solely limited to production of the prized journal artefact that traditionally would be seen to cap the research process. Researchers are therefore required to think about and plan for scholarly communication needs and how to pay for them when conceptualising research and sourcing funding. In many cases, the costs associated with open access publishing – commonly known as article processing charges (APCs) – are therefore recognised as budgetary component of the research grant and institutions are required to develop protocols and mechanisms to work with authors in order to channel funds to pay for open access publishing.

In cases where there are no research grants and research is being funded either by the state, institution or from the pocket of the individual researcher, alternative funding streams need to be investigated (ideally at national level) to explore options for participation.

Whose business is it?

Identifying institutional stakeholders

The role of the academic is changing in the 21st century. The institution is being called upon to

transform in order to support researchers in their new role. The widespread global revolution in scholarly publishing brought on by the internet and new information and communication technologies, in conjunction with the extremely competitive higher education environment, means that institutions are now required to professionalise their communication endeavour and take on the role of publisher – curating, preserving and disseminating knowledge outputs in various formats through multiple channels to a broad audience. How does an institution begin to engage with new forms of scholarly communication and begin the task of capturing (and therefore leveraging) its knowledge output?

Institutions around the world start engaging with scholarly communication through various channels and processes. In certain cases engagement will manifest as a result of the sustained action of a few committed individuals (institutional “champions”), while on other occasions it may become institutionalised as a result of institutional mandate in a more top-down process. In every case, the operation requires institution-wide engagement of a range of stakeholders. Who these stakeholders are and the nature of the stakeholder relationships is largely contingent on historical and contextual factors within the institution; therefore, while there are extensive publicly available guides on institutional processes for addressing the publishing and curatorial components of institutional scholarly communication, it remains for each individual institution to articulate an institutional strategy based on its objectives, capacity, infrastructure and other contextual factors.

The role of the library

While the locus of scholarly communications in institutions is not generic, many common factors typify the institutional process and stakeholder scenario. One such common factor is the question around the role of the library; as information management professionals, librarians are recognised as ideally placed in facilitating knowledge access across the institution, as well as playing an active role in disseminating and facilitating the re-use of knowledge produced by that community.

The role of policy

Given the extent of contextual factors involved and the number of institutional stakeholders engaged, the presence of institutional policy can go a long way towards providing a scaffolding to guide implementation, inform governance structures, identify revenue streams for ongoing capacity development, and make explicit the required contribution of various stakeholder partners.

Institutions have taken various routes in their approach to articulating policy and often a mesh of policies forms a scholarly communication policy framework that informs publishing activity as well as curatorial activity. An open access policy will typically form the overarching structure or framework for engagement, complemented by a suite of other policies (such as institutional repository and intellectual property policies) that regulate associated operations.

Why pay?

The institutional value proposition

Increased visibility

At its core, open access is about making research more visible, more widely accessible, and therefore more widely seen, read and used. Traditional rules of citation still apply for the academic usage of research and open-access articles have been positively correlated with high citation rates.¹

Outside of academic circles, open access articles are often the only ones accessible by businesses, NGOs and other civil society members. Unable to access the literature published in closed-access systems except in a very few cases, social and industrial innovators must either invest in private research and development (impractical in many small, medium and micro enterprises [SMMEs]) that may unnecessarily replicate existing university output or do without the most recent research entirely. Open access bypasses these problems, increasing the stature of the institution locally and regionally.

1 See the compendium of studies on the open access citation impact maintained by the Open Citation project: <http://opcit.eprints.org/oacitation-biblio.html>. Also Swan (2010) and Eysenbach (2006).

Together, these forms of impact serve to increase an institution's visibility nationally and worldwide. With the current importance of global rankings in the higher education system, the payoffs for becoming more internationally prestigious may come in the form of greater attraction of international students, a higher profile for attracting international funding and more attractive employment prospects for highly regarded international scholars.

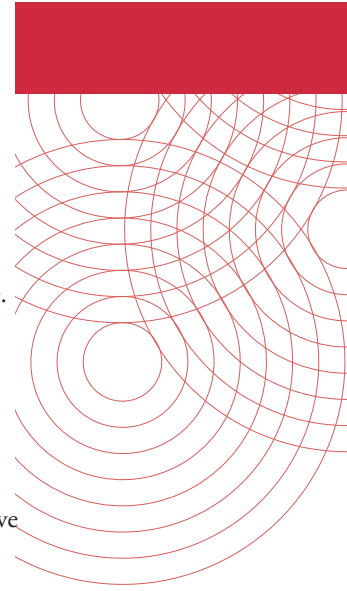
Saving money

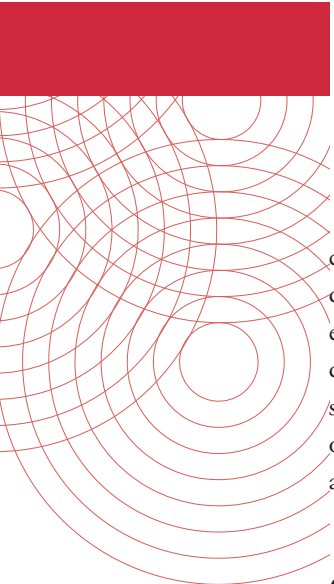
One of the most common fears around open access is the cost of the new system, although these anxieties are largely unfounded. Researchers and managers alike have expressed disinterest in adopting open access principles when these will entail a new layer of additional costs to be imposed on individual or institutional budgets.

These fears, however, are based on ignorance about one of the founding principles of open access scholarship – a reduction in total institutional publishing expenditure. The rising cost of journal subscriptions, often dubbed the “Serials Crisis,” has been as or more influential on the popularity of the open access movement as more philosophical or impact-related concerns. Librarians in particular have embraced open access as a way to reduce overall spending on publications.

The mechanism through which this reduction in cost is achieved is through redirecting existing funding streams. As more journals adopt open access, it is envisioned that total library expenditure on journal subscriptions will decrease, allowing more money to be channelled into paying for the costs involved in open access publishing. The financial model redirects funding away from the demand side (library subscription budgets) towards the supply side (open access publishers and repositories). Library budgets become channels for paying for repository upkeep and APCs, with the advantage that repeat subscriptions to journals in order to access legacy content need no longer be paid.

Implicit in open access is cost-saving in the medium and long term as the publishing industry





converts to a predominantly open model of dissemination. Given the wealth and quality of existing open access materials, institutions with a determined strategic vision can even realise these savings in a shorter time frame by actively seeking out open access content to replace more expensive and less productive proprietary content.

Current publishing cost models: An institutional perspective

This section explores the existing proprietary publishing system in terms of costs and benefits, as well as the costs and benefits of the two major open access routes.

Proprietary (or “paywall”) publishing

The predominant mode of scholarly publishing throughout the later 20th and early 21st centuries has been for-profit commercial publishing. Commercial publishers make their returns through collecting the research of scholars, applying peer-review, editorial and formatting services, collating them into subject-specific journals, and then selling subscription-based access of these works to academic libraries, scholarly societies and individual researchers. Access to individual articles on a short-term basis (typically 24 hours) is also supplied on a pay-for-use model. Commercial publishers also provide publishing facilities for books and monographs, although these have been on the decline (see below).

Costs involved in proprietary publishing

The easily-measured “direct” costs of proprietary journal publication are page charges, which may be levied on the number of pages, the inclusion of black-and-white or colour images, and other formatting specifics. However, the much higher costs are indirect and come in the form of library subscriptions.


Over the past 25 years, prices for academic journals have skyrocketed. Oligopolistic business practices, with three firms (Elsevier, Springer, and Wiley-Blackwell) dominating the market (Young 2009), and the inelasticity of demand for journals have

contributed to the average expenditure on serials rising by 302% from 1986 to 2004 (Young 2009). The reluctance of libraries to move to an entirely electronic system, as well as the persistently high cost of even electronic access to journals, have thwarted the hopes that electronic distribution and access would reduce subscription costs. Instead, prices have steadily risen over the cost of inflation since 1986. Simultaneously, library budgets have suffered cutbacks. As a result, libraries have been forced to reduce the number of subscriptions, especially the number of book and monograph purchases, in order to maintain their access to the most prestigious and demanded journals. This period of spiralling journal costs and the inability of academic libraries to successfully keep them down has been referred to as the “Serials Crisis” (Young 2009).

The cost of the commercial scholarly publishing industry on a per-article or even per-journal basis is hard to determine. Commercial publishers have tended not to sell subscriptions on an individual basis, or have done so at high cost compared to bundled deals including multiple journal subscriptions. Differential pricing, combined with non-disclosure arrangements with libraries, means that the prices paid for identical goods can and do differ significantly between libraries, leading to the rise of consortia to lobby for more equitable price arrangements.

Part of the problem is the disjunct between the producers and end-users of research (researchers) and the retailers (publishers), since purchasing decisions are made through academic libraries. Scholars frequently have no idea of the cost of journal subscriptions and book purchases (McCabe 2002), and rarely seek other options than those given to them by the publishers – which in many cases see them give up copyright of their own work (McKnight 1996). They therefore exert no pressure on publishers to adopt more competitive business practices, to adjust their prices downwards, or act in any other way to make their work more accessible.

The second and largely incalculable cost of the proprietary system comes in the form of lost opportunities by civil and governmental society to use research for economic or societal development.



“Scholars often have no idea of the costs or options involved, and so exert no pressure on publishers to adopt more competitive business practices, lower prices or make their work more accessible.”

The restriction of research access to paying customers, in this case limited to institutional and society libraries, completely excludes the majority of industrial and commercial usage of academic research especially by SMMEs. Preliminary research into the opportunity cost of having research behind paywalls conducted by Houghton, Swan and Brown ⁽²⁰¹¹⁾ in Denmark estimates significant costs in GDP growth by these drivers of the economy, and it is not inconceivable that African SMMEs would benefit from greater access to scientific information.

Open access publishing

Drawing inspiration from the increasing international view of developmentally focused scholarship and an appeal to an historic understanding of scholarship as the free flow of information between peers, the open access movement sought to develop means whereby the completed scholarly object – typically envisioned as a journal article – would be openly and freely available to other scholars, government, industry professionals and civil society as a whole. The interest of libraries in this new form of scholarly dissemination grew from a use-based position where open access was seen as an improved form of scholarly communication, to including cost considerations as the Serials Crisis fuelled dissatisfaction with the pricing systems of the commercial publishing industry.

The international discourse on operationalising open access focuses strongly on two systems: the “Green Route” where institutions create repositories for their own research, made open after

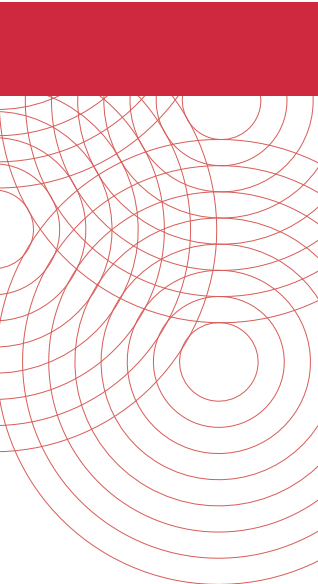
an appropriate embargo period agreed upon with commercial publishers; and the “Gold Route”, where authors submit their work to open access journals that, by definition, publish their contents freely online. In the Southern African context, where other research objects (such as policy briefs and media articles) are widely produced, this binary forms just one aspect for exploring how African institutions can move to a more open process of scholarly communication.

Gold open access (APC route)

The Gold Route involves publishing in an open access journal, which then provides the dissemination and curation services in the same fashion as current proprietary publishers. This form of publishing is funded through government, society or institutional grants, and occasionally through charging authors a fee for deposit, known as an article processing charge (APC). The latter approach is undertaken by a minority of open access journals; most do not charge any fees at all.

Costs involved in Gold open access

APCs constitute the primary cost to authors/institutions in Gold open access publishing in the minority of cases where the journal does levy a charge. These charges are paid by the author, funder or institution, and pay for the running expenses of the journal. Sharing some parallels with page charges levied by proprietary publishers, these charges have nevertheless become one of the most contentious areas among scholars whose introduction to open access has been through hearsay and secondhand information. As scholars are often unaware of the costs already accruing



to their institution in the publication process, Gold Route publishing may seem an unwelcome additional expense, rather than a redirection of the existing financial models. This is an entirely legitimate worry, because so far there has been little opportunity to cut subscriptions. The only way this transition can occur is by conversion of existing subscription journals to APC-funded open access journals and publishers have been reluctant to change their business models.

Complicating the issue significantly is the presence of vanity publishing and predatory journals. These journals provide scholars with an assured publication regardless of quality, raising fears of a flood of poor-quality, non-peer-reviewed scholarship being published and discouraging open access publishing.

Predatory, open-access publishers are those that unprofessionally exploit the author-pays model of open-access publishing (Gold open access) for their own profit. Typically, these publishers spam professional email lists, broadly soliciting article submissions for the clear purpose of gaining additional income. Operating essentially as vanity presses, these publishers typically have a low article acceptance threshold, with a false-front or non-existent peer review process. Unlike professional publishing operations, whether subscription-based or ethically-sound open access, these predatory publishers add little value to scholarship, pay little attention to digital preservation, and operate using fly-by-night, unsustainable business models. (Beall 2011: 1)

However, guidelines to detect and avoid such publishers are freely available (Beall 2011), and predatory journals can be avoided with a little care and prior research.

The transition from library-pays to author-pays advocated by the Gold Route has resulted in significant outcry by the academic community. Much of the concern over APCs was raised after the publication of the highly influential Finch Report in the UK (Finch 2012), in which the issue of payment for articles was strongly expressed and brought to the public's attention. The price estimated by the Finch Report (between GBP1,500 and GBP2,000) for APCs has fuelled complaints

by the academic community of APCs in general, citing their unwillingness to pay to have their work published. This issue has raised several serious concerns for the open access movement, namely the problems of academic ignorance of the current costs of publishing, the wide range of possible pricing models for APCs, and evidence contrary to the Finch report that suggests average cost to be considerably less than their estimates.

Several APC-charging journals have waivers for scholars who cannot afford their full APC. The Public Library of Science journal *PLOS ONE*, the single largest journal in terms of publications, restated its waiver policy: "Our fee waiver policy, whereby PLOS offers to waive or further reduce the payment required of authors who cannot pay the full amount charged for publication, remains in effect." (PLOS 2013: 1).

PLOS is atypical in that it provides waivers for whoever requests one. More common is a system of waivers based on a country's developmental status (BioMed Central 2013; Harvard 2013; JAHA 2013). For countries with per capita GDP below a certain level, waivers typically apply, eliminating or drastically reducing the APC for those countries' research articles. Some publishers provide graded systems, whereby the relative per capita GDP influences cost in a system of fee reduction percentages.

While not all Southern African countries can take full advantage of waivers due to their per capita GDP, researchers interested in Gold open access publishing should inquire about the publisher's waiver policies.

"Gratis" versus "Libre" open access

Gratis and Libre open access refer to two levels of contrasting openness. Gratis open access refers to work that is freely accessible and readable, but has limited options for re-use; Libre open access is work that may be re-used,² subject to the appropriate licensing decided upon by the author.

² Re-use, in the open access context, refers to the granular re-use of components within a research article – such as a table, graph, image or dataset – or text-mining of articles.

While many in the open access community strongly advocate for Libre open access as offering the greatest potential benefits, Gratis open access still offers much of the potential societal development through the dissemination of new ideas and is more likely to be practiced by authors who do not yet fully appreciate the benefits of a truly openly accessible literature (Harnad 2008).

Green Route open access (repository route)

The Green Route in open access publishing focuses on self-archiving of research outputs, published through traditional channels, in subject-specific (such as ArXiv, PubMedCentral or RepeC) or institutional repositories. These materials are then made available to all via the internet, without restrictions or paywalls.

One of the central challenges in the Green Route open access approach is that it relies on the presence of a sustainable repository to store and describe content – and, additionally, relies on systems and structures to facilitate ongoing curation and deposit of content. Voluntary deposit patterns amongst researchers have been shown to be poor (Ferreira *et al.* 2008; Finch 2012; Geiseke 2011; Harnad 2009). Researchers are insufficiently motivated or informed to do their own self-archiving, especially if such activity is not rewarded by the institution. As scholars have not until recently been intimately involved in the research publication process outside of production and peer review duties, more active involvement with the dissemination process is unlikely to be adopted quickly by the majority of scholars, who can be sceptical of peers that “push” their research too vigorously (Cook, Cook & Landrum 2013).

Best-practice concerns are not supplementary to the Green Route, but central. While the Gold Route has experienced publishers and information specialists built into its model of scholarly communication, the Green Route places the onus on institutions to put curatorial systems and processes in place. Not least, this includes significant investment in e-infrastructure designed to facilitate long-term preservation and curation of

non-journal content.³ Repositories are established on a set of technical standards that make them interoperable. The longer-term aim is to ensure optimal licensing conditions for their content so that it is also machine-readable and available for computational analysis (text-mining) (JISC 2012). Without these aspects, the potential impact of archived work is drastically reduced.

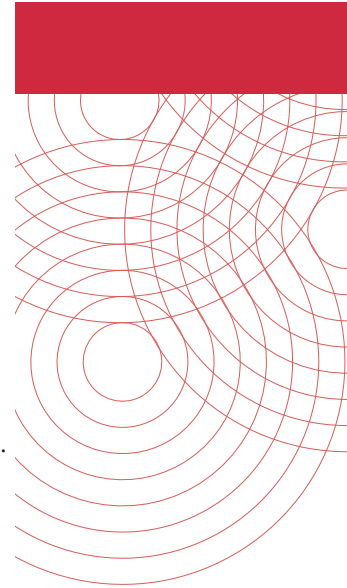
Embargo periods are sometimes required in Green Route open access. As journal articles are published through proprietary publishers, these publishers can retain exclusive publishing rights for a period, usually 6–18 months, after which the articles can be hosted on institutional or subject repositories. Embargo periods apply to post-prints (articles which have undergone the corrections required by peer review but which have not received other value-added services); pre-prints (which have not gone through the publisher’s editorial process) can be hosted immediately. However, hosting the post-print before the embargo period has expired constitutes a breach of contract, and thus measures must be put in place to ensure embargo periods are honoured.

Costs involved in the Green Route approach

The primary cost of the Green Route approach is the development and maintenance of the repository itself. This expense can be subdivided into technological/infrastructural expenses and human resource expenses. The former includes repository development, hosting and bandwidth expenses. The latter includes technical staff for the initial installation and maintenance of the repository, as well as human resource costs in putting material through quality assurance processes and ascribing it with the correct metadata for optimal machine readability. Given the low rate of self-deposit, a potential additional expense in order to maximise the use of the repository would be the human resource cost in actively soliciting material from researchers.

To reduce these costs, institutions can make use of the many open-source resources that are freely

³ Journal content is already curated and preserved through already-established publishing systems or Gold Route open access publishers.



Open access in a nutshell

	GREEN ROUTE
LOCUS OF ACTIVITY	Open access repository
COSTS PER ARTICLE	Marginal cost to repository owner
LONG TERM	Running costs
PRESERVATION	Institution (grey literature)
ACCESS	Grey literature: Immediate Traditional outputs: 6–18 months
CONTENT	Journal articles, books, book chapters, grey literature
AUDIENCE	Academic, government, civil society

available online, including repository software that is designed for optimal resource description and preservation, as well as best-practice guides for repository management and resource deposit strategy. These resources have been developed by open access practitioners and conform to both optimal technological interoperability and lessons learned from international repositories in acquiring resources.

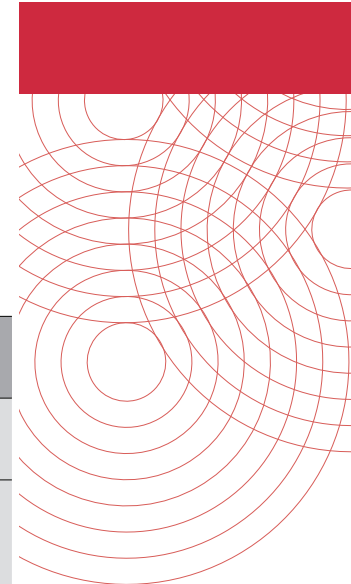
Hybrid open access

“Hybrid” journals are subscription-based journals that make individual articles openly available in return for a fee, typically around USD3,000 for the major publishers (Björk 2012). First proposed by Thomas Walker (Walker 1996), the hybrid path has been suggested as a means for traditional publishers to make a transition to open access publishing without significantly decreasing revenue, by charging fees for open access articles equal to the average subscription revenue per article (Björk 2012). As in only some cases the publisher is decreasing the subscription costs in line with new revenue from open access charges, however, many see this as a way of increasing revenue for publishers.

The hybrid model has not experienced the popularity that full open access publishing models have achieved. The number of hybrid journals rose from approximately 2,000 journals publishing 8,000 articles in 2009 to 4,000 journals publishing 12,000 articles in 2011 – the same number as published by the single largest open access publisher, *PLOS ONE* (Binfield 2011). One possible reason for this has been the considerably higher costs to the authors. Compared to the average cost of Gold Route open access publishing (for those open access journals that charge APCs), the USD3,000 price tag is considerably higher and may act as a disincentive.

Discussion

Both the Green and Gold routes offer increased potential impact. Under both models, scholarly material is made free and available to the public and researchers. Nevertheless, the structural constraints of each approach contribute to distinguishing factors.



GOLD ROUTE	SUBSCRIPTION
Open access journal	Subscription/Closed access journal
Article processing charge (author) – Average USD900	Subscription charges (end user) Page charges
–	–
Publisher	Publisher
Immediate to all audiences	Immediate to subscribers
Journal articles, book chapters	Journal articles, book chapters
Academic, government, civil society	Subscribers

Immediacy

Gold open access offers immediate access to all viewers as soon as the article has passed the quality assurance and/or review criteria of the journal. In practice, this constitutes a delay – traditional peer review takes time. *PLOS ONE* and other megajournal publishers have instituted automated workflow management systems to reduce this period with some success (Allen Press 2011).

Green open access materials are subject to an embargo period decided upon in consultation with the publisher, typically 6–18 months. This embargo period does delay access to the research, which needs to be taken into consideration for disciplines (and policy-makers/civil society) that require the most up-to-date research.

Audience

Gold open access, even with the new developments in Gold Route book publishing (Open Oasis 2013) is firmly entrenched in a traditional view of academic outputs. Journal articles are written by and for an academic audience and contain discourse conventions that are unique to that

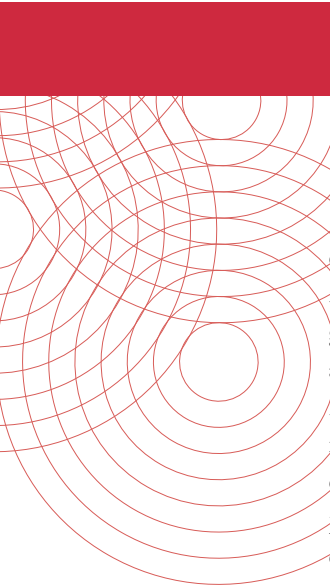
genre (Duff 2007). As such, Gold open access does predispose itself to an academic audience.

Repositories offer the institution the additional option of making other outputs freely accessible. These might include reports, working papers, policy briefs and media pieces. The Green Route also offers, subject to design considerations, a user-friendly showcase of all of an institution’s research.

Institutional participation in open access publishing: Cost–benefit analysis

Approaching cost–benefit analysis in the African higher education context

Internationalisation of higher education has put pressure on institutions to compete regionally and globally for students, funding and prestige. The substantial and growing increase in the demand for higher education and the desire from national governments to monitor and assess the performance of universities has created an



environment where quantitative performance measures are sought from multiple parties – governments, global higher education monitoring and ranking organisations, funding bodies, researchers and students – in order to evaluate, fund and scope research frameworks. While evaluation is not new to education, the increasing professionalisation of the sector has begun to emphasise the importance of “return-from-investment”, and ways to report upon the benefit of the services they perform.

However, academic activity is multi-faceted and not all aspects of tertiary education are easy to quantify and assess. While teaching has an established set of performance indicators – throughput rates, compliance with international teaching standards, and provision of postgraduate degrees – the value of research has been less easy to assess.

Quantitative measures do exist for assessing university research. The number of journal articles, books and book chapters produced are typically recorded and presented in annual research reports, and citation counts are used to evaluate the quality of the journals in which published articles appear. However, these metrics are geared almost exclusively to an academic audience and appeal to academic sensibilities. While important and valuable in that context, they are harder to translate into metrics of interest to civil society and government stakeholders, who look to socio-economic development rather than contributions to scholarship as the primary metric for publicly funded research.

The Houghton Report (2009) has been the most influential study to approach this question of costs and benefits of academic research. Using cost–benefit analysis (CBA), the Houghton Report quantified academic workflows and arrived at a prediction of cost-saving that would result from institutions’ decision to embrace open access principles in disseminating their research. It also described the potential beneficial effect that an open system of scholarly communication would have on economic development through improved access to knowledge by governmental, industrial,

commercial and societal agents. The Houghton Report had a massive impact in influencing high-level stakeholders in government and the academic community to think very seriously about their publication and dissemination practices.

What worked in Australia and other countries for the Houghton research team cannot be directly translated into an African situation. CBAs rely on extensive fiscal reporting systems that are not as embedded in African institutions as in the developed world; publishing activity especially is usually embedded within other institution reporting systems, making it difficult to determine how much is being spent on publication and dissemination activity. Moreover, Africa’s comparative advantage currently lies more in the social sciences and humanities disciplines and their potential for developing innovative social solutions. As African institutions increase their scientific and engineering capabilities, they are in a position to affect social change by adopting open dissemination principles that will benefit not only GDP growth but also social welfare. African research production is strongly shaped by government and private consultancies, which produce reports and briefing papers that the Houghton methodology does not cover and these outputs carry the potential for significant social impact through translating academic concepts for a larger audience – if open principles are adopted.

Limitations of cost–benefit models in the African higher education context

GDP as mode of analysis

GDP is a tool designed for a specific purpose – to measure the total value of goods and services produced within a country. It works well within a commercial framework with defined prices and adequate recording mechanisms, such as in the formal market economy. It is less well-suited to measuring the benefit of public goods such as education and health, the informal sector, unpaid labour and negative externalities such as environmental degradation or socio-economic inequality that may arise from economic growth. In an environment where social service provision,

dual economies, land degradation, pollution and unequal distribution of wealth are key priority areas for local developmental research, a narrow focus on GDP alone is unlikely to be the best approach.

A range of positive, non-financial outcomes are made possible through open research dissemination. Not all faculties are geared towards direct economic impact. In the humanities and social sciences, research is less easily converted to industrial applications through patents and technology transfer but has real possibilities for addressing social development in the fields of land use, equitable wealth transfer, education and indigenous knowledge protection.

Other economic methodologies exist that have the potential to analyse benefits in a way more applicable to the African situation. Cost-effectiveness analysis and Cost-utility analysis both offer methodologies for evaluating benefits in non-financial terms, and thus potentially could be used in measuring open access benefits. In order for these methodologies to be effective, the utility of making research open access needs to be understood and accepted. However, these methodologies still rely on institutional financial reporting systems that are rarely optimised in African higher education institutions, specifically with regard to the invisibility of research publication costs, and thus considerable work needs to be done by institutional management in order to surface these costs in a representative, accurate and holistic way.

Benefits of the new world of scholarly communication

The benefits from open access are gained whether it is provided through open access repositories or open access journals.

Benefits to research

For the research community itself, an open research literature enhances the research process in several ways. It has been robustly demonstrated that open access increases the visibility, usage and impact of research (Swan 2010; Swan & Carr 2008; Wagner

2010). On the other side of the coin, access to the literature is much easier and this enhances the research process (see below).

Efficiency of the research process

Barrier-free access to research results benefits the research process by cutting the time researchers spend looking for information for their work or checking information when conducting peer review, by saving them going up blind alleys that they might otherwise not have known about, by helping to prevent duplication of previous research because it is more easily discoverable when openly available, and by saving the time currently spent seeking permission from publishers when material in journal articles is to be re-used for various purposes.

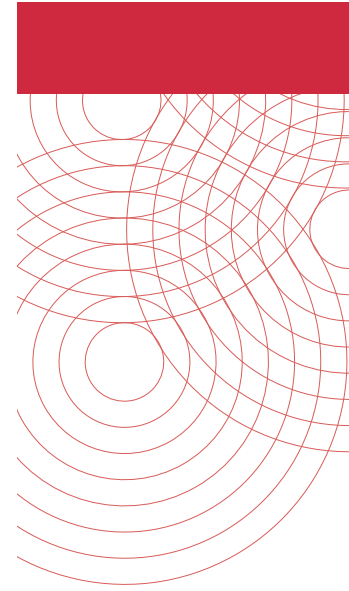
Open access means research can move more quickly and efficiently when researchers do not have to spend time seeking access to articles that are not available through their library. Authors cite a number of problems that open access overcomes,⁴ including enhancing the efficacy of the research process and “returning their faith in the integrity of their own work”. Independent researchers, who do not normally have access to library electronic holdings at all, happily find themselves on a par with their institutionally employed colleagues when research findings can be located and accessed freely via the Web. And as well as the issue of finding and reading articles, other processes are made more efficient – peer review, for instance, where reviewers can easily access articles cited by the paper they are assessing in order to check claims and the validity of arguments and data.

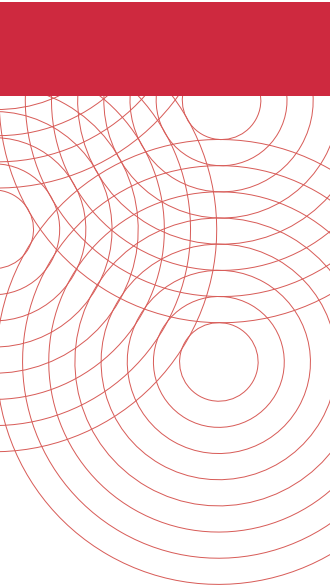
Solving the access problem

The SOAP study,⁵ a project looking at open access and publishing, surveyed 40,000 researchers across

⁴ These include: avoiding duplication, going up blind alleys and redundancy in their work; avoiding disruptions to their work due to the need to search for an article, losing their thread and having to revisit issues; avoiding delays in the submission of papers to journal and funding bids; avoiding hindrances to peer review; avoiding resource bias (Research Information Network 2009).

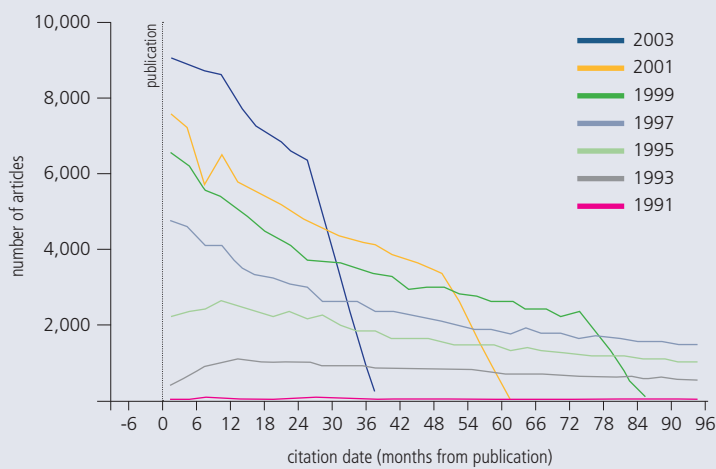
⁵ <http://project-soap.eu/>



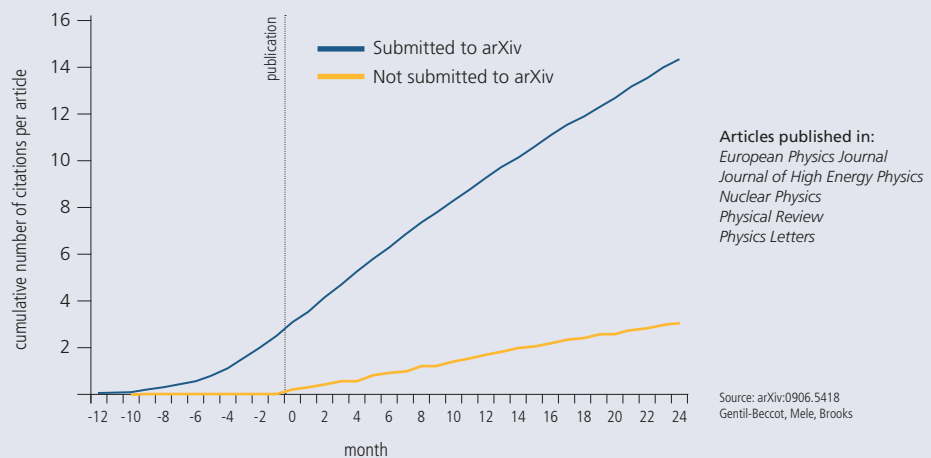


CASE STUDY arXiv

Studies of the open access repository in physics, called the arXiv, shows how the time between research being conducted and citations appearing to the publications that result from that research gets shorter as research becomes freely available. Each year, citations to articles in the arXiv appear earlier, shortening the life cycle of research in the area of physics covered by the arXiv database and bringing greater efficiency to the research process.



Moreover, because authors deposit their papers when they are accepted for publication or, frequently, before peer review, citations can sometimes happen even before the journal is finally published, as shown in the graph below, where the time of journal publication is indicated by the vertical black line.



Together, these studies show the power that open access has to speed up and streamline the research cycle.

the world and found that 37% of respondents overall said they could find all the articles they need “only rarely or with difficulty”. Another indicator of access problems is open access repository download figures, which indicate the extent to which access is being fulfilled through that open access route for those unable to access the original journal.⁶

There is a problem even for relatively wealthy institutions in the richest countries.⁷ Studies have shown that even in wealthy research-intensive countries no researcher has access to all the information he or she needs. For example, the Research Information Network (RIN) concluded from the results of five UK studies carried out on discovery and access, that “the key finding is that access is still a major concern for researchers”.⁸ It is inevitable that journal access problems will increase even in the developed world. Library budgets are under pressure, Big Deals (purchase of “bundles” of a publisher’s offerings on multi-year deals) are being cancelled⁹ and society-published journals are seeing attrition of prestigious but unaffordable titles.

In the developing world, the situation is far worse. A World Health Organisation (WHO) survey in the year 2000 found that for researchers in developing countries, access to subscription-based journals was one of their most pressing problems. In countries where the per capita income is less than USD1,000 per annum, 56% of research institutions had no current subscriptions to

international journals, and had not had for the previous five years (Aronson 2004). More recently, a study by the Southern African Regional Universities Association (SARUA) revealed a picture on access to and dissemination of research publications in that region (Abrahams *et al.* 2008) that indicates that improvement is still far from being realised.

Publisher-mediated initiatives such as the WHO’s HINARI,¹⁰ OARE¹¹ and AGORA¹² provide free access to journals for some developing world users. They are not open access by definition, however, since access is available only to some users in some countries and these programmes charge a fee to institutions in countries with a per capita GDP of above USD1,000. Moreover, if a country manages to raise its economic status a little it can find itself eliminated from these programmes, as recently happened to Bangladesh.¹³

Solving the dissemination problem

Access is one side of the coin: dissemination is the other. Just as researchers have a problem locating and reading research material, so too do they face difficulties making their own outputs available to all who might wish to see and use them. Researchers in the global South have suffered particularly in this regard since they publish more often in local journals with relatively low subscription numbers and with little reach into the research libraries of the world, especially the global North. The problem has been compounded by the influence of the big indexing services, whose coverage has focused heavily on the journals of the West and North, thus exacerbating the exclusion of scientists from the global South.

Open access changes all this. Once the entire world’s research is freely accessible to all, indexed and made instantly available by Google and other search engines, the traditional inequities will be

6 For example, the University of Salford’s repository containing some 1,500 full-text research papers, experiences 25,000 downloads of these each month and the University of Liege in Belgium, with 50,000 downloads per month of the 50,000 articles it holds.

7 “[M]any researchers are encountering difficulties in getting access to the content they need and that this is having a significant impact on their research.” RIN press release: www.rin.ac.uk/our-work/using-and-accessing-information-resources/overcoming-barriers-access-research-information. See also the full report (Research Information Network 2009).

8 www.rin.ac.uk/our-work/using-and-accessing-information-resources/overcoming-barriers-access-research-information

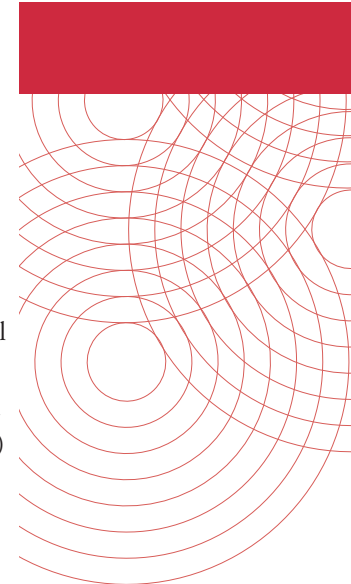
9 In the US: <http://chronicle.com/article/Libraries-Abandon-Expensive/128220/> and in the UK: <http://chronicle.com/blogs/wiredcampus/british-research-libraries-say-no-to-big-deal-serials-packages/32371>

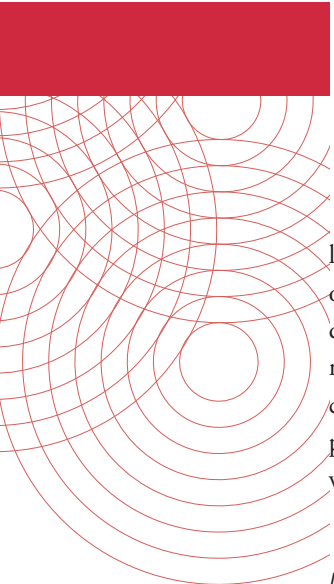
10 Health InterNetwork Access to Research Initiative: www.who.int/hinari/en/

11 Online Access to research in the Environment: www.oaresciences.org/en/

12 Access to Global Online Research in Agriculture: www.aginternetwork.org/en/

13 www.bmj.com/content/342/bmj.d196.full





levelled. So many critical research issues are global ones (environment, agriculture, public health, disease) and we can't hope to resolve them without meaningful, progressive global approaches and collaborations. And this will only ever be properly possible when there is barrier-free circulation of the world's research knowledge.

Interdisciplinarity, multi-team research, e-research

The same issues apply in other contexts. Researchers who are working in multi-centre teams or in teams doing interdisciplinary research frequently find provision of information to be poor, because the institution cannot afford to buy information across a broad range of fields. Often, members of a team working in different institutions have different levels of information provision. Access variances like these hamper the research effort.

Moreover, the growth of data-driven research (often termed e-research or e-science) really demands a different system of access to information. Large volumes of data created by the research process need to be made accessible to others in the field, partly to enable verification and duplication of the work, partly to enable others to build on the data already created. Data underpins journal articles that provide details of the experimental or data-gathering work, the conditions under which the data was collected and the ways to manipulate and interpret the data; the only means by which other researchers can understand and use the results from such work is when the articles and datasets are made openly accessible.

Data-intensive research is as developed now in the humanities and social sciences¹⁴ as it is in the natural sciences and engineering. In the African context, where social science research has such a critical place in the research ecology, Open access must be a pervasive element of the research communication system for maximal advances to be made.

¹⁴ www.clir.org/pubs/reports/pub151/pub151.pdf

Cost savings

Background

Governments and universities have a natural interest in controlling costs and those costs associated with scholarly communication activities are no exception. The work of the Australian economist, Professor John Houghton, has provided an insight into the economics of the current system and of future scenarios.

The Houghton modelling exercises did not simply compare the costs of library subscriptions to the potential cost of paying for Gold open access publishing through APCs for each article published. It did more, taking into account the efficiency savings that would be enjoyed throughout both the research process itself and in library operations. For example, researchers would spend far less time searching for and trying to access information, and libraries would spend less time handling journals (open access journals are all electronic and do not have to be recorded, shelved and stored physically).

The modelling envisaged three possible future scenarios for scholarly communication and, though this is not the place to go into too much detail, it is instructive to mention these since they give a flavour of the options ahead. They are open access scenarios in which:

- The cost of publishing all articles is covered “up front” by an APC charged to the author (who pays from grant or institutional funds).
- The costs of publishing continue to be covered by subscriptions but articles are simultaneously available through repositories (Green open access).
- Repositories are used to collect, peer review and publish articles and the costs of the whole process are borne by institutions.

Of course, the future will be more complex than any of these single scenarios. The point is that there is consensus around the view that while the future for communicating research findings cannot be seen clearly, the present system will not endure. The Web and its associated developments, including the

evolution of social media, are changing researcher expectations and behaviour.

Costs and benefits of open access to nations

Houghton has shown that a system based on open access would save money and produce efficiency gains for all the countries he has so far studied (Australia,¹⁵ UK,¹⁶ Netherlands,¹⁷ Denmark,¹⁸ Germany,¹⁹ USA²⁰). Table 1 gives a summary of the findings of some of these studies.

The Houghton work took into account the amount of money spent on journal subscriptions, the number of articles published each year (and calculated the amount that would be spent on APCs if open access were provided through that means) and also data on researcher and librarian salaries, the costs of running repositories, time savings that could be enjoyed if all research were easily and immediately accessible, and other similar parameters.

These are research-intensive countries which in the Southern African context have perhaps their best parallel in South Africa and, on a smaller scale, Mauritius. These countries spend considerable amounts on research and on the infrastructure that supports that research effort, including the provision of research information in the form of journals, research monographs and databases. The cash and efficiency benefits of open access will apply equally well to these African nations as they do to the Western nations studied.

For example, the four Mauritian universities between them publish around 100-120 papers in international peer-reviewed journals each year and the national research budget is around 30 million

rupees (USD 1 million). The spend on scholarly journal services (package deals from publishers Elsevier and Emerald, and journals purchased through the third party agent EBSCO) amounts to USD450,000. In other words, accessing research information costs Mauritius almost half the research budget itself. This is far higher than in Western research-intensive countries, where journal subscription costs amount to approximately 2% of the national research budget, and where the journal costs for small universities may amount to around 25% of the institutions' research budget.

For Mauritius, an open access system in which costs of communication were at a per-article level would be hugely advantageous economically: the disproportionate costs of purchasing journals would disappear and be supplanted by much more manageable costs of paying a processing fee for the 100–120 articles published per year. Average APCs do vary (and in some cases journals do not charge at all), but making an informed assumption that APCs average USD910 apiece would mean a total of USD180,000 which, combined with efficiency savings, would be greatly beneficial compared to the journal subscription costs of USD450,000 at current rates. Moreover, for Mauritius to move to open access through the Green route – that is, by making sure all outputs are put into open access repositories, the cost would be far less again than paying open access journal APCs.

South Africa, Southern Africa's largest economy and with the greatest level of research effort in the region, would also win out economically from a move to open access. In this case the national annual research budget is some USD 3 billion and around 9,000 journal articles are published annually. If paid for in per-article charges in a Gold open access system, these articles would cost around USD 13.5 million to publish. Given that the University of Cape Town (UCT) alone currently spends USD 5.5 million on subscriptions, and is only one of 23 publicly-funded higher education institutions, the total cash savings resulting from a move to Gold open access would be considerable – and when efficiency savings are added, the economic benefit to South Africa would be significant.

15 www.eap-journal.com/download.php?file=696

16 www.cfes.com/EI-ASPM/

17 www.knowledge-exchange.info/Admin/Public/DWSDownload.aspx?File=%2fFiles%2fFiler%2fdownload%2fDK_Costs_and_benefits_of_alternative_publishing_models.pdf

18 Ibid.

19 publikationen.ub.uni-frankfurt.de/frontdoor/index/index/docId/27530

20 www.sparc.arl.org/bm-doc/vufpaa.pdf

TABLE 1 Savings based on switching to open access systems

Annual USD savings from moving to	UK	Netherlands	Denmark	US federal agencies
Open access journals (“Gold” open access)	575 million	160 million	85 million	Value of benefits amounts to between 4x and 25x the costs of the system
Open access repositories (“Green” open access), while retaining subscriptions to journals	150 million	60 million	35 million	
Open access repositories used as the basis for peer-reviewed publication	Circa 575 million	Circa 160 million	Circa 85 million	

Costs and benefits of open access to institutions

As well as modelling costs and benefits to nations, Houghton’s model has been extended to model these things for research-performing institutions (universities and research institutes) and further developed to take account of how APCs might be allocated when research papers are authored by multiple authors, sometimes from multiple institutions.

The results showed that for all universities, large and small, there would be cost and efficiency savings from moving to an open access-based scholarly communication system. The studies were done using data from universities in the UK, which is a research-intensive country, but the principle applies to all countries. Subscriptions to journals are expensive everywhere and even in countries where the research effort is not so intensive there is a need to spend large amounts on them in relation to the amount of research carried out and the size of the research budget.

Data from UCT shows that around USD 5.5 million is spent annually on journal subscriptions (print and electronic) and that over 1,100 journal articles are published. Even without taking into account efficiency savings throughout the UCT research system from an openly accessible literature, we can still “do the maths” and calculate simple cash comparisons for UCT for the different types of open access.

If UCT opted to go for Gold open access and paid an article-processing fee (at the current average of around USD910 per article) to publish all of its journal outputs, the annual cash cost would be around USD 1 million. If the whole world were also open access, so that subscriptions no longer existed, there would be cash saving to UCT in

“going Gold” because it would save 80% of its current expenditure on subscriptions. It is likely that there will be additional economic savings, as efficiency savings and more effective research – with greater societal impact – will provide yet more socio-economic benefit. There may also be lower costs than anticipated due to other institutions paying the fees for jointly authored papers, research funders providing money to pay publishing fees, or a continuation of the present situation where not all journals charge APCs. There is the possibility, then, that UCT may spend even less than the USD 1 million that would accrue from Gold open access.

The alternative would be for UCT to “go Green” and make all its outputs available through repositories. In such a case, the cash costs lie in running the repository. For the sake of example we can assume the annual cost to be something in the region of USD100,000 (based on known costs of running repositories elsewhere in the world).

In this case, UCT would need also to pay for subscriptions until the rest of the world switched to open access. This means an annual total cash cost of around USD 5.6 million, little more than the subscriptions alone but with the potential to create greater impact and societal value.

Finally, in an open access world, institutions can enjoy the benefits of new ways of measuring and assessing impacts of research. The new “alternative metrics” (Altmetrics) approaches to impact offer considerable advantages to universities, allowing them to examine the value they are creating and returning to society, as well as academic impact as we currently understand it, measured in terms of usage and citations.

Of course, alternative metrics can be applied to the subscription-based, traditional literature as well

where access is allowed for assessment purposes, but they are much more meaningful if the tools for measuring things like citations are permitted to roam across the whole literature. This will also eliminate the existing impact bias towards journals from Western nations – those that appear in the Journal Citation Reports database (which publishes the Journal Impact Factor list each year).

In summary, where institutions invest in the provision of open access for their research, especially where they build an open access repository that becomes an institutional research management tool, they can reap rewards in terms of seeing and understanding the various types of impact that research may generate.

Benefits to society

In addition to academic scientists and their institutions, other elements of society can also benefit from access to the scientific literature. They include educators (middle and high school teachers), independent scholars and consultants whose work is research-based, the professional community (e.g. family doctors, legal practices, accountancy firms, healthcare workers) and the practitioner community (e.g. civil engineering companies, horticulturalists, consultancies). Open access can improve performance in these sectors and increase the return on investment to the taxpayers who fund that investment.

The SMME sector is particularly important because of the crucial role of SMMEs in most economies, including those of Southern Africa. Small companies cannot afford to buy journal subscriptions costing thousands of dollars a year, nor to regularly purchase articles through publishers' single-article supply services at a cost of around USD30–40 a time. Yet when research information is made available, SMMEs do use it (see box).

In summary, open access for scientific results will spur innovation, generate jobs and create wealth, whereas innovative enterprises are being hampered by information access difficulties, at high economic cost to governments.

Academic impact

The authors of academic works enjoy increased visibility, usage and impact of their research outputs when they are made open access. Because Google and other Web search engines index open access repositories and open access journals, authors' work is easily found and retrieved by others.

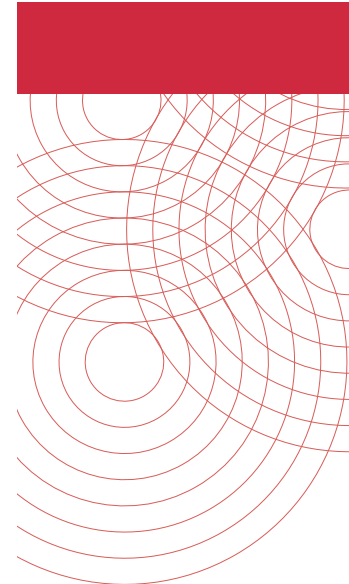
Visibility

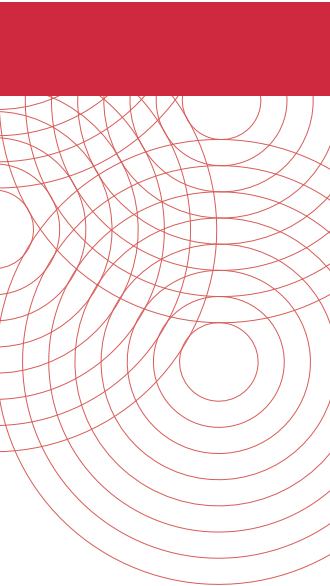
This visibility is new: without open access, the only way to see academic work is by paying for subscriptions to journals or by paying a fee to view an article on a publisher's website. This has the effect of restricting access to all but the minority who can afford to pay for access in these ways. For those who work in universities with well-stocked libraries, it is sobering to note that the WHO found in a survey conducted at the start of the millennium that more than half of research-based institutions in lower-income countries had no current subscriptions to international research journals, nor had they had any for the previous five years. Unsurprisingly, researchers in developing countries rank access to the research literature as one of their most pressing problems.

In fact, it is not just in the developing world that access is an issue. In survey after survey, it is found that researchers in the wealthy, developed world also run into problems accessing what they need. A recent study by the Research Information Network in the UK, for example, found that although researchers report no problems in finding the information they need, gaining access to it is still difficult. So by making their work open access, researchers are helping to create a global knowledge commons so that all may benefit.

Usage

Visibility translates into usage. Download figures from repositories indicate the latent demand for research information that has traditionally been locked up behind pay walls, accessible only through subscription or by paying for individual article access. For example, the items in the University of California's large open access collection, eScholarship, are viewed well over a million times





Open access helps everyone

There is plenty of evidence that making research information open access can benefit many outside the main research arena.

- Usage data from the US National Institutes of Health database of open access biomedical research, PubMed Central, shows that 17% of the 420,000 unique users each day are from companies.
- PubMed Central usage data also shows another rather surprising statistic – 40% of users are ‘citizens’: that is, they are accessing the database from private IP addresses. This is a health information database so naturally would be of interest to many citizens, but the high proportion indicates clearly that where authoritative, validated, good quality information is available, people will find and use it. This is a principle fundamental to building a knowledge society and only with an open access research literature can this aspiration be facilitated.
- Recent work on R&D-based SMMEs in Denmark showed that more than two-thirds have difficulty accessing research articles and almost 60% want better access; it also shows that without access to research information there is an average delay of over two years on getting products to market.
- A study in the UK demonstrated that SMMEs had problems discovering relevant academic “grey” literature (unpublished reports, working papers, theses and dissertations) and in accessing published literature (for reasons of cost).
- The Human Genome Project (HUGO) results were made openly accessible in 2003. By 2010, every dollar invested from federal funds in the USA in the HUGO research had generated economic activity worth USD 141: the total value of the economic activity so far is USD 796 billion, from an investment in the original research of USD 3.8 billion. In 2010 alone, 310,000 jobs were created in the USA. Overall, 3.8 million job-years of employment have been created, with an average of USD63,700 personal income per job-year.

per year. The University of Liege in Belgium, another institution with a well-stocked repository (around 60,000 freely available articles), sees downloads of its articles averaging around 50,000 per month. Again, it is worth emphasising that this is *new* usage, since people who have access to the journals in which those articles were published do not need to access them through the open access repository; the repository is serving users around the world whose libraries do not subscribe to the journals, and is bringing new and additional users to the University of Liege’s research.

Citations

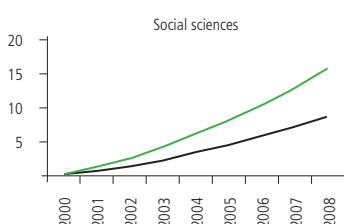
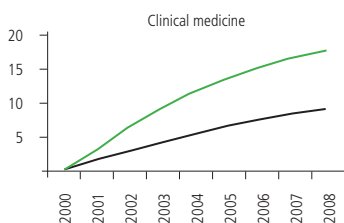
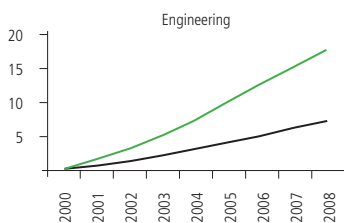
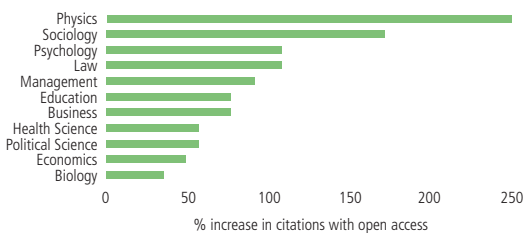
This high usage brings ensuing benefits in terms of impact. It can be impact in the traditional academic form of citations to the work. A substantial literature is growing on the effect of open access on citation impact.

Citations tend to rise when an author starts making his or her work open access. Importantly, the citation advantage persists – and frequently increases – as time goes on. This is probably explained by the fact that citations feed upon

citations, so the earlier an author makes their work open access, the better their chance of maximising citation impact. The graphs in Figure 1 show the open access citation effect across all disciplines, and in specific examples.

In a sample of disciplines – engineering, clinical medicine and social sciences – the effect is shown as a time trend. The vertical axis shows citation numbers to papers; the horizontal axis shows time since publication in the year 2000. The black curves are the citations to articles that are published in toll-access journals and not made open access, while the green curves are citations to papers that are open access from the date of publication.

FIGURE 1 Effects of open access on citations



Such increases in citations for individual researchers of course accrue to universities in aggregate form for all researchers in the institution who make their work freely available to a worldwide audience, rather than just to those who can buy the journals in which they publish.

Institutional benefits

Research management

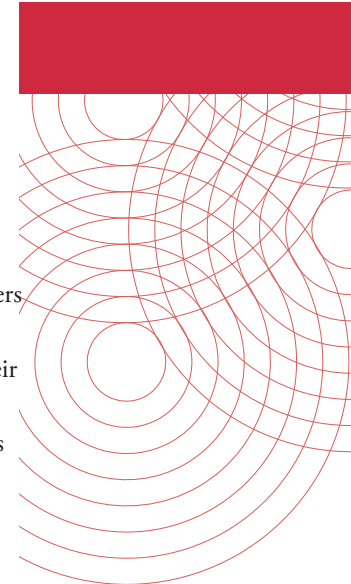
Very few, if any, universities around the world have a complete record of their research activities and the results of those efforts. As the rector of the University of Liege in Belgium puts it, “I don’t know what publications come from my university. I am like a factory boss who does not know what products come out of his factory.” This rector sees open access, provided through the University of Liege’s repository, ORBi, as having a dual purpose – enabling the research effort to be more visible and have greater impact, and giving him the tools to analyse and better manage the research programme of the university.

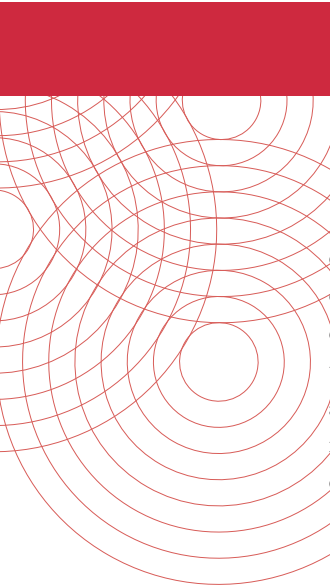
A repository delivering an institution’s research results to the world has the following benefits to that institution:

- Collects all research products in one place creating a catalogue of the institution’s research.
- Publishes the contents to the world via the Web, thus increasing visibility, usage and impact of the institution’s research.
- Presents a comprehensive institutional research profile.
- Acts as a management information tool through which to monitor and analyse the research activities of the institution.
- Provides the means for researchers to create automatic publication lists, CVs, etc.

Boosting rankings

Certainly, increasing the dissemination of institutional outputs through open access has reputational payoffs in terms of position in world





or regional rankings. While there are many different ranking systems, each measuring slightly different combinations of factors and weighting those factors variably, academic impact (citations) and presence on the Web are very significant factors for universities to get right. The case study on page 21 illustrates this point.

Public engagement

Universities that promote access to their research can benefit from the engagement with the public that such a move brings. Some elements of that social return are difficult to measure, such as the transfer of knowledge into the education sector or improvements in prospects for independent researchers. Others, though, can be assessed. The case study on page 21 gives some examples of what advantages open access can deliver to an institution.

Summing up

In summary, there are benefits from open access for a number of stakeholders:

- Research-performing institutions, who benefit from greater visibility, usage and impact of their research, in terms of citations, social return and funding.
- Research funders, whose mission – to create and spread knowledge – is enhanced by open dissemination.
- The research process, which benefits from minimised delays, effort and cost of access to information, and from the efficiencies of barrier-free access to research information.
- Society at large – in the form of educators, businesses, professionals, practitioners and the interested public – who benefit from cost-free access to information that helps them fulfil their roles and create a knowledge-based society equipped to tackle the problems of the future.

CASE STUDY

University of Southampton

The University of Southampton has long been a leader in open access and innovation in scholarly communication. In 2002, the School of Electronics and Computer Science introduced the world's first mandatory policy on open access. Eight years later, the university as a whole adopted the same mandatory policy and established an institutional repository to house authors' copies of published articles. This repository currently contains almost 89,000 journal articles and books (or book chapters) – a huge open shop window for the university's research activities.

In the 2012 QS World University League Rankings, Southampton is ranked in 73rd place, one of only 18 UK universities in the global elite of 100 higher education institutions. And in the Webometrics Ranking of World Universities (www.webometrics.info), produced by CSIC in Spain, Southampton (ranked 16 in the European ranking) punches well above its weight for a university of its size. These outstanding performances by Southampton are partly due to its huge web presence as a result of having a well-filled institutional repository with tens of thousands of full-text, freely available research articles, generating high usage levels and impact for Southampton.

Recommendations

The main obstacles to open access in Africa remain familiar ones – lack of awareness and understanding, copyright issues, lack of policies, lack of coordination between libraries, lack of infrastructures and lack of funding (Bowdoin 2011). All of these can be overcome, but this needs a determined, coordinated approach by African institutional leaders, research funders and libraries.

Recommendation 1

Build an open access repository infrastructure in Southern Africa

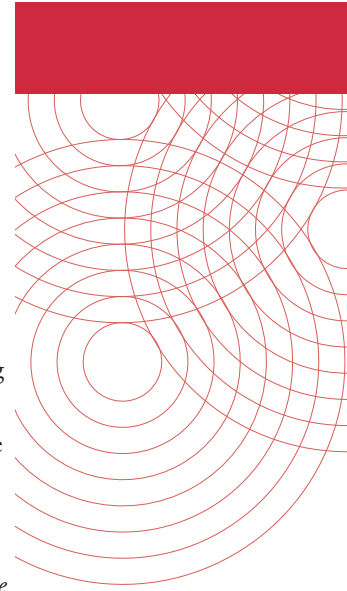
There are currently around 45 open access repositories in Southern Africa, but many institutions are without one of their own or without shared access to a repository. All Southern African researchers need to have depositing rights

in at least one repository if open access is to be provided effectively in the region. A properly functional repository infrastructure requires the repositories themselves, implementation according to international interoperability standards and a planned approach to the repository network shape and structure.

Recommendation 1.1

Examine potential patterns of repository infrastructure

Drawing on past studies, recommendations and evidence of best practice, determine the most appropriate structure for the repository network in Southern Africa. This means deciding on whether a single repository or a network of institutional or national repositories is best; if a single repository, whether it should be the locus of deposit or should harvest content (metadata) from a federated network of institutional or national repositories (such as the European repository, OpenAIRE); and whether national repositories should accept



CASE STUDY

Queensland University of Technology

Queensland University of Technology (QUT) in Brisbane, Australia, undertook a study to see what benefits its open access repository, QUT ePrints, had brought in the six years it had been in operation. A number of different types of advantage were discovered:

- An increase in research income of nearly double that of the Australian university average.
- Growth in research income from the industrial and commercial sectors.
- Increased citations for its authors, correlating with the time they began making their work open access through the repository.
- Testimonial evidence from individual authors, describing how their work had been discovered by researchers in many institutions globally (businesses, public sector bodies and the general public) and how in individual cases these had resulted in new collaborations, more research income, career development or the satisfaction of knowing that someone was helped by the discovery of their research.

deposits or harvest content (metadata) from institutional repositories.

Recommendation 1.2

Maximise interoperability of African repositories

Fully interoperable repositories are essential to provide seamless access to research outputs without any barriers or obstacles. To provide interoperability at the optimal level (i.e. making sure all Southern African repositories operate according to the same technical standards as each other and international repository networks) entails using standardised metadata schemas, systems of identifiers, and so on (Rodrigues & Clobridge 2011). It will also entail development of centralised coordinating and communication structures to build the community of practice surrounding this endeavour.

Recommendation 2

Invest in open access publishing infrastructure

Southern Africa has around 80 open access journals, predominantly published from South Africa. In comparison, 270 open access journals are published from Brazil,²¹ with more from other South American countries. Open access journals can be cheap to produce and publish and could form the basis of a “brand Southern Africa”. Journals can be published using repositories as the hosting service or other publishing arrangements can be established. It is recommended that an appraisal of the costs and logistical requirements of establishing a suite of Southern African open access journals is carried out.

Recommendation 2.1

Build publishing services onto repositories

Investigate and prepare costings for options for using repositories as simple publishing tools or building existing journal publishing packages²² into repositories.

²¹ Scientific Electronic Library Online (SciELO), Brazil: www.scielo.br/scielo.php?lng=en

²² For example, Open Journal Systems, the open access journal publishing software (open source) from the Public Knowledge Project: <http://pkp.sfu.ca/?q=ojs>

Recommendation 2.2

Scope the potential for new African open access journals

Carry out a feasibility study and prepare costings for launching new open access journals from Southern Africa. The study should include consideration of:

- how to provide publishing services (hosting, editorial services, peer review management)
- researcher interest and willingness to take on the new challenges involved; readiness of research funders to support these ventures in terms of cash and of support for the principle and the practicalities involved
- how these journals can be made viable in the first place and how they should be sustained and supported in the long term.

Recommendation 2.3

Carry out a feasibility study on developing an African “megajournal”

Carry out a feasibility study and prepare costings for launching one new open access journal (a “megajournal” in the style of *PLOS ONE*²³) from Southern Africa. The study should include consideration of:

- how to provide publishing services (hosting, editorial services, peer review management)
- researcher interest and willingness to take on the new challenges involved
- readiness of research funders to support the venture in terms of cash and of support for the principle and the practicalities involved
- how this journal can be made viable in the first place and how it should be sustained and supported into the long term.

See Appendix 1 for details on megajournals and regional repositories.

²³ www.plosone.org

Recommendation 3

Develop policy on open access

However good the provision of technical infrastructure, open access content does not accumulate at high levels without the right policy support.

There is now much experience and information on policy implementation (Suber & Shieber n.d.; Swan 2012) and, since there are now many policies around the world, alignment of policies is becoming the critical issue. Alignment means that authors are not working under different or even conflicting demands when they are funded from more than one source, or are under both funder and institutional mandates on open access.

It is recommended that good open access policy development is undertaken in Southern Africa and especially that policies align across the region and with the significant policies already in place in other parts of the world.

Recommendation 3.1

Develop institutional policies

Drawing on the wealth of experience and understanding gained from open access policy-making globally over the last decade, research-performing institutions in Southern Africa should develop mandatory institutional open access policies. These should align with each other and with funder mandates.

Recommendation 3.2

Develop funder policies

Drawing on the wealth of experience and understanding gained from open access policy-making globally over the last decade, research funders in Southern Africa should develop mandatory open access policies. These should align with each other.

Recommendation 4

Institute a programme of education and advocacy for open access

Just as good infrastructure does not generate high levels of open access content without policies, so policies do not succeed as well as they ought without advocacy to support them.

A planned, coordinated information programme for the region is necessary to back up other open access initiatives. The aim is to ensure that all researchers, policy-makers and research managers are accurately and fully informed about open access, its costs and benefits, and the twin routes to achieving it.

Recommendation 4.1

Establish an advocacy network for the region

An advocacy network could be in the form of distributed nodes (maybe a node in each country) with centres of expertise at each node, or it could be in the form of a central organisation that works across the region.

It is recommended that an appropriate governance team is set up and enabled to carry out the investigatory and practical work required.

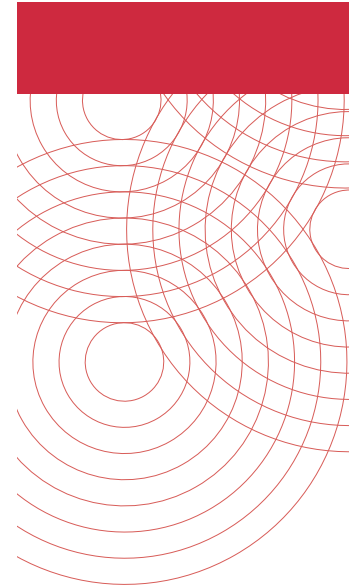
Recommendation 4.2

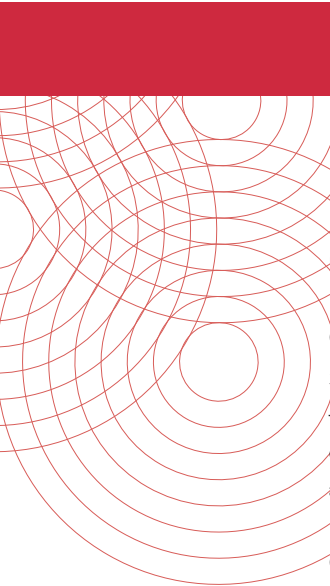
Encourage and enable the establishment of repository support organisation(s)

A repository support network could be in the form of distributed nodes (maybe a node in each country) with centres of expertise at each node, or it could be in the form of a central organisation that works across the region.²⁴

It is recommended that an appropriate governance team is set up and enabled to carry out the investigatory and practical work required.

²⁴ Suitable examples are the Confederation of open access Repositories (a global organisation): www.coar-repositories.org/ and the UK Council of Research Repositories: <http://ukcorr.org/>





Conclusion

Open access to research is no longer a fanciful notion promoted by a small group of advocates – it has become a mainstream concept being embraced by governments, funders, institutions and individual researchers.

Open access has been shown to increase academic impact and to improve the impact on other sectors, notably the small business, education and health sectors, and is an enabler of knowledge societies.

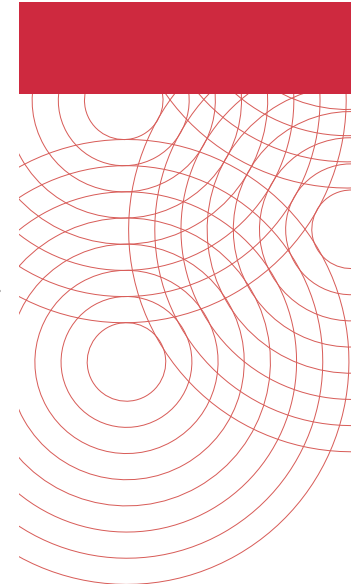
It improves efficiencies in the research process wherever this may be undertaken – in academia, in industry and commerce, in the cultural heritage sector and by independent researchers. Research moves more quickly and more efficiently if there are no barriers to locating and accessing information.

Open access also saves money and this, coupled with efficiency gains, means that the future system of scholarly communication will be cheaper and better, with payoffs for the producers of research and for those who can and could, given free access, use it.

There are no downsides to open access, but its progress is slower than ideal because of entrenched behaviour patterns and an adherence to the practices of the past. New thinking is needed on the part of the leaders of our research system. UNESCO and the World Bank have shown by example that they understand the potential benefits, to the whole world, of open access. Institutional policy-makers must now grasp the opportunity to push for a better system for disseminating research.

References

- Abrahams L, Burke M, Gray E & Rens A (2008) Opening access to knowledge in Southern African universities. In *SARUA 2008 Study Series*. Johannesburg: Southern African Regional Universities Association
- Allen Press (2011) *PLoS named SPARC innovator*. Available at <http://allenpress.com/frontmatter/issue/issue-17-2011/plos-one-named-sparc-innovator> [Accessed 25 April 2013]
- Aronson B (2004) Improving online access to medical information for low-income countries. *New England Journal of Medicine* 350: 966–968. <http://content.nejm.org/cgi/content/full/350/10/966>
- Beall J (2011) *Beall's list of predatory, open-access publishers*. Available at <http://carbon.ucdenver.edu/~jbeall/Beall%27s%20List%20of%20Predatory,%20Open-Access%20Publishers%202012.pdf> [Accessed 23 January 2013]
- Binfield P (2011) *PLoS ONE* and the rise of the open access mega journal. Presentation to the Society of Scholarly Publishing (SSP) meeting, 1 June 2011. Available at www.slideshare.net/PBinfield/ssp-presentation4 [Accessed 25 April 2013]
- Bloom D, Canning D & Chan K (2005) *Higher Education and Economic Development in Africa*. Washington DC: The World Bank
- Bowdoin NT (2011) Open access, African scholarly publishing, and cultural rights: An exploratory usage and accessibility study. *Library Philosophy and Practice*, paper 619. <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1651&context=libphilprac>
- Burley R (2012) *Open access in 2011*. Available at <http://blogs.wiley.com/publishingnews/2012/02/14/wiley-open-access-update-january-2012/> [Accessed 31 January 2013]
- Björk BC (2012) The hybrid model for open access publication of scholarly articles: A failed experiment? *Journal of the American Society for Information Science and Technology* 63(8): 1496–1504
- Cook BG, Cook L & Landrum TJ (2013) Moving research into practice: Can we make dissemination stick? *Exceptional Children* 79(2). Available at <http://www.questia.com/library/journal/1G1-314347594/moving-research-into-practice-can-we-make-dissemination#articleDetails>
- Cooper D (2009) University–Civil Society (U-CS) research relationships: The importance of a ‘fourth helix’ alongside the ‘triple helix’ of University–Industry–Government (U-I-G) relations. *South African Review of Sociology* 40(2): 153–180
- Duff PA (2007) *Problematising Academic Discourse Socialisation*. Melbourne: Monash University
- Eysenbach G (2006) Citation advantage of open access articles. *PLoS Biol* 4(5): e157. doi:10.1371/journal.pbio.0040157
- Favish J, McMillan J & Ngcelwane SV (2012) Developing a strategic approach to social responsiveness at the University of Cape Town, South Africa. *Journal of Higher Education Outreach and Engagement* 16(4): 37
- Ferreira M, Rodrigues E, Baptista AA & Saraiva R (2008) Carrots and sticks: Some ideas on how to create a successful institutional repository. *D-Lib Magazine* 14(12)
- Garfield E (2006) *The history and meaning of the journal impact factor*. Available at <http://jama.jamanetwork.com/article.aspx?articleid=202114> [Accessed January 2013]
- Geisecke J (2011) Institutional repositories: Keys to success. *Journal of Library Administration* 51(5–6). doi: 10.1080/01930826.2011.589340
- Harnad S (2008) *Open access primer for the perplexed*. Available at: <http://openaccess.eprints.org/index.php/?archives/408-OA-Primer-for-the-Perplexed.html> [Accessed 8 May 2013]
- Harnad S (2009) Institutional repository success is dependant upon institutional mandates: The affirmative argument. *Bulletin of the American Society for Information, Science and Technology*. Available at http://www.asis.org/Bulletin/Apr-09/AprMay09_Harnad-McGovern.pdf [Accessed 6 May 2013]
- Harnad S (2011) *Megajournals, quality standards and selectivity: Gaussian facts of life*. Available at <http://openaccess.eprints.org/index.php/?archives/823-guid.html> [Accessed 31 January 2013]
- Harvard University Library (2013) *Harvard University Office of Scholarly Communication: Request a waiver*. Available at <http://osc.hul.harvard.edu/authors/waiver> [Accessed 28 January 2013]
- Hey T (2013) *A journey to open access, part 2*. Available at <http://tonyhey.net/2013/01/04/a-journey-to-open-access-part-2/> [Accessed 24 April 2013]
- Houghton JW & Swan A (2013) Planting the green seeds for a golden harvest: Comments and clarifications on “going for gold”. *D-Lib Magazine* 19(1/2). www.dlib.org/dlib/january13/houghton/01houghton.html
- Houghton J, Swan A & Brown S (2011) Access to research and technical information in Denmark. Report for the Danish Ministry for Research & Innovation and Danish Ministry for Culture. <http://www.fi.dk/publikationer/2011/adgang-til-forskningsresultater-og-teknisk-information-i-danmark/adgang-til-forskningsresultater-og-teknisk-information-i-danmark-access-to-research-and-technical-information-in-denmark.pdf>



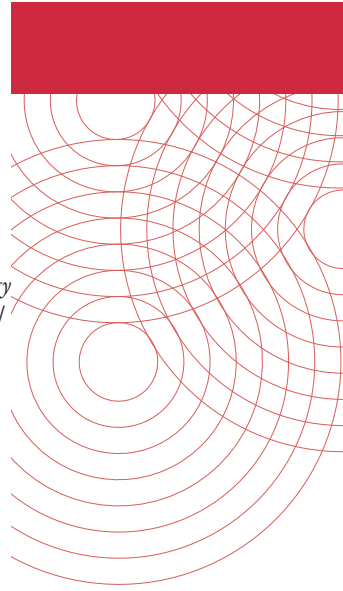
- Huisman J & Currie J (2004) Accountability in higher education: Bridge over troubled water? *Higher Education* 48: 529-551.
- JISC (2012) *The value and benefit of text mining to UK further and higher education*. Available at <http://bit.ly/jisc-textm>.
- Johnson RK (n.d.) Whither competition? *Nature Web Debates*. Available at www.nature.com/nature/debates/e-access/Articles/johnson.html [Accessed 24 April 2013]
- Journal of the American Heart Association (JAHA)*. (2013). JAHA open access waiver country list. Available at http://jaha.ahajournals.org/site/misc/oa_waiver_country_list.xhtml [Accessed 28 January 2013]
- Kee JE (1999) At what price? Benefit-cost analysis and effectiveness-cost analysis in program evaluation. *Evaluation Exchange* V(2/3). Available at www.hfrp.org/evaluation/the-evaluation-exchange/issue-archive/methodology-15/at-what-price-benefit-cost-analysis-and-cost-effectiveness-analysis-in-program-evaluation [Accessed 1 November 2010]
- Kruss G (2012) Conceptions of higher education, development-oriented social engagement and innovation in the SADC context. In SARUA, *Perspectives on Regional Identity and the Role of Higher Education in Southern Africa*. Johannesburg: SARUA
- Lao C, Materu P & Saint W (2009) *Legal Frameworks for Tertiary Education in Sub-Saharan Africa: The Quest for Institutional Responsiveness*. Washington DC: World Bank
- Levin HM (1983) *Cost-effectiveness: A Primer. New Perspectives in Evaluation (Volume 4)*. California: Sage.
- McCabe M (2002) A true market failure. Interview with Richard Poynder. Available at <http://www.infotoday.com/it/dec02/poynder.htm> [Accessed 22 April 2013]
- McKnight C (1996) Copyright in the electronic domain: An author's view. *Library Management* 17(8): 30-33
- Moses I (1986) Promotion of academic staff: Reward and incentive. *Higher Education* 15(1): 135-149
- Norman F (2012) *Megajournals*. Available at <http://occamstypewriter.org/trading-knowledge/2012/07/09/megajournals/> [Accessed 31 January 2013]
- Open Oasis (2013) *Open access monographs*. Available at www.openoasis.org/index.php?option=com_content&view=article&id=348&Itemid=381 [Accessed 25 April 2013]
- Palmer S, Byford S & Raftery J (1999) Types of economic analysis. *British Medical Journal* 318 (1349). Available at www.bmj.com/content/318/7194/1349.1.full [Accessed 1 November 2010]
- Public Library of Science (2013) *Publication fees*. Available at www.plos.org/publish/pricing-policy/publication-fees/ [Accessed 25 January 2013]
- Research Information Network (2009) *Overcoming barriers: Access to research information content*. www.rin.ac.uk/system/files/attachments/overcoming_barriers_report.pdf
- Rodrigues E & Clobridge A (2011) The case for interoperability for open access repositories. Report of Working Group 2 of the Confederation of Open Access Repositories. Available at www.coar-repositories.org/files/A-Case-for-Interoperability-Final-Version.pdf
- SAGE Open (2013) *Manuscript submission*. Available at www.uk.sagepub.com/journalsProdDesc.d=Journal202037&crossRegion=africa#tabview=manuscriptSubmission [Accessed 30 January 2013]
- Smart JC (1978) Diversity of academic organisations: Faulty incentives. *Journal of Higher Education* (49)5: 403-419
- Solomon DJ & Björk B (2011) *A study of open access journals using article processing charges*. Available at www.openaccesspublishing.org/apc2/preprint.pdf [Accessed 29 January 2013]. doi: 10.1002/asi.22673/
- Suber P & Shieber S (regularly updated resource) Good practices for university open-access policies. http://cyber.law.harvard.edu/hoap/Good_practices_for_university_open-access_policies
- Swan A (2008) Study on the availability of UK academic "grey literature" to UK SMEs: Report to the JISC Scholarly Communications Group. <http://eprints.ecs.soton.ac.uk/17667/>
- Swan A (2010) *The open access citation advantage: Studies and results to date*. <http://eprints.ecs.soton.ac.uk/18516/>
- Swan A (2012) UNESCO *Policy guidelines for the development and promotion of open access*. www.unesco.org/new/en/communication-and-information/resources/publications-and-communication-materials/publications/full-list/policy-guidelines-for-the-development-and-promotion-of-open-access/
- Swan A & Carr L (2008) Institutions, their repositories and the web. *Serials Review* 34(1). <http://eprints.ecs.soton.ac.uk/14965/>
- Swan A & Houghton JW (2012) *Going for Gold? The costs and benefits of Gold Open Access for UK research institutions: Further economic modelling*. Report to the UK Open Access Implementation Group (July 2012). Available at <http://ie-repository.jisc.ac.uk/610/>
- Taylor J (2003) A higher education perspective on linking performance indicators to extrinsic rewards: An empirical analysis. *Journal of Public Affairs Education* 9(1): 13-31

Te Velde DW (2005) *Globalisation and Education: What do the trade, investment and migration literatures tell us?* London: Overseas Development Institute.

Van Damme D (2001) *Higher education in the age of globalisation: The need for a new regulatory framework for recognition, quality assurance and accreditation.* Introductory paper for the UNESCO Expert Meeting Paris, 10–11 September 2001. Available at <http://goo.gl/pGeJz> [Accessed 25 April 2013]

Wagner AB (2010) Open access citation advantage: An annotated bibliography. *Issues in Science & Technology Librarianship* Winter. <http://www.istl.org/10-winter/article2.html>

Young P (2011) *The serials crisis and open access: A white paper for the Virginia Tech Commission on Research.* http://scholar.lib.vt.edu/faculty_archives/YoungP/OAwhitepaper.pdf



Appendix 1

Operationalising open access in Africa: Megajournals and regional repositories

The relative size of institutions in the higher education sector in Southern Africa presents its own concern. The small size of these institutions and the low potential for growth given the population and wealth constraints of the region have proved to be a serious problem in allowing institutions to assert their own publishing identities, thus affecting visibility. Africa is riddled with “Volume 1 Issue 1” journals – publications that through lack of critical mass (and fears of low prestige and impact) have failed to see a second publication. Similarly, institutional repositories created for universities with low numbers of active researchers could worry about being marginalised by larger, more successful repositories. Possible alternatives to this atomised system are regional repositories and megajournals.

Many point to *PLOS ONE* as the first megajournal (Harnad 2011; Norman 2012). Basing its acceptance decisions on scientific rigour, proper methodology and conclusions supported by data (not on relevance, novelty, or impact considerations), *PLOS ONE* became the largest single journal in 2010, four years after its inception in 2006. Along with its considerable size, it is also a world-renowned and prestigious publisher, and desirable as a journal of first publication.

Megajournals have been estimated by some to continue to grow, accounting for up to 50% of scientific literature by 2016 (Binfield 2011).

Megajournals, according to Norman (2012: 1) share a number of distinguishing characteristics:

- Sound science
- Impact not required
- Academic editors
- Automated, scalable workflows
- Fast turnaround time
- APCs around GBP1,000
- Post-publication promotion
- Article-level metrics

The reduced focus on novelty, impact and the use of post-publication review allows megajournals to theoretically publish considerable quantities of research before technical constraints become relevant. The use of automated workflows and academic editors instead of in-house editors help process this large volume of research. The end result is a great volume of research being produced, utilising benefits of scale, which is vetted for scientific rigour and not relevance or impact concerns, freely available to both the academic community and the public.

The regional repository is identical to the Green route open access repository, except that it draws its inputs from several different universities across national boundaries. Structurally, no additional work is needed above the normal set-up procedures for an institutional open access repository. However, hosting, vetting concerns and the issue of national pride, shared with megajournals, become relevant.



This work was carried out by the Scholarly Communication in Africa Programme with the aid of a grant from the International Development Research Centre, Ottawa, Canada



This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of the license, visit <http://creativecommons.org/licenses/by/4.0/>