Australian Government

Department of Education, Science and Training

RESEARCH COMMUNICATION COSTS IN AUSTRALIA, EMERGING OPPORTUNITIES AND BENEFITS

John Houghton, Colin Steele & Peter Sheehan

A report to the Department of Education, Science and Training

September 2006

EXECUTIVE SUMMARY

Note:
This report has been prepared for the Department of Education, Science and Training. The report will help to inform the Australian research and education sector of the economic issues, costs and benefits that reside at the core of the debate considering various scholarly communications models. The views expressed are those of the authors and are not necessarily the views of the Department of Education, Science and Training or the Australian Government.

Acknowledgements

The authors would like to acknowledge the support of the Systemic Infrastructure Initiative, a part of the Commonwealth Government's *Backing Australia's Ability – An Innovation Action Plan for the Future*, and those in the higher education and research sector and in the publishing industry who gave so generously of their time during consultations and in responding to the many questions asked of them.

Disclaimer

While every effort has been made to ensure its accuracy, The Centre for Strategic Economic Studies (Victoria University) does not make any representations or warranties (express or implied) as to the accuracy or completeness of the information contained in this report. The Centre for Strategic Economic Studies (Victoria University), its employees and agents do not accept any liability in negligence for the information (or the use of such information) which is provided in this report.

Copyright

Table of Contents

Figures and Tables

Executive Summary

The environment in which research is being conducted and disseminated is undergoing profound change, with new technologies offering new opportunities, changing research practices demanding new capabilities, and increased focus on research performance. Nevertheless, despite billions of dollars being spent by governments on R&D each year, relatively little policy attention has yet been paid to the dissemination of the results of that research through scholarly publishing.

A key question facing us today is, are there new opportunities and new models for scholarly communication that could enhance the dissemination of research findings and, thereby, maximise the economic and social returns to public investment in R&D? By exploring the costs involved in scholarly communication activities and some of the potential benefits available through emerging scholarly communication alternatives, this study contributes to helping us answer this question.

The study provides background information to support the development of the Australian 'Accessibility Framework' (Appendix III), which is intended to provide a strategic framework to improve management of, and access to, research information, outputs and infrastructure so that they are discoverable, accessible and shareable. It also provides activity costings for a range of core activities within the higher education sector that may prove useful in the management of institutional budgets and priorities.

Costs of scholarly communication

Chapter 3 explores the activities and costs associated with scholarly communication, using a systems perspective. It suggests that scholarly communication costs include:

- *Research* – the costs associated with the research that enables the production of the article, monograph or other composition, its writing and preparation, submission and revision, and related editorial and peer review activities;
- *Publishing* – the costs associated with acquisition of content, editing and production, marketing and sales, and distribution and access;
- *Research infrastructure (distribution)* – the costs associated with access to research findings, including library infrastructure and activities, the provision of equipment and the network infrastructure for access; and
- *Research infrastructure (funding and management)* – the costs associated with research funding, research management and the evaluation of research activities.

An Australian cost model

An extensive literature review provided the foundation for the development of a model of the costs associated with these activities in Australia. The model was refined through local data collection and a series of interviews with local stakeholders. Inevitably, a

number of simplifying assumptions must be made in the construction of such a model, and the preliminary costings outlined should be taken as no more than a first approximation, intended to scope local activities rather than provide detailed costings.

Scholarly communication system costs

Research communication costs are significant. Summing the estimated costs associated with core scholarly communication activities in Australian higher education (*including higher education related ARC and NHMRC research grant application and review, reading for those higher education staff producing HERDC compliant publications, writing HERDC publications, related peer review and editorial activities, and related publishing costs*) gives an approximate estimate of overall system costs of between AUD 2.6 billion and AUD 4.6 billion (mean AUD 3.6 billion) per year (Table A1).

Table A1 Costing estimates for Australian higher education, circa 2004 (AUD per annum)

Activity, Content & Infrastructure Costs	*Lower Bound*	*Upper Bound*	*Mean*
Reading (Published Staff)	2,036,200,000	3,423,700,000	2,698,700,000
Reading (Academic Staff)	3,507,900,000	5,898,300,000	4,649,300,000
Writing (HERDC compliant publications only)	325,400,000	604,100,000	480,100,000
Peer Review (Scaled to HERDC)	39,900,000	177,800,000	100,200,000
Editorial activities (Scaled to published staff)	13,300,000	59,400,000	33,100,000
Editorial board activities (Scaled to published staff)	1,700,000	5,800,000	3,500,000
Preparing Grant Applications (ARC & NHMRC)	77,500,000	143,900,000	114,400,000
Reviewing Grant Applications (ARC & NHMRC)	9,800,000	35,100,000	21,700,000
Publisher Costs (Scaled to HERDC)	104,100,000	190,500,000	147,700,000
Library Acquisition costs (CAUL)	..	..	181,900,000
Library non-Acquisition costs (CAUL)	..	..	316,800,000
Acquisition Cost per Serial Title (CAUL)	..	..	76
Implied acquisition cost per Article (Estimated)	..	..	< 1
Cost per download (Sample of CAUL subscriptions)	1.24	10.11	4.49
Acquisition Cost per non-serial item (CAUL)	..	..	60
Research Management costs (Estimated)	..	..	36,800,000
ICT Infrastructure (Estimated Total Expenditure)	806,900,000	1,344,800,000	1,075,900,000
Scholarly communication system costs	*2,607,900,000*	*4,640,400,000*	*3,599,500,000*

Note: All costings relate to Australian higher education. Upper and lower bounds are set, primarily, by academic salary ranges. National total includes core publishing related activities only.
Source: CSES project model, Author's analysis.

Nationally, these costs amount to around 30% of total higher education revenues and expenditures. Institutions vary, with estimated scholarly communication related costs accounting for 40% or more of total revenues and expenditures for some of the more research intensive universities (*e.g.* University of Queensland and Australian National University), and as little as 10% for others (*e.g.* Southern Cross and Charles Darwin Universities).

Research costs

Costs associated with research activities are based on those found in the literature, with activity times translated into costs using the AVCC guide to full cost recovery for (non-laboratory) contract research activities. They include full staff salary and on-costs, as well as overhead costs.

Writing (≈AUD 480 million pa): In Australian higher education institutions it is estimated that it costs around AUD 480 million per year to write those publications counted in the Higher Education Research Data Collection (HERDC) alone. No account is taken of the cost of producing other outputs, publications that do not qualify for inclusion or those rejected by publishers.

Peer review (≈AUD 120 million pa): Assuming that journal and monograph related peer review activities scale to peer reviewed publication, it is estimated that in Australian higher education they cost around AUD 100 million a year. It is further estimated that peer review of higher education related ARC and NHMRC grant applications costs a further AUD 20 million or more, bringing the total costs of peer review activities in Australian higher education to around AUD 120 million a year. No account is taken of other peer reviewing activities relating to other grants or those associated with other outputs.

Editorial activities (≈AUD 37 million pa): Based on an extensive international survey, it is estimated that in Australian higher education editorial activities relating to scholarly journals alone cost around AUD 37 million a year. No account is taken of other editorial activities (*e.g.* internal working papers, contract research reports, etc.) or of activities relating to books.

Reading (≈AUD 4,650 million pa): Based on extensive international surveys, it is estimated that reading by academic staff in higher education may cost around AUD 4.6 billion a year. Of which, reading by those staff who are actively publishing (*i.e.* approximating reading in order to write) may cost around AUD 2.7 billion a year.

Publishing costs (≈AUD 150 million pa)

Publishing costs are based on a wide ranging review of studies of the costs associated with publishing, supplemented by consultation with senior publishing industry executives. It is estimated that publisher costs relating to those Australian higher education publications reported in the HERDC alone amount to almost AUD 150 million a year. No account is taken of the cost of producing other outputs or publications that do not qualify for inclusion in the HERDC collection.

Research infrastructure costs

Research infrastructure costs include those associated with access to findings, including library infrastructure and information acquisition, the provision of equipment and the network infrastructure for access, as well as costs associated with research funding, management and evaluation.

Library acquisition costs (≈AUD 182 million pa)

Those research libraries reporting to The Council of Australian University Librarians (CAUL) reported total expenditure of almost AUD 500 million during 2004, of which AUD 182 million was spent on content acquisition – AUD 125 million on serials, and AUD 56 million on non-serial items. In 2004, total acquisition expenditures amounted to around AUD 5,180 per FTE academic staff. On a per item basis, subscriptions to serials titles cost an average AUD 76 each, while non-serial items cost an average AUD 60.

Based on averages derived from an analysis of almost 5,000 journal titles, the implied cost of providing higher education access per article was less than AUD 1. The cost per download for a sample of seven of the larger publishers' packages subscribed to through CAUL during 2005 ranged from a low of AUD 1.24 to a high of AUD 10.11 (weighted mean AUD 3.60, unweighted mean AUD 4.49).

Institutional Repositories (≈AUD 2 to 10 million pa)

A wide range of repository establishment and operational costs are reported, due to the range of content, scope and functionality offered and varying practices regarding the inclusion of overhead and 'in-kind' costs.

A review of the literature suggests average repository establishment costs of around AUD 9,000 and annual operating costs ranging from a low of around AUD 4,000 to a high of around AUD 80,000 per year (mean AUD 41,000). Assuming a 5 year depreciation of establishment costs, mean annual costs per archive would be around AUD 42,500, implying that the total costs of operating institutional repositories for all higher education institutions in Australia might be of the order of AUD 2 million a year.

However, it should be noted that canvassing a small number of local examples unveiled annual costs of up to AUD 275,000. These cost levels would suggest that the total cost of operating institutional repositories for all higher education institutions in Australia might be up to AUD 10 million a year at the upper end. Taking account of the policy, advocacy, management and operation of a substantial institutional repository, and fully costing staff time involved, suggests that individual institutions might expect repository costs to be of the order of AUD 200,000 a year.

ICT expenditure in higher education (≈AUD 1 billion pa)

Preliminary findings from CAUDIT's benchmarking study suggest that higher education institutions typically spend between 6% and 10% of their total income on ICTs. This suggests total higher education ICT expenditure of the order of AUD 1 billion in 2004.

Research grants (≈AUD 160 million pa)

It is estimated that the preparation of ARC and NHMRC grant applications in Australian higher education institutions alone cost around AUD 114 million in 2004. External peer review costs associated with such applications are estimated to have been

AUD 22 million in higher education alone. ARC and NHMRC agency costs amount to around AUD 25 million. There is insufficient information available to be able to apportion this expenditure between higher education and other institutions, and no account is taken of other research granting agencies and activities.

University research office operations (≈AUD 35 million pa)

There is no central reporting of the activities of university research offices comparable to that of libraries and IT services. Moreover, structures and activities vary widely, with some research offices operating centrally while others are more diffuse (*e.g.* decentralised data collection done within departments and faculties). Hence, it has not been possible to estimate the costs involved with any accuracy. Nevertheless, based upon the extrapolation of three diverse cases on an FTE staff basis, Australian higher education research offices' annual operating expenditures would be of the order of AUD 35 million.

Institutional costs

In most cases it is possible to disaggregate these costings to individual higher education institutions. However, it should be noted that these disaggregated data are substantially less reliable. They are at best indicative, and should be taken as no more than an approximate guide.

Tables 3.5 and 3.6 (see body of this report) present estimated annual scholarly communication related activity, content access and infrastructure costings for individual higher education institutions in Australia. They show, for example, that:

- Writing HERDC publications costs some AUD 40 million a year at The University of Melbourne, compared with less than AUD 1 million at the University of the Sunshine Coast;
- Peer review of such publications may cost more than AUD 8 million a year at The University of Melbourne, Sydney University and University of Queensland, compared with AUD 320,000 at Charles Darwin University, AUD 250,000 at Bond University and less than AUD 200,000 at the University of the Sunshine Coast;
- Library acquisition expenditures exceeded AUD 14 million at Monash University in 2004, but were less that AUD 3 million at Victoria University (with differences in reporting likely accounting for a part of the difference); and
- 'Author-pays' publishing might cost the University of Sydney more than AUD 4.5 million, compared with less than AUD 1 million at no fewer than 22 universities (were it to be adopted for all HERDC compliant journal publications).

Benefits of enhanced access

Chapter 4 builds on a review of the literature discussing the potential benefits of emerging open access scholarly communication models, and seeks to quantify some of those benefits.

Enhanced access opportunities

Perhaps the most important potential benefit of open access is enhanced access to, and greater use of, research findings, which would, in turn, increase the efficiency of R&D as it builds upon previous research. There is also significant potential for open access to expand the use and application of research findings to a much wider range of users, well beyond the core research institutions that have had access to the subscription-based literature.

Focusing on higher education, Getz (2005, pp11-12) noted three important dimensions of benefit: broader industry, government and society impacts; educational impacts; and the potential for greater integration of publications and other the digital objects that are increasingly the outputs of research (*e.g.* numeric data sets, software algorithms, animations, sound and video files). Kircz (2005) explored the 'dis-benefits' of the subscription publishing system, noting that the published literature was not, as often described, the record of science – at least, not the full record. Firstly, because of timing, it is "*the full stop after the fact*", with current discussion in many fields already based on pre-prints and other communications mechanisms (*e.g.* discussion lists, web logs, etc.). Secondly, because of selectivity in publishing, it is "*only a trophy cabinet*", with little reporting in the formal journal literature of failed experiments or trial and error tests.

Identifying the benefits that might be measured

The dimensions of potentially measurable benefits from enhanced access include those relating to research, industry and government, and the wider community.

Research

The most immediate benefits of open access would be likely to accrue within research, wherein the dimensions of potential benefit include:

- Speed of access speeding up the research and discovery process, increasing returns to investment in R&D and, potentially, reducing the time/cost involved for a given outcome, and increasing the rate of accumulation of the stock of knowledge;
- Improved access leading to less duplicative research, saving duplicative R&D expenditure and improving the efficiency of R&D;
- Faster access leading to better informed research, reducing the pursuit of blind alleys, saving R&D expenditure and improving the efficiency of R&D;

- Wider access providing enhanced opportunities for multi-disciplinary research, inter-institutional and inter-sectoral collaborations;
- Wider access enabling researchers to study their context more broadly, potentially leading to increased opportunities for, and rates of, application and commercialisation; and
- Improved access leading to improved education outcomes, enabling a given education spend to produce a higher level of educational attainment (at least at the post secondary level), leading to an improvement in the quality of the 'stock' of researchers and research users.

Industry and government

Given relative levels of access under the subscription publishing system, it is possible that greater potential benefits lie in enhanced access for industry and government, wherein the dimensions of potential benefits include:

- The potential for wider access to both accelerate and widen opportunities for adoption and commercialisation of research findings, thereby increasing returns on public investment in R&D and on private investment in commercialisation related activities;
- The potential for much wider access for GPs/nurses, teachers/students, small firms in consulting, engineering, architecture, design, law, electronics/ICTs, biotechnology, nanotechnology, etc., who currently have limited access, with a positive impact on quality of services and, possibly, productivity in those sectors of the economy; and
- The potential for the emergence of new industries based upon the open access content – there are examples of new industries built on publicly accessible data (*e.g.* weather derivatives based on meteorological data), and there are potential futures for publishers to become value adding services providers overlaying open access content (*e.g.* peer review services, bibliometrics and webometrics for research evaluation, etc.). In turn, these might enhance research evaluation and lead to better focused R&D expenditures.

Impacts might be felt more in particular sectors (*e.g.* knowledge intensive services, biotechnology, etc.). Impacts in such areas as management and economic consulting and engineering might be significant, raising the quality of advice to the benefit of clients across the economy. There may also be significant impacts in policy development, through better informed policy debate and enhanced access to information underpinning policy decisions.

One important dimension might be the potential for greater access for small and medium sized firms (SMEs), enabling SMEs to do more research internally, increasing the share of R&D undertaken by SMEs, and increasing the share of R&D done in industries and countries that include a relatively high share of SMEs (*e.g.* Australia).

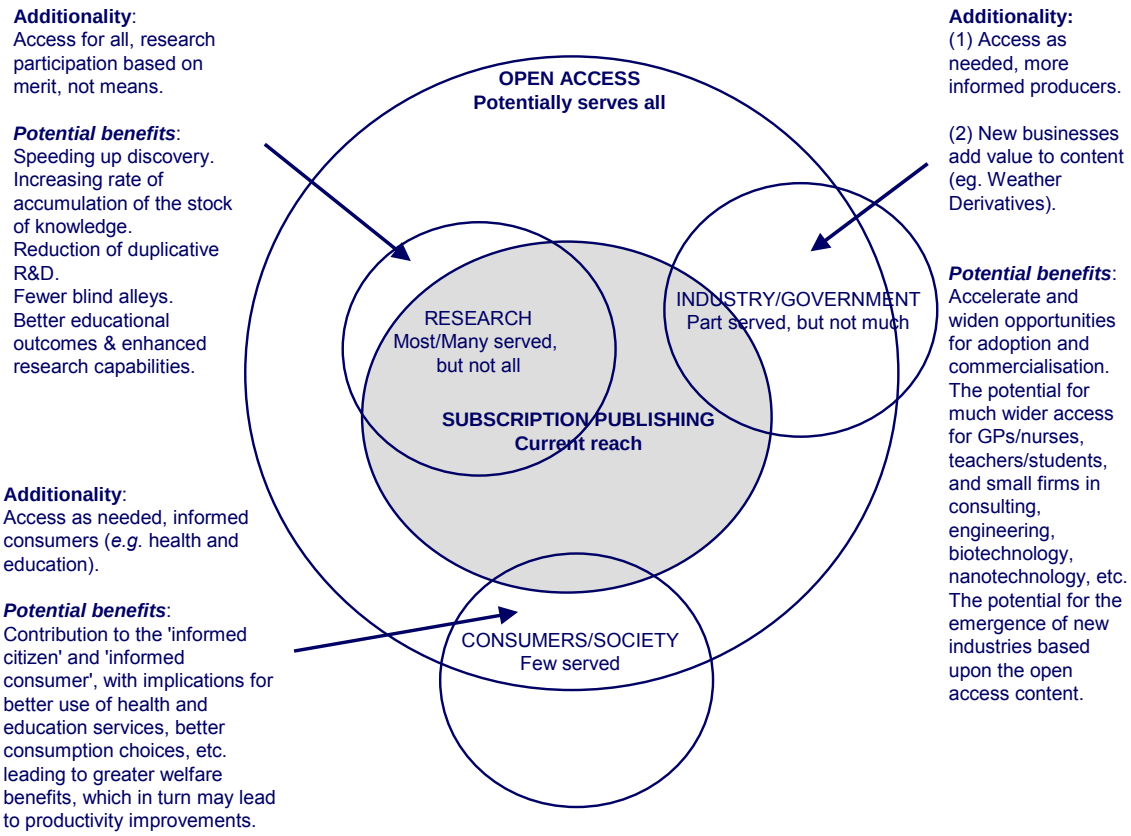
The wider community

In relation to the wider community, the dimensions of potential benefit include the potential contribution of open access to the 'informed citizen' and 'informed consumer', with implications for better use of health and education services, better consumption choices, etc. leading to greater welfare benefits, better health, etc., which in turn may lead to economy-wide productivity improvements.

An impacts framework

These dimensions of impact are represented in Figure A1, which shows the potential expanded coverage and access available through open access. In these three spheres of activity, subscription publishing has served: most but not all research institutions; some but not many industry and government users; and few consumers. The additionality and some of the potential benefits of enhanced access are also shown.

Figure A1 Impact framework: Subscription versus open access publishing



Source: Author's Analysis.

Quantifying some of the benefits

There are many difficulties involved in attempting to quantify benefits and compare costs and benefits. Nevertheless, it is possible to gain some sense of the possible scale

of potential impacts by developing impact scenarios focusing on the aggregate measure of social returns to investment in R&D, and a modified growth model introducing access and efficiency variables into calculating the returns to R&D.

Estimating the benefits of a one-off increase in accessibility and efficiency

Using a simple Solow-Swan Growth Model to explore the returns to R&D, we note that the standard approach makes some key assumptions. In particular, it is assumed that:

- All R&D generates knowledge that is useful in economic or social terms (*efficiency of R&D*);
- All knowledge is accessible to all firms or other entities that could make productive use of it (*accessibility of knowledge*); and
- All types of knowledge are equally substitutable across firms (*substitutability*).

A good deal of work has been done to address the fact that the substitutability assumption is not realistic, as particular types of knowledge are often specialised to particular industries and applications. Much less has been done on the other two assumptions (*i.e.* efficiency and accessibility). We introduce 'accessibility' and 'efficiency' as negative variables into the standard model to take account of real world access and efficiency limitations.

Estimating the benefits of a one-off increase in accessibility and efficiency (*e.g.* because of a move to open access), we find that if accessibility and efficiency are constant over the estimation period but then show a one-off increase, then, to a close approximation, the return to R&D will increase by the same percentage increase as that in the accessibility and efficiency parameters. Assuming that the increase in both parameters is the same, that the change to open access has no *net* impact on the rates of accumulation and obsolescence of the stock of knowledge, and that the information are discoverable, we find that:

- With *public sector R&D expenditure* at AUD 5,912 million and a 25% rate of social return to R&D, a 5% increase in accessibility and efficiency would be worth AUD 150 million a year;
- With *higher education R&D expenditure* at AUD 3,430 million and a 25% rate of social return to R&D, a 5% increase in accessibility and efficiency would be worth AUD 88 million a year; and
- With *ARC administered funding* (competitive grants) at AUD 480 million and a 25% rate of social return to R&D, a 5% increase in accessibility and efficiency would be worth AUD 12 million a year (Table A2).

Note that these are recurring annual gains from the effect on one year's R&D. Assuming that the change is permanent they can be converted to growth rate effects.

Table A2 Potential annual benefits of enhanced/open access, circa 2003

Research sector	*Expenditure AUDm*	*Social returns*	*Increase in accessibility & efficiency*	*Annual impact AUDm*	*Benefit/cost ratio*
Gross expenditure on R&D	12,250	50%	5%	628	214
Government expenditure on R&D	5,438	25%	5%	139	47
Public sector R&D	5,912	25%	5%	151	51
Higher education R&D	3,430	25%	5%	88	30
ARC funded research (NCGP)	481	25%	5%	12	4.1
NHMRC funded research	350	25%	5%	9	3.1

Note: Benefit/cost ratios are calculated over 20 years for a full system of institutional repositories in Australia costing AUD 10 million a year and achieving a 100% self-archiving compliance.
Source: CSES project model, Author's analysis.

Comparing costs and benefits

It is possible to express these impacts as benefit/cost ratios by focusing on a limited range of costs that relate to a change from the current position to open access to public sector and/or higher education research via a national system of institutional repositories. Thus we are comparing the estimated additional incremental cost of open access institutional repositories in Australian higher education with the potential additional incremental benefits from moving to open access to Australian higher education research. No other changes are taken into account.

Expressing these impacts as a benefit/cost ratio we find that, over 20 years, a full system of institutional repositories in Australia costing AUD 10 million a year and achieving a 100% self-archiving compliance would show:

- A benefit/cost ratio of 51 for the modelled impacts of open access to public sector research (*i.e.* the benefits are 51 times greater than the costs);
- A benefit/cost ratio of 30 for the modelled impacts of open access to higher education research; and
- A benefit/cost ratio of 4.1 for the modelled impacts of open access to ARC competitive grants funded research (Table A2).

Obviously, there is unlikely to be 100% open access to all research, because of commercial limitations, confidentiality and non-compliance. Nevertheless, whether applied across the board or to sector specific research findings it appears that there may be substantial benefits to be gained from increasing access to research findings. While it is difficult to calculate the quantum of those benefits with any certainty, these simple preliminary estimates of the potential impact of open access on social returns to R&D suggest that a move towards more open access may represent a substantial cost-benefit advantage.

Emerging opportunities and futures

Three of the four main functions of scholarly communication (*i.e.* registration, certification and dissemination) have been integrated in traditional scholarly publishing. The common thread in the literature on possible futures is the expectation of a fragmentation of these activities.

In the immediate future, we may see open access repositories and 'author-pays' open access journals as complementary elements in an evolving system, wherein repositories provide registration, awareness and archiving, and 'author-pays' journals provide the certification (primarily through peer review).

In the mid term, it is likely that such a system might evolve further, with more focused and specialised services providers emerging and a rationalisation of overlapping activities, which would lead to a more cost effective and efficient system. In the 'born digital' environment, cost savings could be made by stopping production of journals (and, perhaps, research monographs) in print form, and replacing them with overlay journals and services (*e.g.* peer review, branding and quality control services) and institutional e-presses, which depend upon the open access archives and repositories for distribution.

In the longer term, the evolution of the scholarly communication system may involve the dissolution of existing and emergence of new combinations of objects, activities and responsibilities – such as, for example, the decline of commercial publisher control over peer reviewed journal titles and the rise of open access subject archives and institutional repositories populated by free-standing digital objects of all kinds, with quality control based around career review, online user commentary and more formalised but diffuse review processes, and impacts measured as hits, downloads, citations and links, which better reflect the use and impact of the work than do citations alone.

Whatever the future, the emerging system should take account of new and emerging research practices. As Van de Sompel, *et al.* (2005) put it, "…dramatic changes in the nature of scholarly research require corresponding fundamental changes in scholarly communication. Scholars deserve an innately digital scholarly communication system that is able to capture the digital scholarly record, make it accessible, and preserve it over time… the future scholarly communication system should closely resemble – and be intertwined with – the scholarly endeavour itself, rather than being its after-thought or annex."

Conclusions and recommendations

There are new opportunities and new models for scholarly communication that can enhance the communication and dissemination of research findings to all potential users and, thereby, increase the economic and social returns to investment in R&D. Open access is, perhaps, the most important.

From a policy perspective, the question is how to enable the current system to evolve towards such a future. Setting the goals and using points of policy leverage to facilitate the transition are the keys.

Setting the goals

This report provides a basis for a re-examination of individual and institutional scholarly communication behaviours, and the ways in which both can be reorganised and streamlined. The study findings need to be incorporated within existing government initiatives (*e.g.* the Accessibility Framework, Research Quality Framework, National Collaborative Research Infrastructure Strategy and the Australian Research Information Infrastructure Committee), which are based upon the Government's desire to ensure accessibility to, and dissemination of, research results, especially where it has contributed funds to supporting the research. Through these initiatives an opportunity exists to increase the returns on our investment in research by enhancing access to it.

This study reveals a growing global open access publishing movement in the research sector. It is driven by two major factors. Firstly, a widespread sense that publicly funded research should be accessible to the public. Secondly, that the accessibility of such research is a major factor in the distribution and impact of that research and, thereby, in maximising the return on our investment in it. The cost-benefit analysis undertaken for this study reveals substantial potential benefits from more open access.

Accessibility to research information can be facilitated through the development of a national system of institutional or enterprise-based repositories to support the new modes of enquiry and research. All Australian higher education and research institutions should be encouraged to develop enterprise-wide digital repositories for the storage, preservation, curation, access, registration and management of their intellectual property. The ability to access all Australian research through institutional repositories will not only make it available, but will also facilitate its management and increase the impact of Australian research.

Realising the benefits of enhanced access depends upon appropriate infrastructure and incentives, to ensure:

- Widespread adoption of open access strategies by universities, research funding bodies and government agencies;
- 'Hard or soft mandated' deposit of research output at the national, funder and/or institutional levels;
- Fully integrated institutional repositories or relevant subject-based archives based upon open access standards; and
- Fully developed links between content 'publishing' and research management, reporting and evaluation.

In this context, there is a need to support further work on understanding how best, and most cost-effectively, to support the research process and the research infrastructure to maximise Australian research dissemination and impact.

Points of leverage

Research evaluation is the primary point of leverage, influencing strongly the scholarly communication and dissemination choices of researchers and their institutions. A related secondary point of leverage is funding, and the conditions funding bodies put upon it.

To attain the goals of accessibility articulated in the Accessibility Framework and elsewhere, it will be essential to ensure that funding and grant assessment, research evaluation and reward take account of emerging possibilities and opportunities, and build in open access options. As Willinsky (2006, pxii) put it: "A commitment to the value and quality of research carries with it a responsibility to extend the circulation of such work as far as possible and ideally to all who are interested in it and all who might profit by it."

Inter alia, this means:

- Ensuring that the Research Quality Framework supports and encourages the development of new, more open scholarly communication mechanisms, rather than encouraging a retreat by researchers to conventional publication forms and media, and a reliance by evaluators upon traditional publication metrics (*e.g.* by ensuring dissemination and impact are an integral part of evaluation);
- Encouraging funding agencies (*e.g.* ARC, NHMRC, etc.) to mandate that the results of their supported research be made available in open access archives or repositories;
- Encouraging universities and research institutions to support the development of new, more open scholarly communication mechanisms, through, for example, the development of hard or soft open access mandates for their supported research; and
- Providing support for a structured advocacy program to raise awareness and inform all stakeholders about the potential benefits of more open scholarly communication alternatives, and provide leadership in such areas as copyright (*e.g.* by encouraging use of creative commons licensing).

In the light of the global nature of research, Australia can also contribute through international activities. This might, for example, include working at the international level to encourage open access through international fora (*e.g.* OECD, CODATA, etc.), exploring the possibility of further building upon open access to data initiatives (*e.g.* the OECD Declaration on Open Access, and The Global Information Commons for Science Initiative), and participating in international work exploring the impacts of enhanced access to research.