1 Scientific Publishing

The segment of the Report *Public Support for Science and Innovation'* ("Draft Report") that looks at scientific publishing ("STM Publishing") is in its draft form but seemingly lacking in analysis of the underlying fundamentals of draft finding 5.7t::

5.7 Scientific Publishing

The importance of scientific publications (such as journals, monographs and databases) to the innovation system lies in their role in disseminating and providing access to knowledge and, thus, in turn, on contributing to the stock of knowledge and economic well being. As the ORCD (2005a) noted:

Scientific publishing is an important mechanism for providing dissemination and access to a wide range of scientific, technical, medical, economic and social information. Scientific publishing also *plays an important role in making research more efficient ... Dissemination of findings helps other* researchers define their research work, minimises duplicative activities and may provide data, which might otherwise have been collected again. Moreover, as an evolving process of building on findings, rapid publication and dissemination help to accelerate the advancement of science and, thereby, economic development. (p17)

This paper responds to the central hypothesis of Section 5.7 of the Draft Report by first making some general and then some specific observations.

2 General Observations

- The Commission's views of STM Publishing are too narrow and focused only on dissemination while ignoring other important aspects in the process.

- The opening paragraph of the Draft Report understates the broader role of STM Publishing in the research continuum, which in the case of journals is defined by Ware' as:

Journals form a core part of the process of scholarly communication and are an integral part of scientific research itself. Journals do not just disseminate information; they also provide a mechanism for the registration of the author's precedence; maintain quality through peer review and *provide a fixed archival version for future reference. They also provide an important way for scientists to navigate the ever-increasing volume of published material (Scientific publishing in transition* page 5).

- The commission comments on the "high and increasing cost of scientific publications" but does not balance this perception with analysis or even acknowledgement of the benefits that are delivered to the research community. Specifically, the peer review process managed by publishers and funded by a subscription model is integral to the research process.
- The recommendation in the report to make content from the research process freely available has the potential to erode and eventually collapse the existing system and the implications need to be very carefully assessed.

To enlarge upon these comments the submission turns to the process mentioned in the quotation from Ware. That process at its simplest has the following participants and functions:

- Author
- Publisher

1' Public Support for Science and Innovation, Productivity Commission Draft Research Report, November 2006 Australian Government

[2] Ware M. *Scientific Publishing in Transition: An overview of current developments.* September 2006. London.
http://www.stm-assoc.org/storage/Scientific%20iournal%20publishing%20-20STM%20ALPSP%2OWhite%2OPaper%20140906.pdf
http://www.alpsi).org/news/STM-ALPSPwhitepaper.pdf

- Publication
- Peer Reviewers
- Distribution.

The author of the Oak Report[3] notes that to establish and manage an open access system, the roles of the stakeholders and the legal relationship amongst them is a determinant of how the repository will operate with the end users. In the OAK Report seven categories of key stakeholders and relationships are identified:

1. Funding organisation -Author
2. Author- Employer
3. Author-Publisher
4. Author - Digital repository
5. Digital repository - End Users
6. Author/Publisher - End Users
7. Copyright Collecting Society - Digital Repository and End Users.

It is interesting that even in this discussion peer review for technical, academic and scientific works[4] is not mentioned. Yet this is the most important key value-added features of the process for STM Publishing. However, leaving this to one side the content of this list from the Oak Report does highlight that a sound starting point of any analysis of the process of producing scientific works for the purpose of open access in the process. For any economic assessment of how to grow the innovation sector within Australia and any resulting economic well-being the same also applies. In the context of scientific publishing, section 5.7 of the Draft Report does not do this.

3 The STM Publishing Process: The Supply Side of the STM Market

3.1 Free Goods

The process of STM Publishing is the supply side of the market, which the Draft Report is seeking to analyse. The key thrust of the Draft Report is that free Open Access repositories for scientific works will grow innovation within Australia. In economic terms the following quote addresses the use of the word `free':

> Beware of misleading uses of the word free. It does not mean simply anything distributed at a zero money price. On the contrary, some zero-priced goods are scarce, for example, "free" education, "free" public libraries, "free" campsites, "freeways", and "free" beaches. These are scarce even though the money price is zero. Charging a zero money price does not magically make a scarce good so plentiful that all of us can have as much as we want. Indeed, paradoxically, a zero money price on an economic good, as we shall see, creates what is called a shortage of the good.[5]

The Draft Report simply fails to construct, in respect to scientific reporting, any clear discussion as to how a free distribution network will maintain a viable and vibrant sector producing Australian authored scientific works. To discharge this analytical obligation, which is an implied part of the Draft Report's remit, an analysis of the process is integral. This point is emphasised, as a free distribution outlet, as part of the whole process that creates the commodity comprising the supply side of the market, would have a major impact on the supply of the STM Publishing goods.

[3] www.oaklaw.qut.edu.au, page 124 of the Report.
[4] The phrases or words `scientific works', `scientific work', `works' and `work' all refer to the written report in the STM publishing process and is a reference to the use of the wording within the meaning of the *Copyright Act 1968* and its reference to `literary expression' in section 31 of that Act.
[5] Alchian & Allen, Exchange & Production, Competition, Coordination & Control, Third Edition, Wadsworth Publishing, 1983, p 14

3.2 Peer Review

The Draft Report does not mention the subject of peer review. However, a preliminary review of STM Publishing compared to other sectors of the publishing industry identifies the specialised subject matter and the validation of this material through peer review as being key differences. The challenge for the author(s) of the Draft Report was to explain how this validation might be maintained in a free mandated distribution structure or licensed Open Access regime. Peer review adds a demand value to the published research. This added value raises the issue of the 'elasticity of demand' and `price effects'. This is highly relevant to any examination of the assertion in Section 5.7 of the Draft Report of the "high and increasing cost of scientific publications". Yet there is no commentary or analysis of the nature.

3.3 The Tradable Item in the Supply Side

After the descriptive process of STM publishing has been settled, it is then necessary to understand what lies at the economic heart of the process. What is being provided in the innovation market is a commodity on the supply side of that market. What allows that commodity to have any economic worth is the legal right within that commodity. That economic and tradeable right is the copyright interest created by the *Copyright Act* 1968 *(Cth).* Without conferring legal and tradeable rights the scientific work has no legal and enforceable worth. Under the copyright regime that operates through International Treaties, if copyright is granted in a `qualifying country' then the rights granted in that jurisdiction will be honoured in other member countries. So, the copyright protection through exclusivity of certain acts being granted to the copyright owner in Australia is in effect an international protection and thereby an international economic right. It could be argued that there is some intrinsic market value in a work without the protection of copyright. Therefore, the value has to be negligible in comparison to the statutory right granted and so is ignored in this paper.[6] It is also noted that Australia has removed any right to common law copyright. The regime is entirely statutory based.

So two key propositions create the supply side of the STM Publishing industry within Australia: the legal right created by the Parliament of the Commonwealth of Australia and the process that adds value to this exclusive right contained within the work.
It might be countered that an industry process does not constitute the supply side because the modelling used in economic theory has both demand and supply curves in the modelling to represent total demand and total supply. This aspect of the modelling is not denied. However, to reach the position of having a supply in STM Publishing goods then some form of tradeable commodity, good or right needs to exist to allow the economic good to be created.
The reference to modeling brings any consideration of supply and demand to the issue of exchange or ‘market clearing point’ or ‘equilibrium-sustaining price’. This is the point where an individual will move their position on their ‘own marginal personal valuation curve’ to meet the seller. The seller might move also on their supply curve to create a trade that is referred to as an efficient reallocation of goods.

There is no discussion of this market mechanism in the Draft Report in Section 5.7. Yet reference to price issues and dissemination of information through a market mechanism would suggest that a discussion, even in the absence of hard data, is necessary to arrive at the view that free open Access will build the innovation

[6] An indication of how the market place reacts to no legal rights and thereby economic right and certainty might be extrapolated from the time when it appeared that computer programs has no legal standing in Australia when the Courts were hearing the Apple Case. The reaction was such that the Parliament of the Commonwealth of Australia passed legislation before the High Court rules on the appeal.

market. The market-clearing concept works as a theory because it seeks to explain the allocation of scarce goods within a market through the behaviour of an individual making choices. The notion of `free' goods has been raised previously. If the consumer has a choice between a work that is free compared to a scientific, technical or medical work at a price then the market clearing point would drop to a point where no works would be produced. One substantial reason would be that the economic return on the supply side would not exist.

If this example of a supply / demand curve analysis is viewed as too simplistic, the example is adjusted such that if the consumer has a choice of a free work without any value add against a peer reviewed work, the consumer might choose the peer reviewed work because of its integrity and soundness as a research tool and as a potentially innovative work. In this circumstance there is a market clearing point for the latter work greater than nil so there is a market in some form. However, the outcome is the same because the market clearing point is, in all probability, below the production cost.

All of this appears sound in textbook economics, but in reality any attempt to analyse the Australian market in isolation from the global STM Publishing industry is an exercise without any sound intellectual basis. Australia represents 2% of the global STM publishing industry. Any move to manipulate the market clearing point downwards will have the opposite effect to that which the Draft Report seeks to achieve.

4 Open Access

If ‘Open Access’ is to be free access, then such a mandated position will have an adverse impact on Australia’s STM publishing sector and on STM publishing for Australian authors within Australia. A preliminary case for this proposition is made in the paragraphs above.

If open Access is to be a contractual or licence issue then the preceding commentary changes. The oak Report is based on the premise of a licensing regime. This is clearly different to a mandated Open Access regime and it uses an analysis of copyright, the parties and process, which create the published materials.
The Oak Report contains an alternative concept for the idea of Open Access. Support for this can be found in the language used in 5.7 of the Draft Report.

If ‘Open Access’ means ‘accessibility’, and this meaning is implicit in the opening quotation of Section 5.7 of the Draft Report, then the concept and meaning that is associated with this word is also contained in the word ‘catalogue’. If this premise is accepted then the next step is to acknowledge that the core issue is efficiency in the allocation of scarce resources to aid scientific research and to avoid duplication.

A discussion is required to ascertain what technology is currently available to and within the publishing sector to effect and assist the distribution of the information to a market place. Whilst this is not usually the role of an economic appraisal, we submit that to understand how dissemination of published scientific materials might be more efficient, such a discussion is necessary, as Open Access might not be the best option. Sadly, the Draft Report is silent on this issue.

Setting aside Google’s failure to obtain appropriate licenses and the pending copyright litigation, the Google Library scanning process could be viewed as a form of ‘Open Access’ as it freely allows the dissemination of information and its search engines does find works. A more familiar means is the use of Metadata and search engines. The latter approach does not disrupt the publishing process with unknown economic outcomes. Through agreement this digital capability aids and abets the distribution of information using technology.

5 Public Funding Equates to Free and Open Access

The proposition that if research work is publicly funded then the scientific paper(s) that result from the research should be free and in the public domain must be addressed. On the surface, free and Open Access seems a sensible notion until it is reviewed. The relationship between the Public Agency and the researcher / author is governed by a contract. There is law on this even where grant funding provides the monies. This is the source of the governance of the relationship and there are issues in seeking to unilaterally alter such a relationship after agreement has settled it. This position needs renegotiation.

Where the contract or grant is to be allocated then the terms of the contract or grant application can stipulate that all works are to be placed in the public domain free of charge. However, if this is so, and the key value added feature of scientific publishing is the publishing and peer review, then the cost of these in all likelihood will need to be paid for by the Public Agency either directly or embedded in the contract sum or grant sum. In section 5.7 of the Draft Report none of these key issues have been raised. No reasoning has been provided as to why STM publishing would support funded research by publishing and providing peer review when the author is required to place the work into the public domain free of charge. The Governments of Australia would in all likelihood need to enhance or re-establish a publishing arm or contract out the works at profit-cost. The Draft Report is silent on this even though it aims to build a case for greater economic well being through the dissemination and accessibility of scientific research.

6 A Differing Approach to the Hypothesis

There are several ways to achieve the dissemination sought.

- Encouraging STM publishers to allow extracts and key words to be made available to search engines and library catalogues so that works can be found with the speed and ease the digital environment allows;

- Encouraging a voluntary licensing regime whereby STM publishers may choose to contribute in open access' repositories as part of their commercial operations;

- The Productivity Commission to broaden the scope of its inquiry and review how academic areas other than medicine, law and science may be published with commercial reward for participants using the market mechanism, and

- Facilitate how libraries of Australia through a licensing arrangement between publishers and libraries might become the repositories for extract of works to assist dissemination of all Australia research works — current and back lists.

7 Specific Observations

7.1 Assumptions Based on Unproven Research

The Commission draws heavily on a single report by Houghton *et al*[7]. This report is a bold attempt to quantify the social and economic benefit from the communication of research results based on a number of hypotheses. It speculates that there will be significant benefits from creation of a series of open access repositories.

[7] Houghton J, Steele C, Sheehan P. Research Communication Costs in Australia: Emerging Opportunities and Benefits. A report to the Department of Education, Science and Training. September 2006. Canberra. http://www.dest.gov.au/NR/rdonlyres/0ACB271F-EA7D-4FAF-B3F7-0381F441B175/13935/DEST_Research_Communications_Cost_Report_Report_Sept2006.pdf

Our key concern is that the report has not been subjected to the rigors of peer review and the implications of introducing the suggestions in Box 5.11 of the draft report have not been tested. The report is acknowledged as a valuable contribution to the ongoing evolution of publishing processes, but we are concerned that the Commission is taking it on face value as fact when the underlying hypotheses are not proven.

The data and assumptions from Houghton *et al* that are quoted verbatim in Table 5.2 of the draft report are questionable and actually confuse rather than clarify the discussion. The fact that Houghton *et al* state "these estimates should be treated with caution" has been ignored in the draft report which further undermines the methodology and findings.

The use of selective excerpts from Houghton *et al* to illustrate particular points of view in the Commission's report is disturbing. We would ask that the Commission consult more widely with other stakeholders, including publishers, to bring greater clarity, understanding and balance to the issues involved before drawing conclusions or perpetuating what could be unfounded perceptions.

7.2 Perceptions of Limited Access & the Impact on Innovation

The perceptions and tone of the report imply that access to Australian STM content is restricted, which in turn impedes innovation. We challenge this premise. Publishers, particularly in STM areas, have delivered innovative solutions to the ever-increasing expectations of the global research community by maximising the potential offered by digital technologies. As the Ware report states:

> The development of online electronic versions of journals has revolutionized scientists' access to the literature. Over 90% of STM journals are now online, and in many cases their publishers have retrospectively digitized earlier hard copy material back to the first volumes. More content is available to more users than at any time in history while the cost of use of each article is falling to well below one euro. The industry has made this possible through the application of sustainable business models and the collective investment of hundreds of millions of euros in electronic developments (Scientific publishing in transition page 8).

Journals of course underpin the work of the STM research commodity and a combination of deep, interconnected digital and powerful ICT infrastructure developed by publishers and research institutions brings extraordinary functionality to the desktop of virtually every Australian researcher.

The fact that researchers are highly satisfied with the levels of access being delivered is supported by Ware who refers to recent surveys conducted over the last few years:

> Independent research by City University (London) in 2004 found that 70% of researchers believed that access to journal literature was better or much better than 5 years ago. Only 10% of authors said that access to the literature was poor or very poor. Another survey found that access to the literature came a long way down a list of possible barriers to research productivity, well behind factors like funding, ability to recruit suitable staff, insufficient autonomy in setting research direction, bureaucracy, lack of job security, etc. (*Scientific publishing in transition* page 13.)

Australian researchers were included in these surveys and, in addition, we have substantial informal feedback from the local research communities that support these findings. We do not accept that there are any significant impediments for researchers in STM in particular from finding and accessing information that in turn should lead to innovation.

7.3 Australia in the Global STM Context

Science has always been based on the interchange of ideas but the flow of information has been enormously enhanced over the last 10 years thanks to technological developments and significant investment in applying these by publishers.

Publishers have played a major role in significantly enhancing access to the global information community. We agree that technology offers new possibilities and STM publishers will continue to be leaders in developing and applying technology to enhance the breadth, depth and speed of access to quality assured content.

It is important to keep Australian science in perspective, however, since we are a small economy that contributes only about 2% of the published outcomes as part of a global framework. One of our major concerns is the lack of data on the magnitude of Australian science / STM research and publishing that would allow more rigorous analysis.

Houghton *et al* offers some insight with a figure $181.9 million mentioned in Table Al to be the cost of acquiring content. This, of course, includes material acquired by libraries across all areas not just STM and is limited to just the university sector represented by CAUL. What is the total cost of acquiring STM material for Australia?

Our estimate of the STM market in Australia follows:

- Ware estimates the size of the global STM market to be $USD5 billion or $6.4 billion Australian dollars *(Scientific publishing in transition* page 6).

- Australia represents 2% of the global investment in R & D thus the nation might spend $130 million on STM material annually.

- Australia also publishes about 2% of the world's scientific literature annually thus the "cost" to Australia to access "Australian" research is $2.6 million annually.

These numbers may be fanciful, but they just may be right and we think this should give the Commission cause to reflect on references in the draft report. If the Australian science community has access to its research outputs for $2.6 million annually, there is no logic in duplicating what is already on offer and to invest $10 million annually to build a "national system of institutional or enterprise-based repositories" (Houghton *et al).*
We also believe that there is a need for realistic data to enable improved analysis and plans for going forward. We would welcome the chance to be part of the process.

8 Conclusion

By making our concerns known to the Commission, publishers are not claiming that the research dissemination process is perfect. We do seek to be involved in identifying better models for everyone in the community and an orderly transition that will benefit Australian research as part of the global community.