

Open Access to Research Outputs

Final report to RCUK

September 2008

Executive summary

1. SQW Consulting and LISU, Loughborough University, were commissioned by Research Councils UK (RCUK) to identify the effects and assess the impact of Open Access to research outputs on pay-to-publish and self-archiving publishing models.
2. Open Access models provide free¹, online access to research literature (in particular, peer-reviewed journal articles): either by publishing in an Open Access journal, which does not charge fees to the reader ('Gold' OA); or by archiving peer-reviewed articles published in subscription journals in an online repository ('Green' OA)².
3. RCUK published a position paper on access to research outputs in June 2006. The guiding principles in the paper were:
 - publicly funded research should be made available and accessible as rapidly as possible
 - outputs should be effectively peer reviewed
 - it should be a cost effective use of public funds
 - outputs must be preserved and remain accessible.
4. Individual research councils provided statements on open access to research outputs to their communities. Open access policies vary between research councils.

Scope of the study

5. This study addresses two key areas:
 - what has been the impact of RCUK Open Access policies on pay-to-publish and self-archiving?
 - more generally, what has been the impact of Open Access on the 'traditional' scholarly communication process?
6. The research comprised four main stages:
 - a review of existing data and literature – covering the position both nationally and internationally with regard to trends in Open Access publishing; drivers and barriers to the take-up of Open Access publishing; researcher perceptions of Open Access journals and repositories as both sources of information and places to publish; market developments and current funding trends for both subscription and Open Access journals; and gaps in the existing data and literature

¹ to the reader; under 'Gold' OA, the costs of publication are met through non-subscription means

² See the JISC website for further details:

http://www.jisc.ac.uk/whatwedo/themes/information_environment/scholarly_comms/oa.aspx

- a series of consultations with a variety of key stakeholders involved in the scholarly communications process - including funding bodies (Research Councils, charities, government departments); higher education institutions (HEIs) and representative organisations; researchers, librarians, publishers, and not-for-profit organisations. Topics covered varied by stakeholder organisation and involvement.
 - primary data collection – the research included two web-based surveys; one of HE libraries in the UK, and the other of researchers and post graduates supported by the research councils
 - analysis and reporting.
7. An expert panel provided support and guidance to the research team.

Findings

8. Demand for scholarly output comes primarily from the academic research community (though there are other users of scholarly output from government, the business sector, not-for-profit organisations and the general public). Demand from the academic community is not directly influenced very much by price – rather, demand is determined by the standard of the work sought. In general, academic authors seek to place their articles in outlets which are widely read and highly respected with high impact factors.
9. Different individuals and institutions in the communications process: scholars, research funders, publishers, higher education and research institutions and the wide variety of users, sit in different structural positions within the process and have different amounts of power in influencing how the process operates. They have different objectives in the short and long term and this influences how they behave in the process.
10. Variables which influence behaviour in the commercial market do not necessarily have a strong relationship with the concerns of academic users and producers, in the context of the furtherance of scientific communication.
11. The costs of publishing can be carried by the scholars who wish to publish, by the individuals and institutions who wish to have access to their work or by a third party who may wish to facilitate the communication process. Different ways of covering costs – payment systems – have implications for the efficiency of the communications process.
12. There are a number of different funding models for journal publishing. Journal funding models include:
- traditional subscription (the reader may not be directly responsible for the cost of subscription, for example where university library budgets pay subscription costs on behalf of academics and students)
 - Open Access (often referred to as pay-to-publish, which include author-pays, funder-pays and institution-pays models)
 - hybrid models – where a traditional subscription journal offers authors the opportunity for Open Access to their articles on payment of a fee.

13. In general, the costs of ‘Gold’ OA are met through pay-to-publish models, and those of ‘Green’ OA through traditional subscription models. The extent to which Open Access journals are currently able to cover their publication costs, and the level at which pay-to-publish charges should be set, were both contested by consultees.

Context

14. There are a number of arguments, both ethical and practical, put forward in favour of OA. The first is that knowledge is an international public good, and that barriers to accessing information should be minimised. The second is that since much research is funded by the taxpayer, taxpayers should have easy access to the results of the research which they collectively fund. In addition, there are concerns on the part of funding bodies that they do not necessarily have access to publications stemming from research which they have funded, but must pay a subscription fee for access.
15. Opposition to OA arises largely from the view that commercial publishers and learned societies provide useful and necessary services to the research community, which have to be paid for. Open Access may threaten the viability of a stable system. In addition, existing pay-to-publish models may burden smaller research funders, for example some of the small charities, and so reduce their opportunity to publish the results of their research and ultimately to fund research. However, it should be noted that most publishers now allow some form of open access publishing – either through hybrid journals (which still require a payment to publish), or in repositories (following an embargo period).
16. There has been a shift in favour of Open Access in the past decade on the part of many actors in the scholarly communications process. While Open Access and online access are not equivalent, the technologies allowing online access have facilitated the dissemination of Open Access material. Technological developments mean that the marginal costs of providing online access to journal articles are minimal, so that there is no need to charge subscription fees to meet additional (online) distribution costs. The growth of OA and hybrid journals, as well as repositories, mean that there are now more opportunities for researchers to publish and use Open Access material. However, knowledge and understanding of the key features of Open Access remains relatively limited.
17. Engagement with the Open Access debate varies by subject area. These differences stem from the nature of the subject; differences in the research process; the history of scholarly communication and collaboration within different disciplines; the number of active researchers within the discipline; funder mandates; and the nature of data sets used.

Journals

18. There are about 25,000 active peer-reviewed scholarly journals currently published in English³, both paper and online. The market is dominated by five or six major commercial companies. Subscription journals remain the most common model, with Open Access provided by some exclusively Open Access journals but also hybrid journals, now offered by virtually all publishers (but not for all journals).

³ see www.ulrichsweb.com

Repositories

19. There are two main types of repository: central repositories (CRs) organised on a subject/discipline basis; and institutional repositories (IRs), which collate output from an individual institution (or, in some cases, a small grouping of institutions). Institutional repositories are seen by HEIs as a good tool for showcasing and managing research; and a number of major research funders require the research outputs that they have funded to be deposited in subject-based repositories.
20. Nine institutions responding to the survey had a policy on Open Access, and another thirteen were planning to introduce one (generally over the course of the 08/09 academic year). Two-thirds of responding institutions had their own repositories, and a further quarter had plans to introduce one. In general, Open Access has had no impact on library subscriptions to date.
21. Academics have so far been relatively slow in adopting the use of repositories and are not, in general, actively depositing their work. Less than one third of survey respondents had deposited material in a repository in the last five years. Various support projects and programmes have been established at different levels to support the use and improve the take up of institutional repositories by academics as well as other users

The operation of the funding regime for pay-to-publish

22. Respondents to library survey stated that pay-to-publish Open Access was funded through a variety of means at their institutions: 41% by being specified in research funding; 15% from indirect costs administered at faculty/department level; 13% from indirect costs administered centrally; and 18% from the author's own resources.
23. Relatively few authors had paid a fee to publish – just 357 of the 1,067 who responded to this question reported having done so, and only 17% of these had paid this personally. The fee was paid by the project funder in 45% of cases. Other funders mentioned included sponsor organisation, collaborators, third party funder, and publisher of proceedings. Some noted that fees were included in a wider payment, such as a conference fee or learned society membership. In some cases, fees had been waived due an inability to pay, or remained unpaid.
24. Not all OA journals are pay-to-publish, and there are a variety of business models that can cover the costs of OA journals, including mixed revenue streams and subsidy by a university or learned society. This does not mean that the costs of publication disappear, but rather that they are met not by the author or reader, but by the publisher.

Visibility and use of research outputs available via Open Access in both academic and non-academic environments

25. Initial evidence appears to suggest that OA articles (whether published in OA journals or self-archived) have increased citation rates immediately after publication compared to subscription-model articles, although resultant impact is more difficult to assess.
26. Open Access is not equivalent to online access. However, a number of consultees and survey respondents were unclear as to this distinction, and conflated the two.

27. There is very limited evidence on the importance of access to journals by non-academic users and therefore the value to them of Open Access models. Many non-academic users have, at most, limited interest in original research outputs (articles). Their need is, instead, for synthesis and interpretation of leading edge results. There are, however, specific areas where free access could be important, including access to medical research by the general public and access by the voluntary sector.

Research funder policies

28. A number of major research funders, both within the UK and overseas, have started to mandate or encourage Open Access to research outputs stemming from the research which they fund. The rationales for these mandates include ensuring that bodies have access to research which they have funded, ensuring that the public has access to research funded by taxpayers, and ensuring the widest possible dissemination of research output.
29. Research funders are increasingly mandating Open Access to research outputs, and requiring researchers to deposit articles in repositories. The RCUK statements need to be understood in the context of global changes. In particular:
- there had been a trend towards OA for some time before the 2006 statements.
 - the UK accounts for a relatively small proportion of global research funding and the policies of other funders will have a major impact on the movements towards OA.
30. The Research Councils have adopted varying mandates, with some significantly stronger than others. Since the Research Council mandates were adopted, there have been further funder mandates worldwide, including, most recently, the adoption of a new mandate by the US National Institutes of Health, which requires grant-holders to submit a copy of their peer-reviewed articles to PubMed Central, with a maximum period of 12 months from the date of publication. However, few funders are currently monitoring compliance with their mandates in any systematic way.
31. It is too early to determine the impact of the RCUK mandates on Open Access, although they appear to assist in:
- supporting the development of an institutional policy on Open Access
 - supporting development of an institutional repository
 - raising awareness of Open Access.
32. Our consultations suggest that to date the impact of the Research Councils' mandates has been limited. To some extent this is because of timing and is likely to increase as additional publications from RC-funded research are produced.

Drivers and barriers to take up of Open Access

33. Drivers for Open Access include:
- Legacy of the ‘serials crisis’ when the price of many subscription journals rose significantly faster than the rate of inflation - the legacy of the serials crisis has been a lack of trust between (particularly commercial) publishers and libraries; and a disjuncture in the scholarly communications process whereby publishers are seen as separate from (and in some cases in opposition to) other actors in the process, motivated largely by financial returns rather than by disseminating research
 - Funder mandates - Research funders are increasingly mandating Open Access to research outputs, and requiring researchers to deposit articles in repositories. Consultees, including librarians, argued that funder mandates have had a significant impact on behaviour and are the main influence on increased self-archiving. However, the survey findings contradict this.
 - Citations - it is in the interests of researchers and funding bodies for research findings to be disseminated as widely as possible. Initial evidence appears to suggest that OA articles (whether published in OA journals or self-archived) have increased citation rates immediately after publication compared to subscription-model articles, although subsequent impact is more difficult to assess.
34. Non-researcher access to publications appears to be of limited significance.
35. The reasons most frequently given for not publishing Open Access concerned the Research Assessment Exercise, and the need to publish in high impact journals. Many respondents stated that there were no high impact Open Access journals in their fields. Open Access journals were perceived to be generally of lower quality, and as ‘easier to get into’ by some respondents. A number also perceived Open Access journals as having little or no peer review. Cost was also an issue for some, as was unfamiliarity with the concept of Open Access.
36. Authors who had published Open Access papers were asked to rate the most important factor as speed of dissemination, followed by the principle of free access for all; the availability of material to researchers with limited access to subscribed journals; and the possibility of increased citations. The least important reasons in general were mandates from funders and from institutions. Overall 66% rated mandates from funder as not at all important.
37. The views of learned societies on the benefits of Open Access vary. In general they expressed concern about the impact of Open Access on their publishing, often in relation to embargo periods, particularly by those societies where the ‘half-life’ of research is long.

Conclusions

38. There is undoubtedly a trend towards OA amongst the UK research community. We expect these trends to continue as awareness spreads within the research communities and more HEIs adopt policies towards institutional repositories and self-archiving. We would note, however, that there are substantial differences between subject areas in this respect.

39. The main obstacles to continued expansion are:
- a perception amongst many disciplines that OA journals lack impact
 - limited awareness amongst researchers of funding sources for pay-to-publish models
 - non-compliance with institutional policies which mandate self-archiving in institutional repositories.
40. The underlying rationale for OA is that use of codified knowledge by one individual does not prevent use by another. A socially optimum allocation of resources requires it be made available at marginal cost which, given on-line access, is virtually zero. More specifically OA has enabled:
- research outputs and data to be accessed by a wider academic constituency
 - wider access by the non-academic community of users, although it is unclear whether this is a substantial benefit in practice
 - quicker (free) availability of research results under Gold
 - more efficient searching, and therefore research, in at least some disciplines.
41. The costs of scholarly communication, notably quality control, are, however, still incurred. A recent study sponsored by RIN estimated that there would be a net cost to the UK of a movement to a pay-to-publish model which in very broad terms is around 2% of the research and HE funding councils research budgets.
42. The eventual outcome of a move to OA is uncertain, but our general conclusion is that there is no inherent reason why such a movement should jeopardise the position of existing publishers to the detriment of the academic community; especially under a funded system of Gold publications. The main caveat is that learned societies may find it difficult to adapt to a new business model and their general contribution to scholarly communication could be threatened.

1: Introduction

Background to the study

- 1.1 SQW Consulting and LISU, Loughborough University, were commissioned by Research Councils UK (RCUK) to identify the effects and assess the impact of Open Access to research outputs on pay-to-publish and self-archiving publishing models. This study focuses on the potential impacts of Open Access to research outputs on the scholarly communications process, and how these might affect the UK research community, including producers and users of research.
- 1.2 The scholarly communications process refers to the ‘combination of the publishing and distribution of scholarly research articles in scholarly journals, and the provision of access to such journals by academic and non-academic libraries and other channels (including Open Access journals). It is the final, essential stage in a piece of scholarship or research project that provides certification of the work, dates it, identifies the authors as originators and disseminates it’⁴. This study focuses in particular on peer-reviewed journal articles, and the data which underpin them.
- 1.3 Traditionally, access to journal articles is provided by subscription journals published by learned societies or commercial publishers, and the costs of providing access are met largely through subscription fees charged to readers. Open Access models provide free⁵, online access to research literature (in particular, peer-reviewed journal articles): either by publishing in an Open Access journal, which does not charge fees to the reader (‘Gold’ OA); or by archiving peer-reviewed articles published in subscription journals in an online repository (‘Green’ OA)⁶.

RCUK policy statements

- 1.4 RCUK published a position paper on access to research outputs in June 2006. The guiding principles in the paper were:
 - publicly funded research should be made available and accessible as rapidly as possible
 - outputs should be effectively peer reviewed
 - it should be a cost effective use of public funds
 - outputs must be preserved and remain accessible.
- 1.5 In recognition of the differences between disciplines, individual research councils provided their own statements to their communities. These shared similarities, notably the affirmation of Open Access and archiving (subject to outstanding agreements with publishers), but there have also been some differences in approach. The Medical Research Council (MRC), for example,

⁴ Activities, costs and funding flows in the scholarly communications system in the UK, RIN, 2008 - pp9-10

⁵ to the reader; under ‘Gold’ OA, the costs of publication are met through non-subscription means

⁶ See the JISC website for further details:

http://www.jisc.ac.uk/whatwedo/themes/information_environment/scholarly_comms/oa.aspx

directs researchers to PubMedCentral or UKPMC; the Natural Environment Research Council (NERC) has established its own repository (for published peer-reviewed papers by its own staff, and as a repository of ‘last resort’ for other researchers supported by NERC funding); the Economic and Social Research Council (ESRC) has set up a repository for all outputs resulting from ESRC-funded research; and others have left researchers and their institutions to decide on the most appropriate way forward. Examples of policies and position statements are listed in Annex A.

Study objectives

- 1.6 This study addresses three key areas:
- what has been the impact of RCUK Open Access policies on pay-to-publish and self-archiving?
 - more generally, what has been the impact of Open Access on the ‘traditional’ scholarly communication process?
- 1.7 The focus of this study has been the UK research community, including academics and other users of research information. Thus, we have not considered the potential benefits which researchers in low income countries might derive from free access to journals⁷; nor the difficulties they might encounter in publishing under pay-to-publish models. Nor is the study concerned with the commercial returns to the publishing sector except insofar as an OA model might threaten the stability of scholarly communications. It seems likely that OA could lead to a redistribution of revenues between actors in the scholarly communications process, and perhaps also between publishers, but the economic implications of such transfers have not been considered in this study.
- 1.8 It should also be noted that relatively little time has elapsed since the Research Council Open Access mandates were adopted. As such, it is too early to determine the full impact of the RCUK mandates on Open Access. This report identifies trends to date and the likely future direction of travel.

Approach

- 1.9 The research comprised four main stages:
- a review of existing data and literature
 - consultations with a wide range of organisations
 - primary data collection, mainly through web based surveys
 - analysis and reporting.
- 1.10 LISU took lead responsibility for the literature review and primary data collection, with SQW Consulting leading on stakeholder consultations, analysis and reporting.

⁷ The publishers currently operate price discrimination between different markets and researchers in such countries pay lower subscription rates (or none) in some cases.

- 1.11 Areas covered in the literature review (attached at Annex C) included:
- the position both nationally and internationally with regard to trends in Open Access publishing
 - drivers and barriers to the take-up of Open Access publishing
 - researcher perceptions of Open Access journals and repositories as both sources of information and places to publish
 - market developments and current funding trends for both subscription and Open Access journals
 - gaps in the existing data and literature
- 1.12 A series of consultations was undertaken with a variety of key stakeholders involved in the scholarly communications process, including funding bodies, researchers, librarians, publishers, and not-for-profit organisations. A full list of consultees is attached at Annex G. Topics covered varied by stakeholder organisation and involvement (full aides-memoire are attached at Annex H and Annex I).
- 1.13 Topics covered with funding bodies (for example, Research Councils, charities, government departments, major overseas funders) included:
- policies towards Open Access
 - funding support for pay-to-publish
 - views and data on trends.
- 1.14 Consultations with HEIs and representative organisations covered:
- policies on institutional repositories and pay-to-publish
 - drivers and barriers to the take up of Open Access journals
 - researcher perceptions
 - effects on researcher career development.
- 1.15 Topics discussed with publishers included:
- market developments
 - funding regimes and the range of models for Open Access
 - key drivers.
- 1.16 Staff in non-academic environments (for example professional and learned societies, as well as charities) were also interviewed to assess their approaches to, use and awareness of Open Access sources.

- 1.17 LISU undertook two web-based surveys as part of the study, in order to fill data gaps, update existing research and assess directly the impact of the RCUK mandates. One survey was of HE libraries in the UK and the other of researchers and post graduates supported by the research councils. The surveys were carried out in June 2008. The results of these surveys are attached at Annex B, and referred to where relevant throughout the body of the report.

Management group and expert panel

- 1.18 Four meetings were scheduled between the project team and the client management group. The purpose of these meetings was to:
- agree the scope and workplan for the project
 - finalise the work programme after the research design task
 - report on progress and present proposals for primary data collection
 - present and discuss the draft final report⁸.
- 1.19 In addition, an expert panel provided support and guidance to the research team. Two meetings were held with the expert panel: at the end of the research design stage; and prior to the preparation of a draft report to discuss its structure and present some of the work in progress. Members of the expert panel were also consulted individually.

Format of the report

- 1.20 The remainder of the report is structured as follows:
- Chapter 2: Background and context
 - Chapter 3: Features of the scholarly communication landscape
 - Chapter 4: Factors in the move to Open Access
 - Chapter 5: Findings
 - Chapter 6: Scenarios
 - Chapter 7: Conclusions
- 1.21 There are a number of annexes, in a separate document, providing further background detail:
- Annex A: Policies and position statements
 - Annex B: Survey Findings
 - Annex C: Literature Review
 - Annex D: Role of publishers
 - Annex E: Research specification

⁸ A presentation was also made in September to the Research Outputs Group of the RCUK

- Annex F: Expert panel membership
- Annex G: List of consultees
- Annex H: Aide-memoire for Expert panel and strategic level consultations
- Annex I: Aides-memoire for stakeholder consultations
- Annex J: Terms of reference

Acknowledgements

- 1.22 Thanks are due to the members of the Management Group and the Expert Panel, as well as all those who gave up their time to assist us, by taking part in consultations and surveys.

2: Background and context

Introduction

- 2.1 Scholarly communication is an important element of the research process. It allows researchers to disseminate their findings and results, and to maximise the impact of their findings by allowing other researchers to access their outputs. Traditionally, scholarly communication has relied upon researchers providing a significant proportion of their scholarly outputs without the expectation of payment, in the form of journal articles, peer-reviewed by other researchers (also without expectation of payment). However, the production and dissemination of articles is not free, and these services must be paid for.
- 2.2 Publishers of scholarly journals have traditionally relied upon a subscription model to meet the costs of providing their services. Initially, journals were mostly published by learned societies, which represented researchers active in their field, and facilitated the sharing of knowledge within dispersed groups. Increasingly, journals are now published by commercial publishers (including many on behalf of learned societies), and learned societies which also publish on a commercial basis.
- 2.3 Technological developments, in particular the growth of the internet, have facilitated the provision of online access to research outputs. There are certain costs associated with publishing, many of which (such as copy-editing) do not differ significantly between online and print-based publishing. However, the costs of printing and circulating paper copies of outputs are significant. These circulation costs are largely eliminated with online access, as the marginal cost of providing access to an additional user is close to zero.
- 2.4 However, it is important to note that Open Access is not the same as online access, although it is facilitated by the latter; and that the majority of subscription, print journals also have online versions.

A definition of Open Access

- 2.5 The Budapest Open Access Initiative (2001) states that ‘an old tradition [researchers publishing in journals without the expectation of payment] and a new technology [the Internet] have converged to make possible an unprecedented public good... the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds’⁹. It continues: ‘By "Open Access" to this literature¹⁰, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and

⁹ Budapest Open Access Initiative; cached at <http://www.soros.org/openaccess/read.shtml>

¹⁰ defined as in the Initiative as ‘that which scholars give to the world without expectation of payment’ – which includes peer-reviewed journal articles as well as pre-prints

the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited’.

2.6 There are two main elements to this definition of Open Access:

- access should be free of charge to the reader (removal of price barriers)
- access should be free of copyright and licensing restrictions (removal of permission barriers).

2.7 This report does not investigate copyright and licensing issues in any depth, except insofar as they form one element of the institutional support which may be provided for open access, and were raised by academics in the researcher survey.

2.8 There are two key routes through which Open Access to research outputs can be provided:

- ‘Gold’ OA, whereby peer-reviewed papers are published in an Open Access journal, which does not charge subscription fees. The costs of publishing are met in other ways, including through pay-to-publish models whereby a fee is charged to the authors (or their funder or institution); and
- ‘Green’ OA, whereby research is published in a traditional (subscription) journal, and the authors self-archive their peer-reviewed paper in a digital, online repository (often following an embargo period)¹¹.

2.9 ‘Hybrid’ journals also exist: these are traditional subscription journals, which allow immediate Open Access to individual articles on payment of a fee.

2.10 Repositories are an important component of the Open Access ‘infrastructure’ and there are two main types: central repositories (CRs), organised on a subject/discipline basis; and institutional repositories (IRs), which collate output from an individual institution (or, in some cases, a small grouping of institutions). The aims of repositories are to collate research outputs; facilitate access to research outputs; and to provide a record of disciplinary progress. In some cases, IRs are also used for management information.

2.11 Theoretically, there is no limit on what type of material can be deposited in a repository. Some accept only peer-reviewed articles; others accept preprints, non-published material including teaching material; and visual and audio files.

2.12 Repositories should be fully searchable. Some have their own search index; many are searchable using Google Scholar. The Open Archives Initiative¹² Protocol for Metadata Harvesting (OAI-PMH) sets out requirements to facilitate inter-repository searching, so that researchers can use an ‘overview’ search and do not have to search each repository individually. Over 90% of the repositories identified in the survey were compatible with OAI-PMH.

¹¹ SHERPA classify publishers’ archiving policies as follows: green - can archive pre-print and post-print; blue - can archive post-print (i.e. final draft post-refereeing); yellow - can archive pre-print (i.e. pre-refereeing); and white - archiving not formally supported

¹² see <http://www.openarchives.org/>

- 2.13 As noted above, Open Access is not equivalent to online access. However, a number of consultees and survey respondents were unclear as to this distinction, and conflated the two. This was largely attributable to the nature of the journal subscription market: in a large number of cases, the users of research (academics) are not those directly responsible for meeting subscription costs (met by institutions). As such, for many academics, online access is perceived as free of cost.

Why Open Access?

- 2.14 In conventional economic terms codified knowledge (such as journal articles) is a “public good” in that use by one individual does not reduce availability, and therefore potential use, by another. Under these circumstances, an optimum allocation of social resources requires codified knowledge to be made available at marginal cost. In a world of electronic publications, this cost is close to zero and this provides the underlying rationale for OA publication. A move to OA could therefore expand the number of readers and the social and economic benefits arising through access to codified knowledge.
- 2.15 OA through archiving in institutional or subject repositories would, at one level, enable these potential benefits to be exploited. The costs to the author of self-archiving would be negligible and readers could search for documents using general and/or specialised search engines. However, archives are not a perfect substitute for journals: most OA advocates regard them as a complement to rather than a replacement for peer-reviewed journals. In particular, repositories do not, of themselves, provide quality control through peer review¹³ or a number of other important journal functions. In addition, the overall costs of providing a means of self-archiving may be significant.
- 2.16 The peer review issue is complex. Some we have consulted consider it unnecessary and claim that researchers who are active in a field can themselves judge the quality of an article without the need for external validation and that this is also sufficient as a means of judging ability and career progression. There is evidence to support this in at least some subject areas. arXiv, for example, is a repository for preprint physics articles which has been established for many years. We understand that the particle physics community relies on this for access to articles. In other subject areas, the peer-reviewed journal appears to be much more important to researchers as a means of narrowing search and judging career progression. Peer-reviewed journals are also important to non-specialists, although there is limited evidence on the importance to these groups of access to primary research outputs (outside health-related research, which is often of interest to the media and the informed public). Peer review may also be important to interdisciplinary activities when researchers need to search outside their specialisms.

¹³ It should be noted that this does not mean that repository content has not been peer-reviewed, but that the repository itself does not generally provide the peer review function.

The current situation

Introduction

- 2.17 This section summarises current trends in the UK in relation to Open Access. There has been a significant shift in favour of Open Access in the past decade on the part of many actors in the scholarly communications process. Many academics, researchers and other actors in the process have more receptive attitudes to Open Access than was the case even five years ago, and a better understanding of the issues. In addition, the growth of OA and hybrid journals, as well as repositories, mean that there are now more opportunities for researchers to publish and use Open Access material. However, our research has shown that knowledge and understanding of the key features of Open Access remains relatively limited.
- 2.18 Engagement with the Open Access debate varies by subject area. These differences stem from the nature of the subject; differences in the research process; the history of scholarly communication within different disciplines; the number of active researchers within the discipline; and funder mandates. For example, in high-energy physics, there is a history of collaboration between different groups who share equipment; and a ‘pre-print’ culture whereby findings are shared at an early stage. In contrast, in the arts and humanities, the monograph remains of prime importance and OA has so far had virtually no impact on this area.
- 2.19 In addition, there are significant variations in the nature of data sets used within disciplines, some of which lend themselves more easily to electronic searching and tagging; the coherence of research communities and commonality of goals; and the importance and nature of collaboration in undertaking research (for example, multi-author papers are far more common in the sciences than the humanities).

The nature of the market

- 2.20 A market exists in the sense of scholarly communication being supplied and demanded but the fact that some sort of exchange process takes place should not be taken to mean that it operates in the way described by conventional economic models.
- 2.21 Publication has costs and those costs must be borne by some body or institution. The way in which the publication takes place may have implications for research output: it may promote or discourage output and we shall come back to this. For the time being however, it is helpful to analyse the market for scholarly communication (not output) as if the nature of the communication has no effect on output.
- 2.22 The most successful communication process is that which makes the output available to the greatest number of users. The process is not static, however, and a process which maximises use now may have consequences which limit use in the future. We shall also come back to this point. For now, to simplify, we shall carry out our analysis in a relatively static framework.
- 2.23 Given these limiting assumptions the analysis is relatively straightforward. Scholars wish, or are required, to publish their outputs. The costs of publishing can be carried by the scholars who wish to publish, by the individuals and institutions who wish to have access to their work or by a third party who may wish to facilitate the communication process. Cost may be carried

by institutions cross-subsidising from one area of their work to another, and in some cases they may be unaware of the costs, or only implicitly aware, but the costs must be borne. Publishing is not free of cost.

2.24 Different ways of covering costs – payment systems – have implications for the efficiency of the communications process, in the static sense in which we are dealing with it here.

- direct payment by, or on behalf of, authors has no restriction on readership and in this simple world is very efficient
- payment by, or on behalf of, readers restricts readership and therefore, again in this simple world, does not enable the communication to reach the greatest number of users
- payment can also be made in many other ways, for example:
 - costs carried in the overhead of organisations such as research departments or learned societies, such as the provision of a free-to-user electronic journal or newsletter where the organisation decides it is part of its objectives to carry out publication of this kind. This is also efficient in maximising use.
 - costs carried by publishers and covered by embargo periods on free access so that overhead costs plus marginal costs, in advance, are covered by reader payments before free access is granted. This is a relatively efficient process in enabling users to have access to outputs but is limited when use is required speedily.

2.25 Different individuals and institutions in the communications process: scholars, research funders, publishers, higher education and research institutions and the wide variety of users, sit in different structural positions within the process and have different amounts of power in influencing how the process operates. They have different objectives in the short and long term and this influences how they behave in the process. Each of them has different levers they can pull to try to fulfil their objectives.

2.26 The two restrictive assumptions made above help to clarify the position. The first assumed the communication process has no influence on research output. In practice ease of publication for those supplying the communications will be influential. If it is difficult to publish or the quality of the publication is poor, there is likely to be less publication. This is one of the areas in which there is disagreement between proponents of different communications processes.

2.27 Secondly, we assumed a relatively static world. The publishing world clearly is not static and it is important to consider the consequences, intended and unintended, of changes to the structure of the scholarly communication process. Electronic publication is ubiquitous and carries expectations linked to other developments in web-searching and the availability of information so that some of the dynamism in the system is outside the control of the present players. There are fears on some sides that adoption of new publication routes might damage a communication system which has been effective for generations, whilst others argue that the opportunities now available have to be grasped systematically because they increase the efficiency of the communication and will inevitably come into play despite resistance to them.

Demand for scholarly outputs

- 2.28 Demand for scholarly output comes primarily from the academic research community (though there are increasingly other users of scholarly output from government, the business sector, not-for-profit organisations and the general public). Demand from the academic community is not directly influenced very much by price – rather, demand is determined by the standard of the work sought. Standards are assessed by the academic’s own knowledge of the subject area plus the ‘brand’ given by the place of publication or the review comments of knowledgeable readers. The journal brand and review comments become increasingly important as the topic of the article moves further away from an academic’s specialist area.
- 2.29 Demand for journals is exercised primarily by libraries on behalf of their academic communities. Demand for articles from repositories is exercised largely by academics themselves. In neither case do the academics pay directly for their use of scholarly output and they are largely protected from the commercial implications of the market. In addition, as Pinfield (2007) argues, ‘once a journal has established itself in its subject area, it increasingly becomes a ‘must have’ title, making demand for it relatively price inelastic. In other words, if the price is raised, people will still buy it’¹⁴. However, any increased costs need to be net from library budgets so the funding available for additional journal subscriptions is reduced academics are indirectly affected. In addition, ‘Big Deals’ or packages of journal titles distort the market, in that they provide ‘little flexibility to select or cancel individual titles’.

Supply of scholarly outputs

- 2.30 In general, academic authors seek to place their articles in outlets, usually journals, which are widely read and highly respected with high impact factors. The career path of authors and their opportunities to acquire research funds are partly determined by the outlets in which they publish. As such, authors are primarily concerned with achieving publication in the highest quality vehicle they can reach. In some disciplines, speed of publication is also an important factor.
- 2.31 In some cases, academic institutions and research funders either require or encourage academics working for them or using their funds to place articles in institutional or subject-based repositories, or to publish in journals which have Open Access.
- 2.32 Subscription journals, pay-to-publish journals and repositories have different implications for academic authors. They require different levels of activity from authors including, in the case of pay-to-publish journals, the need to secure funds to pay for publication.
- 2.33 Publishers may operate completely commercially or, in the case of many learned societies, seek surpluses to finance other objectives of the society. Frequently, commercial publishers carry out much of the publishing activity for learned societies. They are an integral part of the supply chain for scholarly outputs. It is obvious that an output must be published in some way if it is to be available in an appropriate form. In some cases, such as working paper series, the publication may be very informal but for the purposes of this discussion it is reasonable to

¹⁴ Pinfield, Stephen (2007) Libraries and open access: the implications of open-access publishing and dissemination for libraries in higher education institutions. In: Digital Convergence - Libraries of the Future. Springer, New York, pp. 119-134.

assume that all scholarly output undergoes some publishing input such as, for example, appropriate tagging (or checking of tags provided by the author) when placed in a repository.

- 2.34 Publishers, whether commercial or not-for-profit, add value to scholarly output. Different levels of publishing activity are required for different kinds of output. A simple working paper series with minimal peer review requires very little intervention and may well be published by a semi-formal group of colleagues but a peer reviewed paper, available electronically and in hard copy in a high impact journal, with all relevant metadata and other features, requires considerable work. In a recent position paper¹⁵, the International Association of STM publishers, lists the contribution of publishers under seven headings: Registration, Certification, Formalisation, Improvement, Dissemination, Preservation and Use (the headings are not self-explanatory and the STM publishers' descriptions of each can be found in Annex D). The position paper argues that through these features 'STM publishers form a core part of the process of scholarly communication'. This is not controversial nor is it controversial that these activities all incur costs which must be funded. There is debate, however, about how and where the different publishing activities take place; whether they are all necessary; whether they are better done by academics or publishers; and how they should be paid for. Many of the tasks are not necessarily ones which the academic community would wish to take on itself, as they often require specialist technical skills and are time consuming. Furthermore, it is also recognised by a number of commentators that the commercial publishers have been important in permitting new directions to develop.
- 2.35 The market is thus very complex. Different players in the market respond to different variables. Academics respond to impact factors and quality measures. Libraries try to obtain a portfolio of journals which best meets the needs of the academic community they serve. Commercial publishers attempt to maximise profits through manipulating price and availability of journals. Learned societies, as 'not-for-profit' publishers attempt to acquire a satisfactory return, which enables them to fulfil other objectives, whilst at the same time maximising the availability and impact of their discipline's output. Managers of repositories wish to make scholarship as accessible as possible but, if they manage institutional repositories, will have a series of other objectives in addition to the furtherance of scholarly communication. Conventional market clearing mechanisms, using price to match demand with supply, do not operate effectively in this market.
- 2.36 For academics, the supply of and demand for articles are determined by factors relating to current research concerns and the quality of output. The commercial market largely bypasses academics and was until very recently a relatively conventional market with publishers providing a product to libraries. The growth in repositories has complicated the picture. Publishers are a mixture of profit-maximising companies and organisations which seek to attain a minimum level of profit. Profits continue to depend largely on the levels of subscriptions to their journals, and to a lesser extent on the price of pay-to-publish articles. The libraries respond to price by increasing or reducing purchases until their budget limit is reached. The publishers worry that libraries will reduce purchases if scholarly outputs are easily available via Open Access though the definition of 'output' in this context is not entirely straightforward and

¹⁵ International Association of STM Publishers (April 2008) *An overview of scientific, technical and medical publishing and the value it adds to research outputs* <http://www.stm-assoc.org/documents-statements-public-co/>

relates to the provenance of the article – largely whether or not it has been peer reviewed and is in its final published state.

- 2.37 Variables which influence behaviour in the commercial market do not necessarily have a strong relationship with the concerns of academic users and producers, in the context of the furtherance of scientific communication. If ‘the market is to decide’, which is one of the ‘solutions’ sometimes proposed, it is important for participants in the market, especially the academic users and producers, to assess their relative power and how they might exercise that power.
- 2.38 Mandates from funders or higher education institutions have an influence on relationships in the market and market outcomes, as demonstrated by activity subsequent to the Wellcome Trust’s decision to mandate its grant-holders. The Wellcome Trust is now recognised by most commentators as behaving thoughtfully and appropriately in the way it insists on its researchers behaving in certain ways and in its willingness to pay for the consequences (although there are some dissenting voices which argue that the Wellcome Trust mandate limits researcher choice over where to publish or deposit. Publication in journals devoted purely to Open Access has grown and most publishers now have flourishing hybrid options available. The uptake has been relatively low across the whole of scholarly output (currently about 2% of papers are published as ‘Gold’ OA) but relatively high in some areas, such as bio-medicine, where the debate has been at its most acute. Open Access publishing operates to a different business model from conventional subscription journals and is more transparent in its costing. This changes relationships in the market as other players are able to see some operational characteristics more clearly. Levels of trust in this market are low, partly as a result of the serials crisis of the late 1990s which continues, though currently at a lesser level.
- 2.39 The number of repositories has increased enormously and this has had a substantial influence on attitudes towards the nature of the market itself. This has caused questions to be posed about the long-term existence of journals in the form they are currently understood, notwithstanding the centuries over which they have existed and the inherent conservatism of the academic world.
- 2.40 Looking at the wider market for scholarly output, the approach of the HE funding councils to research assessment has the potential to make significant differences to the acceptability of different publication routes and the requirements of other user groups are now being asserted more strongly.

Drivers for Open Access

- 2.41 There has been a noticeable increase in Open Access in recent years, both in terms of journal and repository availability, but also the profile the subject has attained in policy and academic debate. In this section we discuss some of the key factors responsible for this.

Public good and public funding

- 2.42 There are a number of arguments, both ethical and practical, put forward in favour of OA. The first, discussed in 2.14 and subsequent paragraphs above, is that knowledge is an international public good, and that barriers to accessing information should be minimised. Financial costs

are a significant barrier to access. A separate, but often conflated argument is that since much research is funded by the taxpayer, taxpayers should have access to the results of the research which they collectively fund.

- 2.43 In addition, there are concerns on the part of funding bodies that they do not necessarily have easy access to publications stemming from research which they have funded, but must pay a subscription fee for access. While OA advocates acknowledge that publishers can add value, they argue that the majority of the value in research is contributed by research funders and academics; not by publishers.
- 2.44 The producers and consumers of research overlap. Producers of scholarly outputs are primarily academic researchers (and in a smaller number of cases, commercial researchers). The audience for such outputs includes the academic research community (the primary consumer) as well as industry, government, the business sector, not-for-profit organisations and the general public. For example, medical charities or organisations representing individuals with genetic illnesses may have a particular interest accessing the latest research, but subscription prices may be prohibitively expensive, thus forming a barrier to access.
- 2.45 Opposition to OA arises largely from the view that commercial publishers and learned societies provide useful and necessary services to the research community, which have to be paid for. Open Access may threaten the viability of a stable system. In addition, existing pay-to-publish models may burden smaller research funders, for example some of the small charities, and so reduce their opportunity to publish the results of their research and ultimately to fund research. However, it should be noted that most publishers now allow some form of open access publishing – either through hybrid journals (which still require a payment to publish), or in repositories (following an embargo period).
- 2.46 In addition, a number of consultees raised version control as a potential problem – under ‘Green’ OA, not all journals allow the final published version of the paper to be deposited in repositories, but do allow the author’s final version to be deposited. There may be minor differences between the two versions.

Legacy of the serials crisis

- 2.47 The ‘serials crisis’ refers to the trend from the 1970s onwards whereby the costs of access to scholarly outputs have increased faster than inflation. There are two main drivers of these increased costs: the number of journals being published has increased; and publishers have increased subscription fees. This has impacted on the ability of libraries to provide access to journals within constrained budgets. In addition, ‘big deals’, whereby libraries purchase packages of journal titles from publishers, can reduce flexibility in selecting individual journals because libraries have limited control over the content of the packages.
- 2.48 While price increases appear to be moderating somewhat, the legacy of the serials crisis has been a lack of trust between (particularly commercial) publishers and libraries; and a disjuncture in the scholarly communications process whereby publishers are seen as separate from (and in some cases in opposition to) other actors in the process, motivated largely by financial returns rather than by disseminating research.

- 2.49 A recent study commissioned by RIN¹⁶ has modelled the costs of a system with 90% pay-to-publish OA journals. The model compares OA costs with those incurred by a system of 90% electronic publication on a subscription-funded basis. The model imputes a cost for peer reviewers' time, which is significant, although no actual payment is made. This projects a reduction in the global costs of scholarly communication of £273m which arise, in the main, from reduced variable publishing costs¹⁷. The main changes on the funding side are that academic library subscriptions fall by £2.9bn and pay-to-publish charges increase by £3.2bn. The projected changes for the UK are savings to academic libraries of £128m but an increase in publishing payments of £213m, reflecting the high productivity of UK researchers in terms of published outputs¹⁸. We have not had the opportunity to investigate the sensitivity of these figures but, taken at face value, they imply a net financial loss to the UK research community given a movement to OA (as defined in the model).
- 2.50 Within these general movements there would, of course, be:

- a redistribution of costs towards research (publication) intensive HEIs
- a redistribution of costs from the corporate sector towards the academic sector. The RIN report estimates that 17% of current subscriptions are from non-academic sources (including individuals) but it is believed that these subscribers account for a significantly smaller share of published articles¹⁹ and would therefore contribute a smaller share of pay-to-publish revenues.

Role of funders

- 2.51 Research funders are increasingly mandating Open Access to research outputs, and requiring researchers to deposit articles in repositories. Consultees, including librarians, argued that funder mandates have had a significant impact on behaviour and are the main influence on increased self-archiving. However, the survey findings contradict this – funder mandates were only important to 17% of researchers when publishing OA, and 72% said that they were not important²⁰. It may be that mandates have not yet been in place long enough to have affected academics' publishing decisions. Specific mandates with the potential for significant impact include the Wellcome Trust, a number of the UK Research Councils, and the US NIH. These are listed in Annex A and discussed in more detail in Chapter 4.

Maximising impact

- 2.52 It is in the interests of researchers and funding bodies for research findings to be disseminated as widely as possible. Initial evidence appears to suggest that OA articles (whether published in OA journals, or self-archived) have increased citation rates immediately after publication compared to subscription-model articles, although subsequent impact is more difficult to assess.

¹⁶ Research Information Network, Activities, Costs and Funding Flows in the Scholarly Communications System in the UK May 2008

¹⁷ The model appears to assume that the number of articles per journal increases but there is no allowance for the increased costs of peer review which this presumably would imply.

¹⁸ The assumptions about peer review mentioned in the previous footnote may also be relevant here since the UK peer reviews a relatively high proportion of global publications.

¹⁹ 10% is used in the model.

²⁰ Respondents were asked to rate importance on a five point scale where 5 was "not at all important". 72% rated funder mandates as 4 or 5.

It is important to distinguish impact attributable to online access, and that related to Open Access. However, there are some indications that Open Access channels may have advantages in this respect.

- 2.53 First, research outputs might be made available more quickly, thus contributing to a faster research cycle with benefits for further research and innovation. Speed of dissemination was given as the most important reason why respondents to the survey chose to publish OA outputs. Increased speed of access to research is undoubtedly true in relation to self-archiving, but we have not encountered any evidence to suggest that OA journals publish significantly more quickly than electronic subscription journals.
- 2.54 Second, OA articles may have greater impact. This is difficult to assess because of the problems in identifying robust control groups. The evidence at present is unclear but would tend to suggest an accelerated citation rate for OA journals but with little difference in lifetime citations for the subject areas studied.
- 2.55 Third, free availability may increase readership to organisations which cannot at present afford access to subscription journals. In the survey, the principle of free access for all was the second most important reason for publishing OA outputs. A number of research institutions in the UK cannot access all of the literature at present: most HEIs can only afford to subscribe to a proportion of the peer-reviewed output. The current system involves researchers only having access to a proportion of the peer-reviewed literature, whereas an OA system would lead to all researchers having access to all of the literature.
- 2.56 We have not been able to identify evidence on the scale of non-researcher access to publications or the likely costs savings which businesses and others might derive from OA. However, consultations indicated the following:
- many organisations with an interest in research results do not have the capabilities to work with primary research outputs and instead require filtering and interpretation. Such organisations, will typically access research results in many ways including through trade and professional associations, other networks and technology consultants (including from the academic sector in some cases). These channels add value to the primary research information by combining results from more than one source and OA is unlikely to add much value in such cases
 - large corporate R&D departments do require access, but the costs of journals are small in relation to R&D budgets
 - businesses and others are sometimes interested in published outputs, not so much for the results, but because they are a way of identifying leading edge expertise. However, article abstracts are widely and freely available on the web, even for non-OA journals, and these are often sufficient
 - where direct access is required there may be alternatives to direct subscription. Companies may, for example, need to review and cite leading edge research in grant applications or for IP protection purposes, but commercial organisations exist which will undertake the necessary searches and reporting. In addition, some businesses may gain access to university and other research libraries.

Ease of technology

- 2.57 While Open Access and online access are not equivalent, the technologies allowing online access have facilitated the dissemination of Open Access material. Technological developments mean that the marginal costs of providing online access to journal articles are minimal, so that there is no need to charge subscription fees to meet additional (online) distribution costs. Digital repositories play a significant role in facilitating 'Green' OA.

Research assessment

- 2.58 Finally, there have been suggestions that university repositories could play an increasingly important role in research assessment, by providing a record of institutional output, and more particularly a new means of assessing the importance of research to users²¹. However, as is discussed in section [NBSQW] below, methodologies (and theories) to interpret the significance of downloads from repositories means that there are unlikely to be significant changes in this respect in the near future.

²¹ OA journals can be relatively easily incorporated into bibliometric databases for the purposes of citation analyses, although they are unlikely, at present, to alter significantly the picture presented by databases of subscription journals.

3: Features of the scholarly communication landscape

3.1 In 2006, the Research Information Network (RIN), RCUK and the Department of Trade and Industry (DTI) commissioned a Baseline Study report²² to examine existing data in six key areas:

- the volume and value of the academic journal market
- journal supply-side economics
- usage
- citations and impact factors
- disciplinary differences
- costs and impact of Open Access journals and of digital repositories.

3.2 One of the key purposes of that study was to identify gaps in the available evidence, as a consequence of which a number of further studies, including this one, have been commissioned.

3.3 This chapter describes and interprets features of the scholarly communication landscape. It builds on consultations with stakeholders and survey findings. In addition, LISU carried out a literature review focusing on Open Access, covering both academic sources and a wide range of web sites and other resources, which provides an update to the Baseline Study. The full literature review is included as Annex C, and its findings have informed this chapter. There are two important points to note here:

- the published debate amongst the various stakeholders tends to focus on scholarly communication within the higher education sector in developed countries, for example the majority of respondents to surveys have been researchers in universities, based in Western Europe or North America. In the UK, concern has been expressed that the majority of research grants are made from public funds, but then outcomes have to be purchased using public funds (via library subscriptions) and even then only relatively few people have easy access
- a relatively short time has elapsed since the publication of the Baseline Study report; however scholarly publishing, and particularly Open Access to scholarly outputs, is changing at a fast pace, so that much has changed since 2006. The numbers of hybrid journals and institutional repositories have proliferated, research funders and

²² Electronic Publishing Services (2006), UK Scholarly journals: 2006 baseline report: an evidence-based analysis of data concerning scholarly publishing. Report for the Research Information Network, Research Councils UK and the Department of Trade and Industry. Available at <http://www.rin.ac.uk/files/UK%20Scholarly%20Journals%202006%20Baseline%20Report.pdf>

academic institutions are actively promoting Open Access, and support is being provided for individuals and repositories. However, researchers still have some reservations, and, in some cases, a lack of understanding of open access. Publishers also have concerns about the effect this changing climate for research dissemination might have on their operations.

Repositories

- 3.4 According to OpenDOAR²³, the UK currently has 11% of all repositories worldwide which translates to 101 repositories representing 74 UK institutions. Whilst 57% of these repositories are interdisciplinary, 18% are related to Computers and IT, 8% to Library and Information Science and 6% to Maths and Statistics.
- 3.5 Although subject-based repositories were historically the first to emerge²⁴, institutionally based repositories have recently become more dominant. Just over three quarters of UK repositories are institutional, whilst only 17% are subject-based and 4% governmental. OpenDOAR²⁵ lists most UK universities as having institutional repositories (IRs) and, for example, 18 out of 20 Russell Group Universities, and 13 of the 19 universities in the 1994 Group have IRs.
- 3.6 The increase in the number of IRs is partly driven by the HE institutions themselves because the repositories are seen as a good tool for showcasing their research. However, in some institutions there are decisions to be made over who will take the responsibility for running the repositories and how they will be funded in the long run.
- 3.7 Academics have so far been relatively slow in adopting the use of repositories and are not generally actively depositing their work. Less than one third of survey respondents had deposited material in a repository in the last five years. Various support projects and programmes have been established at different levels to support the use and improve the take up of institutional repositories by academics as well as other users. A number of commentators suggested that cultural factors were important here; many academics do not perceive OA to be directly relevant to them, and so have little incentive to deposit where it is not mandated (particularly as the RAE/REF are not dependent on repository content), a view reinforced by the survey responses. International research shows that, across all disciplines, even with policies that invite researchers to deposit in repositories, only 5-15% of researchers self-archive. However, one consultee reported that 95% of researchers agree with OA in principle and would not have any problems with using repositories if mandated; another argued that the proportion of papers deposited in repositories is increasing rapidly.
- 3.8 In addition, there is some confusion about what should be deposited: one commentator, for example, argued that repositories “do not offer quality control and there are issues related to version control”. (Repositories do not directly provide quality control but may include peer

²³ Driver Support (2008). United Kingdom: Summary of Activities. Accessed online: <http://www.driver-support.eu/en/national/uk.html>

²⁴ Suber, P. (2007). Timeline of the Open Access Movement. Accessed online: <http://www.earlham.edu/~peters/fos/timeline.htm>

²⁵ OpenDOAR (2008). Directory of Open Access Repositories: United Kingdom. Accessed online [May 6th, 2008]: <http://www.opendoar.org/countrylist.php?cContinent=Europe#United%20Kingdom>

- reviewed journals– they do have version control and make clear the peer-review status of content). This confusion was also a recurring theme in the researchers’ survey responses.
- 3.9 A number of major research funders require the research outputs that they have funded to be deposited in large subject-based repositories, such as PubMed. According to NCBI²⁶ between January and May 2007 PubMed had on average 79,565,400 searches a month and over time, there has been a steady increase in the number of searches. The subject-based repositories are focused on certain subject areas, such as Bio- and Medical Sciences and Physics.
- 3.10 One of the main opportunities related to subject-based repositories, often highlighted by funders, is their potential to enable derivative research by facilitating data mining. Consequently, there is increasing demand for underlying data to be placed in the repositories together with the research publication. It was suggested that this might enhance accountability, as the validity of underlying data can be checked by academics as needed. However, there is significant variability by subject area regarding willingness to share data, particularly where there may be commercial applications.
- 3.11 Consultees had divergent views on whether institutional or subject-based repositories were preferable. There were no clear differences by role. Some stakeholders suggested that IRs provide a variety of non-OA related functions within their institutions, such as collating outputs and facilitating institutional management. As such, the adoption of institutional OA mandates can be ‘sold’ to senior management teams as a useful internal tool, and they are likely to become the norm. While initially, repositories were seen as competing with publishers, a number of stakeholders now see their function as providing an institutional record of publications, at various stages, which can facilitate the implementation of REF strategies and the management of submissions²⁷. On the other hand, subject-based repositories offer opportunities in building upon existing research, which serves the interest of both funders and academics themselves. It was also argued that most researchers are not particularly concerned about the institutional affiliation of researchers; rather they are seeking information on a specific topic.
- 3.12 There is no consensus on which kind of repository might be adopted most easily: the two are likely to co-exist for some time, as their use depends on the needs of the academics in different subject areas. The key issue here is interoperability – using a single search interface to search across all repositories will facilitate researchers in finding relevant papers by minimising the number of places to be searched. The JISC is currently funding a digital repositories programme looking at repository interoperability²⁸.
- 3.13 There is some variability in who carries the responsibility for maintaining institutional repositories (often librarians, and sometimes with a dedicated responsibility as repository manager). In addition, research funders do not directly meet the costs of running repositories – although the research councils contribute to the costs through contributions to fEC. Some institutions are collaborating to fund ‘group’ repositories, and at least one university runs a ‘depot’ available for individuals whose institutions don’t have a repository.

²⁶ National Center for Biotechnology Information NCBI (2007). PubMed Searches. Accessed online: http://www.ncbi.nlm.nih.gov/About/tools/restable_stat_pubmeddata.html

²⁷ Citations may also be increased, although the evidence for this is not clear.

²⁸ see <http://www.jisc.ac.uk/whatwedo/programmes/digitalrepositories2007.aspx>

- 3.14 A number of commentators (mainly publishers) expressed concern about the use of and growth (in terms of number and size) in repositories. Learned societies expressed concern about the financial impact that repositories might have on their activities. One publisher felt that the ‘Green’ OA route was inequitable, as ‘nobody pays’ for access, and libraries will not pay subscriptions for material which is freely available. There is, however, no evidence that libraries are cancelling subscriptions as a result of OA and this finding was borne out by our survey results. However, this situation may change as additional material is available through open access channels.
- 3.15 Finally, we would note the potential importance of repositories to the research councils themselves:
- if the current mandates are to continue as present, or in some modified form, then the councils will need to monitor compliance and institutional and subject repositories will be a important source of information
 - although not related directly to open access issues, data on research outputs placed in repositories, and potentially also on downloads, could be valuable to the councils in reporting to DIUS and other stakeholders.

Journals

- 3.16 Electronic journals are ubiquitous and the various ‘big deals’ (or bundles) have increased access for academics who now have something which, for them, is close to Open Access at their desktops. However, ‘journal’ is no longer a simple concept.
- 3.17 Subscription journals remain the most common model by far though the proportions vary widely between disciplines. Open Access is provided by some exclusively Open Access journals but also hybrid journals. In addition, journals may allow self-archiving, sometimes after an embargo period.
- 3.18 SHERPA classify publishers’ archiving policies from green to white. They provide summary statistics on the 418 publishers listed in the SHREPA/ROMEO database, as shown in Table 3-1

Table 3-1: Data on OA journals

SHERPA definition	Publisher policy	Number of publishers	% of total
<u>green</u>	can archive pre-print and post-print	139	33
<u>blue</u>	can archive post-print (i.e. final draft post-refereeing)	94	23
<u>yellow</u>	can archive pre-print (i.e. pre-refereeing)	51	12
<u>white</u>	archiving not formally supported	137	32

Information from  Source: <http://www.sherpa.ac.uk/romeo.php?stats=yes>; accessed 1/10/2008

- 3.19 However, this classification does not take embargo periods into account. As such, publishing in the journals offered by green, blue or yellow publishers may not be sufficient to comply with a funder mandate, as embargo periods may be longer than the 6 months' maximum stated in the mandate.
- 3.20 Hybrid journals are now offered by virtually all publishers (but not for all journals) as an option for authors. Several consultees (academics and publishers) argued that 'the journals are not going to disappear' and that 'they bring value that is worth retaining as they have an important role in establishing quality rankings'. Some publishers are relatively open about the costs they incur and appear to regard the hybrid journal very much as a transition model, but there is a high level of cynicism among some commentators regarding publishers' motivation for using the hybrid model and the likelihood of subscription charges falling as Open Access usage increases. Publishers argue that their costs do not decline in a straightforwardly linear way as Open Access options increase. STM Publishers (2008)²⁹ set out a number of factors explaining cost changes, some of which are unrelated, or non-linearly related, to the number of articles published, for example, the increased average length of articles, the increased requirements for specialised language, graphics, images and links to databases, the value added attributes of electronic publication such as navigation, search, retrieval and analysis and the relative inefficiency of new journals. Transparency of costing and pricing is important in improving levels of trust but is not widespread.
- 3.21 The business model for journals is being increasingly stretched. Open Access journals operate on a different business model from subscription journals. Hybrid journals are a mix of the two. Some publishers now have robust systems to supply scholarly output at the article level rather than at a journal level for their subscription journals. The movement from subscription journal to Open Access journal appears to be challenging probably for cultural rather than technological reasons, and very few journals have made the transition – the subscription model is stable for publishers (as is a 'Gold' OA model) but the transition period might bring some financial risk. However, within the Open Access business model, recent developments, such as PLoS One, are changing the landscape. PLoS One is an interactive open-access journal for the communication of all peer-reviewed scientific and medical research but the peer review assesses only the rigour and ethical position of the research, not its importance. In some respects, therefore, PLoS One is a peer reviewed repository rather than a journal. It publishes everything which is rigorous and ethically sound, very quickly. Other publishers have similar models and this demonstrates the fluidity of the journal market created by the opportunities and expectations arising from the new technologies.
- 3.22 In the UK 'big deal' journal subscriptions prices are frequently linked to student numbers, though the details of particular deals are often confidential. In general there seems to be a consistency between universities in terms of access to journals. In the United States there are differences between publicly funded and private universities. Some of the smaller publicly funded universities have suffered from the big deals as they have limited library budgets and researchers in those universities may lack access to the appropriate journals. Similar arguments apply to researchers in poorer countries. Both subscription and pay-to-publish

²⁹ International Association of STM Publishers (April 2008) *An overview of scientific, technical and medical publishing and the value it adds to research outputs* <http://www.stm-assoc.org/documents-statements-public-co/>

business models have methods to ameliorate the problems of more poorly funded research communities.

- 3.23 Many publishing functions have been carried out in countries offering cheaper labour and highly skilled staff for many years. Book publishers as well as journal publishers have used internet communications to carry out quite complex editorial functions since the late 1990s. This may increase and could have significant implications for business models. The success of the Egypt-based Hindawi Publishing Corporation indicates some of the possibilities.
- 3.24 Quality assurance and journal brand are important for academics for their career prospects and prestige. A well known hierarchy of where the best research is published also helps to maintain research excellence and to promote good quality research, it is claimed. There remains a good deal of agreement around this point, though some we consulted in the physics community, but also other commentators on OA, deny the need for a journal at all. They point to the increasing role of repositories and to methods which could be relatively easily adopted, in principle, to enable repositories to acquire peer review and branding credentials.
- 3.25 Review journals, which provide assessments of research areas written by well known experts, have always existed. They usually include value-added content such as summaries of developments and are particularly important for users who are not working in the areas under discussion but need to keep abreast of changes. Some commentators see an increasing role for review journals in recognising the leaders in the field and providing value added services. In addition, some non-academic users of research outputs argued that journals were essential in enabling them to keep abreast of new developments, and thus contributing to innovation. Review journals are frequently seen as a corollary of a move to Green route OA: if academics increasingly deposit their work in repositories, perhaps, though not necessarily with some peer review element, scholars with an interest in the field will need somewhere to turn for guidance on the most up-to-date and important research. Review journals can provide that, as could virtual journals selected by, for example, learned societies. The role of learned societies in the changing market is important.
- 3.26 Concerns are expressed by some about the pay-to-publish model - namely that this increases the temptation for journals to publish more, potentially reducing quality. The counter argument is that there is a trade-off between quality and revenue, whether the latter comes through subscriptions or pay-to-publish models. Editorial boards and referees are charged with the academic quality of the journal and are separated from business decisions associated with publishing papers. Our consultations have not revealed a view that pay-to-publish is an intrinsically weaker model. It is seen as an alternative, in some cases an attractive alternative, to 'conventional' publishing models.

Funders, research councils and HE institutions

- 3.27 A number of major research funders, both within the UK and overseas, have started to mandate or encourage Open Access to research outputs stemming from the research which they fund. The rationales for these mandates include ensuring that bodies have access to research which they have funded, ensuring that the public has access to research funded by taxpayers, and ensuring the widest possible dissemination of research output.

- 3.28 The Research Councils have adopted varying mandates, with some significantly stronger than others (see Annex A). To date, the mandates have had little impact on numbers of OA publications, given the inherent time-lag between award of research funding and delivery of research outputs. However, a number of stakeholders commented that the Research Council mandates were specifically referred to by those lobbying for the adoption of a mandate by the National Institutes of Health.
- 3.29 Since the Research Council mandates were adopted, there have been further funder mandates worldwide, including, most recently, the adoption of a new mandate by the US National Institutes of Health, which requires grant-holders to submit a copy of their peer-reviewed articles to PubMed Central, with a maximum period of 12 months from the date of publication. The argument behind the change in the NIH mandate was based on public interest (research funded by taxpayers who should have access to outputs). It was suggested by several US-based academics that the Research Council mandates helped to increase the cultural acceptability of mandates in the US. A number of medical charities have also adopted Open Access mandates. However, few funders are currently monitoring compliance with their mandates in any systematic way.
- 3.30 Institutional mandates have also played an important role in raising the visibility of OA among HEIs. Within the UK, Southampton University has a long-established mandate. Internationally, the adoption of a mandate by two faculties at Harvard University has raised the visibility of Open Access. However, relatively few of the institutions in the survey had a mandate on Open Access – one in five – and less than one quarter of researchers in those institutions were aware of that mandate.
- 3.31 Publishers have expressed concern about the duration of embargo periods, as set out in mandates. In addition, there are concerns over the negative effects of any transition from the current system to a (universal) pay-to-publish model, relating to:
- an increase in net costs to the UK, given the high productivity of UK researchers
 - while funds to support payments may be available to HEIs (through Full Economic Costing (fEC) treatment from indirect costs), few HEIs have established mechanisms to allocate this to researchers as yet
 - significant research in some disciplines (particularly, but not exclusively, the arts and humanities) is undertaken without project funding and will not therefore generate indirect cost support
 - not all researchers have institutional affiliations and so may not have equal access to research grants
 - in some disciplines, average research grants are small, and so publication costs would form a very significant element of the funding required.
- 3.32 However, it should be noted that not all OA journals are pay-to-publish, and there are a variety of business models that can cover the costs of OA journals, including mixed revenue streams and subsidy by a university or learned society. This does not mean that the costs of

publication disappear, but rather that they are met not by the author or reader, but by the publisher.

- 3.33 It has been suggested by some stakeholders that repositories may enhance research assessment processes by inferring impact through download counts. If this were to be feasible, it might provide a means of assessing applied research and knowledge transfer and we understand that the HE funding councils were at one time considering potential roles for repositories in future REFs. Work is ongoing with the JISC, but the state of the art with bibliometrics is such that there is no accepted means of inferring impact (much less quality) from data on downloads from repositories. Downloading a research output does not necessarily mean that the research therein is used to inform further knowledge. Some work has been done which demonstrates a correlation between downloads and citations, but this does not add anything to assessments based on conventional citation counts. The problem is more acute with respect to knowledge transfer, where there is little empirical or theoretical understanding of the links between download, readership, use and impact. As such it seems unlikely that repositories will have a major impact on research assessment in the near future and our understanding is that their use is not being considered actively in relation to the REF at present.
- 3.34 It should be noted that these comments apply to the actual use of repositories in the formal assessment process. HEIs may continue to use repositories as a management tool in preparing REF submissions. In addition, OA journals can, and have, been relatively easily incorporated into bibliometric databases

Publishers

There are a number of requirements for disseminating academic research findings. Crucially, most scholarly communication relies on quality assurance through peer review, and this process must be managed. Copy-editing and typesetting are also required to facilitate readers' comprehension and ensure that the disseminated information is accurate. Finally, the outputs must be disseminated – traditionally through a print-based journal, but increasingly online. Publishers currently play an important role in this process and services provided include: peer review process management; the production process (copyediting, typesetting, proofing; adding tags/links to electronic versions); and a service element (branding; context; and providing links to other content)

- 3.35 Traditionally, the costs have been met through charging subscription fees, although a number of publishers operate (wholly or partially) on an Open Access model (whether funded through pay-to-publish or other means). Other sources of income include reprint sales, page charges, advertising and additional charges for access to metadata or online supporting resources³⁰. Some OA journals do not charge author fees, but are subsidised by university departments or learned societies. As discussed above, the impact of the serials crisis on libraries had contributed to a feeling that publishers of subscription (and hybrid) journals are benefitting financially from inputs which are provided to them for free (both the research papers and peer review). Publishers argue that they invest heavily in journal branding and technologies to improve the services which they provide to researchers and thus communication.

³⁰ Costs may also be met to lesser degree by reprints, back issues, advertising and rights income

- 3.36 There are about 25,000 active peer-reviewed scholarly journals currently published in English³¹ - both paper and online. The Directory of Open Access Journals (DOAJ) lists 3,620 Gold OA journals. Sherpa collects summary statistics by journal and publisher, which show that 95% of journals allow papers to be deposited in OA repositories, with 63% of journals allowing post print self-archiving; and 32% preprints³². In addition, many publishers offer a 'hybrid' option, whereby an individual paper may be Open Access subject to payment of a fee. This allows publishers to 'test the water'. There are also some 'gold' OA journal publishers, operating on a for-profit or not-for-profit basis.
- 3.37 Table 3-2 shows the number of publishers imposing embargo periods of varying length. In addition, 53 publishers 'allow authors to deposit their articles immediately in open access repositories upon payment of a fee'; these include some large publishers such as Elsevier (which offers an 'author-pays' Gold OA option for 40 of its 1892 journals, as well as for all journals for authors funded by The Arthritis Research Campaign; The British Heart Foundation; Cancer Research UK; Chief Scientist Office; Department of Health UK; Medical Research Council (UK); and The Wellcome Trust); and Taylor and Francis (whose *iOpenAccess* option covers 234 journals).

Table 3-2: Embargo periods on depositing in institutional repository

Length of embargo	Number of publishers
No restrictions	51
6 month	5
12 month	7
24 month	3
4 year	1
5 year	1



Source: ROMEIO website (last updated: 15/09/08); accessed/10/08

- 3.38 'Gold' OA publishers attribute their motivation to publish 'Gold' OA journals to the characteristics of the disciplines which they serve; commitment to widening access to information; and financial incentives. However, there is limited evidence that existing 'Gold' OA publishers are meeting the costs of publishing through OA models, although 'Gold' OA publishers stated that they were confident of reaching financial stability within the period set out in their business plans.

Learned societies

- 3.39 Learned societies are (usually not-for-profit) organisations which bring together and represent researchers within a particular discipline. Some societies are membership organisations; others also act as professional bodies. The aims of learned societies include promoting the discipline; encouraging and fostering research; and disseminating knowledge and research findings. They fulfil this mission in a number of ways:

³¹ see www.ulrichsweb.com

³² see <http://romeo.eprints.org/stats.php>

- holding conferences
- publishing journals
- supporting education within the discipline
- managing and curating research outputs
- in some cases, providing research funding

As such, they are important players in scholarly communication.

- 3.40 Many learned societies publish journals, and subscription fees can form over 90% of revenue (although some societies subsidise their journals). Any surplus made on publications is reinvested into the society's activities. In general, learned society journals are highly regarded.
- 3.41 The Association of Learned and Professional Society Publishers (ALPSP) represents not-for-profit publishers, including learned societies. A number of learned societies, both individually and through ALPSP, have expressed concern about the impact of OA on their journal publishing, and on revenue streams for the societies. ALPSP states that it 'is wholly in favour of maximizing access to research literature; the various proposals for achieving this (e.g. Open Access journals, institutional repositories, self-archiving), however, raise complex economic, logistical and sociological questions which differ from field to field as well as between different sizes and types of publishers'³³.
- 3.42 Learned societies, as not-for-profit organisations, are not entitled to accumulate large surpluses. As such, they are vulnerable to changes in the funding of journal publication, as a limited period of uncertainty (such as during a transition to Open Access publishing) may threaten their financial viability. In disciplines where average research grants tend to be small, there is concern about the impact on funders of meeting pay-to-publish fees.
- 3.43 The views of learned societies on the benefits of Open Access vary, and a number of consultees remarked that their positions had shifted in recent years. However, in general they expressed concern about the impact of Open Access on their publishing activities (despite the fact that a number of learned societies already publish OA journals – an analysis of the DOAJ shows over 400 society publishers responsible for 450 of the OA journals listed). One consultee argued that pay-to-publish models provided a single source of income, whereas subscriptions or pay-to-view models could provide continuous income, which could be used to maximise the utility of existing collections.
- 3.44 The majority of learned societies had not experienced a significant volume of requests for OA. Where an OA option was offered within a subscription journal, less than 1% of authors took this up. This may be because the Research Councils which have adopted mandates are not significant funders of research in some very specific fields. However, it was noted that the Research Council and Wellcome Trust mandates may increase this proportion once research outputs from post-mandate research grants begin to be published. A number of

³³ see [ALPSP Position Statement on Open Access](#); 27 August 2003

consultees argued that academics are not interested in OA, as they do not directly experience access barriers.

- 3.45 Concerns were expressed in relation to embargo periods, particularly by those societies where the ‘half-life’ of research is long. In one case, a society had extended its embargo period following the Wellcome Trust mandate to the maximum allowed under the mandate. Another did not have an ‘author-pays policy’ or hybrid model, seeing it as the ‘thin end of the wedge’. However, it was noted that the Charities Act (2006) requires charities to provide public benefit and OA can provide evidence of this by enabling access to research findings.

Payment systems

- 3.46 There are a number of different funding models for journal publishing. Journal funding models include:

- traditional subscription (the reader may not be directly responsible for the cost of subscription, for example where university library budgets pay subscription costs on behalf of academics and students)
- Open Access (often referred to as pay-to-publish, which include author-pays, funder-pays and institution-pays models)
- hybrid models – where a traditional subscription journal offers authors the opportunity for Open Access to their articles on payment of a fee.

- 3.47 In addition, within traditional subscription journals, authors may be required to pay page charges for elements such as the reproduction of prints, or printing of images.

- 3.48 In general, the costs of ‘Gold’ OA are met through pay-to-publish models, and those of ‘Green’ OA through traditional subscription models. The extent to which Open Access journals are currently able to cover their publication costs, and the level at which pay-to-publish charges should be set, were both contested by consultees.

- 3.49 The role of embargo periods in ‘Green’ OA is also crucial for publishers. In some disciplines, (for example, earth sciences) research outputs can remain relevant for many years; whereas in others, such as medicine, findings are often rapidly superseded. Publishers argue that short embargo periods may significantly affect their revenue and ability to meet publication costs in disciplines where research remains relevant for long periods, and in some cases may mean that publishing is no longer economically viable. This varies by discipline and therefore by journal.

- 3.50 In addition, there is a lack of clarity among researchers as to the business models available for Open Access. A number of survey respondents raised concerns about the potential for Open Access to be seen as vanity publishing, or for journals to accept increasing numbers of articles (perhaps of lower quality) in order to maximise income from authors. The ‘vanity publishing’ argument is, we believe based on a misunderstanding of the OA model that ignores the fact that peer review can be incorporated in exactly the same way as with subscription journals. Publishers may, of course, wish to increase the number of articles in order to increase their

revenues but if this reduces quality then the journal will become less attractive to leading academics.

- 3.51 There is an analogy with the subscription journal situation where publishers may be able to increase revenues by introducing new journals. However, if they are not meeting a genuine need and/or quality is reduced then we would expect this to be reflected in circulation and low quality journals to eventually disappear. The argument in respect to OA journals is symmetrical. In both cases the publisher needs to decide on the trade off between volume and quality. For the reasons discussed elsewhere in this chapter, the journals market has some special characteristics and we are not suggesting that the market will necessarily arrive at the optimum trade-off. However, there does not appear to be any reason why an OA business model would lead to a worse outcome than a subscription model.

4: Factors in the move to Open Access

Introduction

- 4.1 Previous chapters have described features of the OA landscape and explained their importance. In this chapter we discuss how the key features might change over the short-term and the possible impacts on OA and scholarly communication. The discussion is organised under four headings:
- context and environment
 - publishers
 - funding bodies
 - researchers
- 4.2 Under each heading we consider the possibility and potential impacts of a range of developments. This chapter considers the various factors, largely in isolation from one another; Chapter 6 brings them together by describing various scenarios for the future.

Context and environment

General increase in awareness of OA sources

- 4.3 The survey and consultations quite strongly indicated that there is a lack of awareness, both within and outside research communities, of OA models and some confusion as to how they operate. We believe that awareness will almost certainly increase in the near future as OA journals and repositories continue to increase in number. During the consultations we were told of instances where leading researchers have insisted on OA publication, and we believe that such attitudes will become more widely known both within disciplines but also across them. We have also encountered academic opinion which is strongly against OA, but this appears to be in the minority, with ignorance or indifference more common. In addition, we think it likely that institutional managers will increase pressure on researchers to self-archive in institutional repositories; not necessarily because of any commitment to OA, but because this is seen as an important way of raising institutional profiles with stakeholders, and other external bodies more generally. If this is correct there will be a general, perhaps very slow, spread of willingness to disseminate through OA channels such that eventually this becomes the norm for most academics. In the researcher survey, 62% of those who expressed an opinion thought that this would be the case within 10 years.

Change in distribution of global research outputs

- 4.4 There are fairly clear changes in the global balance of research leadership, with China in particular investing very substantial amounts in science and engineering. The result is likely to be a relative increase in the scientific outputs from developing countries vis-à-vis the US and Europe. In the former, publishing sectors tend to form a smaller proportion of GDP than in the UK, and do not have international reputations. Several of those consulted consider there tends to be a (negative) correlation between government attitudes towards OA and the strength of the domestic publishing sector. If and when these countries move to producing relatively more research outputs than they require access to³⁴, then it would possibly be in their short-term financial interests to retain a subscription system. The changing global balance of research strengths could therefore be a factor in promoting OA .

UK Government mandates OA for publicly funded research

- 4.5 A strong, and strongly enforced, mandate from government would obviously promote OA³⁵ but we think this is unlikely to occur:
- although innovation continues to receive a high priority, the links between access to primary research outputs and innovation are poorly understood and there is very little evidence to suggest that unrestricted access to articles is an important component of the process
 - related to the previous point, we have not been able to find evidence that restricted access to research articles is significantly inhibiting the capability of businesses to innovate
 - government also has a responsibility to foster the publishing industry which is a significant employer and contributor to gross value added. There is a nervousness that , in particular Green OA might cause the sector difficulties
 - a strong mandate at this stage might be perceived as one step from dictating where researchers publish outputs and this would raise fundamental issues of academic freedom³⁶.
- 4.6 However, it would not be surprising if governments, in the UK and elsewhere, encouraged HEIs and other research institutes to develop repositories in an effort to make research outputs as widely available as possible, despite the lack of evidence that this will contribute to innovation. We would also note that The Department of Health and the Chief Scientist's Office Scotland, for example, are already both members of UKPMC. The Department of Health mandates that research papers arising from Department funding that have been accepted for publication in a peer-reviewed journal are deposited within six months in UK PubMed Central (UKPMC).

³⁴ Which is the position of the UK; see the discussion in Chapter 3.

³⁵ The Research Councils with strong mandates are, in a sense, already providing this function across defined areas

³⁶ Although it should be noted that Research Councils with strong mandates have not to date encountered significant problems in this regard

Changes in research methodologies

- 4.7 This is a factor which we believe is important, but on which we can do little more than speculate. It is striking how attitudes towards, and uptake of, OA differ between disciplines. In part these reflect differences in the size and cohesiveness of the research communities. Particle physics, for example, is a relatively small community coalescing around large scale facilities (CERN in particular). Research objectives are similar and there is a widely shared methodology so that active researchers can relatively easily assess the validity of research outputs without the need for external peer review. As a result, pre-prints have become the normal way of communicating research results in particle physics and the community is effectively engaged in OA.
- 4.8 Some of the differences may also reflect methodologies and it is noticeable that the biomedical community is in the vanguard of OA. Some we have consulted suggest that this may reflect:
- the importance of communicating results as quickly as possible
 - the importance of sharing data, as well as conclusions, and collaboration
 - and related to this last point, experiences on the human genome project (a publically funded project where the results of DNA sequencing are stored in the open access GenBank).
- 4.9 If these ways of working were to spread to other disciplines then this would promote OA. Similarly, if these subjects were to receive relatively more funding there would be a move towards OA, but it is outside the scope of this study to answer either of these questions. However, we think it is worth pointing out that the current generation of students and post-doctoral researchers are used to accessing and using information in very different ways to their predecessors. More specifically, the widespread use of social networking sites and blogs (and the internet more generally) means there is a new generation of researchers, used to accessing information for which the provenance may not be clear, which makes its own judgements about its validity and usefulness. This general attitude towards accessing and using information could promote the use of repositories.

Reduced importance of journals to researchers

- 4.10 There is an argument that the traditional journal (whether OA or subscription) with peer reviewed articles is becoming obsolete. Instead, articles are placed in repositories and researchers decide for themselves whether they are useful and of sufficient quality. One of the benefits of such a system would be that articles are available very quickly after preparation. If such a system became widespread it would effectively replace the journal market as currently constituted. However, this would only happen if researchers considered repositories to be an adequate substitute so this does not imply any breakdown in the scholarly communication process. It is difficult to judge the likelihood of such developments, but we would note:
- the underlying assumption is that active researchers are able themselves to judge quality. This may be reasonable in certain subject areas, but, where there is a wide

diversity of sub-disciplines which researchers need to keep abreast of, the traditional journal may be an efficient means of filtering research outputs

- researchers seeking to work across disciplines may need external peer review
- similarly, the journal may provide value for non-researchers (such as businesses and other organisations) which are unable themselves to judge the value of articles in repositories.

4.11 For these reasons, our view is that the journal functions of packaging and quality assurance are likely to remain important for most subject areas.

Increasing competition between HEIs for research funding and students

4.12 HEIs are becoming increasingly aware of the potential value of the repository as a means of publicising their outputs and achievements. This may lead to more explicit policies to mandate self-archiving and closer enforcement of these policies. There will be some reluctance to dictate to researchers how they should disseminate research outputs, but there is a tendency for HEIs to seek to manage research much more actively than hitherto, for example in rules governing bidding for projects which do not attract overheads and the selection of staff for the current (2008) RAE.

Research assessment

4.13 There is little doubt that research funding from the HE funding councils will depend on quality assessment and that this may become more concentrated in the future, increasing the importance of returns to the REF. Repositories may offer some scope to extend assessment, especially in relation to applied research and knowledge transfer. However, as was discussed in the previous chapter, there seems to be insufficient understanding of the relationship between downloads from repositories, and impact and quality, for the assessment process to change radically in the short term.

Technology developments

4.14 The key technological developments are likely to be:

- increased bandwidth
- more effective search engines
- improvements in text/data mining and data analysis techniques
- 'harvesting' between repositories.

4.15 Many of these are underway at present or are at least fit-for-purpose. We do not therefore believe that technology will have any new influence in further moves to OA. There is an issue as to whether publishers could discriminate between readers, enabling them to provide OA to academic users but to charge businesses and possibly other users. This would be technically possible through log ins and passwords but the possible leakages between different users could not be easily resolved by technological means alone.

Shift offshore of publishing functions

- 4.16 Some components of the publishing process can be undertaken offshore where skilled labour is available at lower cost than in Europe and the sector is already exploiting this potential. In one sense this tendency is neutral between OA and subscription business models. However, it could be argued that fixed costs are relatively more important to the OA business model than the subscription journal and the possibility of sourcing low cost inputs abroad may therefore benefit OA.

Trend toward business seeking innovation externally (open innovation)

- 4.17 Businesses, especially large corporations, are increasingly seeking innovative ideas from outside the business and are approaching this in a more strategic way than hitherto. They need to be better informed of innovation sources but there is no obvious reason why this should promote OA. As was mentioned in the previous chapter:
- large corporations are unlikely to be significantly constrained by budgets in terms of accessing subscription journals
 - the key requirement is to access expertise rather than results per se and this information is readily, and freely, available via the web.

Publishers

Competition from OA journals

- 4.18 A danger, mentioned by some consultees, is that OA competition might force publishers to withdraw from the market, resulting in reduced services to researchers. However, it is not clear why competition from OA journals should lead publishers to withdraw from the market, even partially. It is possible that some are earning above average (supra normal) profits because they have established a leading brand which acts as a barrier to new entrants. However, if this is the case they ought to be able to charge above average rates in a pay-to-publish model, since the market entry barrier remains and this might be reflected, to some extent, in higher pay-to-publish charges than would otherwise be the case. This might not be the case if OA made it easier to establish new journal titles but we do not have evidence to support this. Indeed, given the additional obstacles which researchers face in a pay-to-publish model, the opposite would seem to be the case. Even if publishers are generating surplus profits, they would not withdraw from the market unless they could obtain similar returns elsewhere; and again it is not clear why this should be the case. If publishers are earning 'normal' profits they should be able to maintain these in competition with OA journals since the cost structures would be similar.
- 4.19 The general conclusion is that publishers would only withdraw if OA publications were preferred by researchers. If this were the case then OA publications would be meeting the needs of researchers and there seems to be no reason why scholarly communication should suffer.

- 4.20 The major caveat we would add is that OA publications might benefit from ‘charitable’ donations to cover their start-up costs and these might enable publication even when there was no prospect of long-term sustainability. The result could be that commercial publishers withdraw from ‘Gold’ OA publishing and, over the longer term, the ‘Gold’ OA substitute is not financially viable without subsidy.
- 4.21 Publishers are also concerned about the costs arising from the growth in ‘Green’ OA, driven by research funder mandates, where no external funding is provided to meet any potential decrease in subscriptions to journals because the papers are also available in repositories.

Loss of revenue to commercial publishers

- 4.22 An OA system may lead to lower revenues for commercial publishers, which may reduce supply, through:
- lower advertising revenue. Advertisers may consider a ‘free sheet’ a less attractive place in which to advertise, but this seems unlikely to be significant. However, a radical move to repositories-only might face difficulties in evolving a business model with advertising revenues so there could be an outflow of revenue from the scholarly communications system.
 - reprints, the revenue potential of which depends on the length of the embargo period.

Learned societies are unable to compete with OA developments

- 4.23 This would result in a reduction of services to research communities. However, there is no reason why the volume of articles should decrease because competition arises from OA provision. As a first approximation, if commercial publishers can compete with OA (see paragraph 4.18) then learned societies should also be able to do so. However:
- they are not commercial organisations and may struggle to adapt
 - there may be transitional issues - if users (libraries) withdraw subscriptions but pay-to-publish funds are not available then learned societies may not have reserves to tide them over
- 4.24 The ‘radical’ model of academics relying on repositories (paragraph 4.10) may create opportunities which learned societies are well placed to realise:
- managing the peer review of articles in repositories
 - producing overlay journals

Demonstration of existing OA journals

- 4.25 If existing journals can demonstrate that pay-to-publish models are financially sustainable this could encourage others to enter the market. At present, there is very limited hard evidence, but a perception that they are not covering full costs and instead relying on start-up donations.

Funding bodies

Allocation of quality-related research(QR) funding and incorporation of repositories in REF assessment

4.26 The incorporation of repositories in the REF would, no doubt, promote their establishment, but for the reasons given in the previous chapter we think this is unlikely in the near future. The main role of the funding councils is likely to be in relation to an allocation of QR funds which recognises the importance of pay-to-publish models. Funding could make for a smoother transition and would also help to ensure that research intensive universities are compensated for their increased share of (pay-to-publish) costs. The funding issue is complex:

- the costs of pay-to-publish are likely to be a relatively small component of QR funds
- it is likely that funding councils would only consider this if they also reduced indicative library budgets (not necessarily pro rata)³⁷. However, the net effect would be a transfer to research intensive universities, which is what the system would need. In addition, if pay-to-publish funds are explicitly identified as a component of QR it may encourage HEIs to establish internal funding streams and facilitate researcher access.

4.27 We note that the recent RIN report³⁸ suggests that costs to the UK of a pay-to-publish model would be greater than savings from reduced subscriptions. Broad-brush estimates are that the difference is not so significant as to warrant funding councils seeking extra funds.

Mandate from HE funding councils for OA

4.28 This would raise the profile of OA and potentially encourage HEIs to adopt institutional OA policies. However, we think it is unlikely that that funding councils will consider a strong mandate and are more likely, if anything, to mirror RCUK statements:

- the funding councils (especially HEFCE) will wish to avoid any suggestion of encroaching on university autonomy
- the councils will consider that the researcher should decide where and how to publish and would not contemplate strong mandates until OA channels were widespread
- QR provides infrastructure for project funding and funding councils will not (and cannot) impose requirements on other funders.

Continued support via the JISC

4.29 We consider this to be relatively important. The JISC has promoted OA by:

- funding demonstrator projects

³⁷ HE funding council funds are provided as a block grant and HEIs have considerable discretion over spend. However, the grant is determined (largely) by formula on the basis of various activities.

³⁸ Activities, costs and funding flows in the scholarly communications system in the UK, Report commissioned by the Research Information Network (RIN), May 2008

- spreading awareness
 - technical support
- 4.30 We assume that this will continue and grow. In part as a result of this support, technology issues are unlikely to inhibit OA.

Strengthening of research council mandates

- 4.31 If the research councils (other than MRC which already has a strong mandate) were to issue a stronger statement which mandated an OA publication route we have little doubt, provided the policy was monitored and enforced, that this would stimulate OA development. It would:
- raise awareness
 - provide greater confidence for OA publishers
 - stimulate the supply side for OA.
- 4.32 However, our discussions with some of the research councils indicated that there may be a reluctance to take any steps which could be interpreted as dictating where grant holders should publish.

Project funders meeting pay-to-publish costs

- 4.33 The current system whereby research councils will consider indirect costs and others (e.g. Wellcome Trust) will meet specific expenditures appear to be sufficient in principle. However:
- there may be problems for researchers in meeting pay to publish costs where research is undertaken without project grants
 - there may be similar problems in funding research outputs published after the project finishes
 - HEIs need to develop internal systems for the allocation of indirect costs to address these issues
 - the RIN study³⁹ indicates a net increase in costs of OA to the UK research system and it is unclear from which funding source the additional funds needed will be provided

HEIs and research institutes

Attitudes towards repositories

- 4.34 This could be a significant factor in the promotion of OA. There are strong pressures within the system for the further development of repositories and harvesting techniques mean that the choice between subject or institutional (or thematic/programme) is becoming less of an

³⁹ Activities, costs and funding flows in the scholarly communications system in the UK, Report commissioned by the Research Information Network (RIN), May 2008

issue. However, our survey indicated a lack of awareness amongst researchers of institutional policies and a general tendency to encourage rather than enforce mandates where policies exist.

Internal provision of funds for pay-to-publish

- 4.35 This is very significant if OA is to spread:
- researchers have to access funds somehow
 - unless funds are easy to access, subscription journals will always be more attractive (other things being equal).
- 4.36 We have encountered (a few) examples of central funds, but it may be that pay-to-publish costs will be met from departmental budgets. In either case, mandating deposit in an IR potentially gives institutions another research management lever. Given the importance of research outputs it seems that some at least will use this lever. Perhaps there will be a move to a situation where the OA or subscription decision depends on whether research is considered a strategic priority by the HEI, as this will affect the relative costs of each model for the HEI.
- 4.37 There may be special issues for disciplines which do not depend on project grants for research activity since they will not be able to generate pay-to-publish funds from project funders and may be driven down the subscription route. Could QR compensate for this? Units of Assessment (UoAs) may be too clumsy a vehicle for selective intervention and it seems more likely that the funding councils would expect HEIs to resolve these issues themselves.

Protection of intellectual property

- 4.38 This has been raised as an issue during consultations but it is difficult to see why it should impact on the choice between OA and other forms of publication. The key issue is that ideas need to be protected before they are communicated and this is true regardless of the means of communication. Similarly, it is difficult to see why industry collaborators or sponsors would have any particular preference for OA compared to traditional methods of dissemination. There may, however, be difficulties in enforcing good practice. Specifically, if self-archiving becomes the norm then it may be more difficult for commercialisation offices to ensure intellectual property is protected in advance of dissemination.

Researchers

- 4.39 The key issues for researchers in terms of a shift toward Open Access are:
- perceptions of OA journal impacts – related to REF considerations and the extent to which OA journals are properly represented in bibliometric data bases
 - the development of internal funding systems for pay-to-publish models. It is far easier for researchers to use the subscription journal route since OA journals typically require them to access funds. The ease with which they are able to do so will have an important influence on attitudes

- simplicity of the archiving process (including in some cases self-archiving)
- awareness of OA potential benefits and opportunities, where we think the culture may be changing
- access, and speed of access, to research outputs and data
- similarly, perceptions of speed to publish, circulation and citation potential
- differences between subject areas reflecting differences in research outputs (e.g. article versus installation art), research methodologies (importance of data versus findings, cohesive versus dispersed communities) sources of funding (project versus time/QR)

5: Findings

- 5.1 One purpose of this study was ‘to identify the effects and impacts of Open Access on publishing models and institutional repositories in light of national and international trends, including the impact of Open Access on the quality and efficiency of scholarly outputs (specifically journal articles)’. In the preceding chapters, we have identified key trends in Open Access and potential future impacts.
- 5.2 This chapter presents our findings against the key areas identified in the terms of reference, as follows:
- Review the current state of play of Open Access to establish national and international trends.
 - Assess the transition from subscription to pay-to-publish models across academic disciplines.
 - Determine the impact of repositories for self-archiving research outputs.
 - Assess the effect(s) of Open Access on the quality, efficiency and impact of research outputs.

Review the current state of play of Open Access to establish national and international trends.

Repositories

- 5.3 There are two main types of repository: central repositories (CRs), organised on a subject/discipline basis; and institutional repositories (IRs), which collate output from an individual institution (or, in some cases, a small grouping of institutions).
- 5.4 According to OpenDOAR⁴⁰, the UK currently has 11% of all repositories worldwide which translates to 101 repositories representing 74 UK institutions. Whilst 57% of these repositories are interdisciplinary, 18% are related to Computers and IT, 8% to Library and Information Science and 6% to Maths and Statistics. Just over three quarters of UK repositories are institutional, whilst only 17% are subject-based and 4% governmental. OpenDOAR⁴¹ lists most UK universities as having institutional repositories (IRs) and, for example, 18 out of 20 Russell Group Universities, and 13 of the 19 universities in the 1994 Group have IRs.
- 5.5 The increase in the number of IRs is partly driven by the HE institutions themselves because the repositories are seen as a good tool for showcasing their research to the outside world and as a tool for managing RAE/REF submissions. A number of major research funders require

⁴⁰ Driver Support (2008). United Kingdom: Summary of Activities. Accessed online: <http://www.driver-support.eu/en/national/uk.html>

⁴¹ OpenDOAR (2008). Directory of Open Access Repositories: United Kingdom. Accessed online [May 6th, 2008]: <http://www.opendoar.org/countrylist.php?cContinent=Europe#United%20Kingdom>

the research outputs that they have funded to be deposited in large subject-based repositories, such as PubMed.

- 5.6 Academics have so far been relatively slow in adopting the use of repositories and are not, in general, actively depositing their work. Less than one third of survey respondents had deposited material in a repository in the last five years. Various support projects and programmes have been established at different levels to support the use and improve the take up of institutional repositories by academics as well as other users
- 5.7 The funding and maintenance of repositories are key issues. There is significant variance in who carries the responsibility for maintaining institutional repositories (often librarians, although in a number of institutions there is a dedicated repository manager). In addition, research funders do not directly meet the costs of running repositories – although the research councils contribute to the costs through contributions to fEC. Some institutions are collaborating to fund ‘group’ repositories, and at least one university runs a ‘depot’ available for individuals whose institutions do not have a repository.

Journals

- 5.8 There are about 25,000 active peer-reviewed scholarly journals currently published in English⁴² both paper and online. The Directory of Open Access Journals (DOAJ) lists 3620 Gold OA journals. Sherpa collects summary statistics by journal and publisher, which show that 95% of journals allow papers to be deposited in OA repositories, with 63% of journals allowing post print self-archiving; and 32% preprints⁴³.
- 5.9 The market is dominated by five or six major commercial companies. Subscription journals remain the most common model by far though the proportions vary widely between disciplines. Open Access is provided by some exclusively Open Access journals but also hybrid journals.
- 5.10 Hybrid journals are now offered by virtually all publishers (but not for all journals) as an option for authors. Some publishers are relatively open about the costs they incur and appear to regard the hybrid journal very much as a transition model, but there is a high level of cynicism among some commentators regarding publishers’ motivation for using the hybrid model and the likelihood of subscription charges falling as Open Access usage increases.
- 5.11 Concerns are expressed by some about the pay-to-publish model - namely that this increases the temptation for journals to publish more, potentially reducing quality. The counter argument is that there is a trade-off between quality and revenue, whether the latter comes through subscriptions or pay-to-publish models. Our consultations have not revealed a view that pay-to-publish is an intrinsically weaker model. It is seen as an alternative, in some cases an attractive alternative, to ‘conventional’ publishing models.

⁴² see www.ulrichsweb.com

⁴³ see <http://romeo.eprints.org/stats.php>

Research funder policies

- 5.12 Research funders are increasingly mandating Open Access to research outputs, and requiring researchers to deposit articles in repositories. Specific mandates with the potential for significant impact include the Wellcome Trust, a number of the UK Research Councils, and the adoption of a new mandate by the US National Institutes of Health, which requires grant-holders to submit a copy of their peer-reviewed articles to PubMed Central, with a maximum embargo period of 12 months from the date of publication. These mandates are listed in Annex A and discussed in more detail in Chapter 4.
- 5.13 The RCUK statements need to be understood in the context of global changes. In particular:
- there had been a trend towards OA for some time before the 2006 statements. Indeed, the statements were a response to these changes
 - the UK accounts for a relatively small proportion of global research funding and the policies of other funders will have a major impact on the movements towards OA. Their policies will influence the ‘take-up’ of OA by researchers in other countries, but UK researchers may also secure funding from other agencies and/or collaborate with foreign researchers who are subject to these mandates.
- 5.14 Consultees, including librarians, argued that funder mandates have had a significant impact on behaviour and are the main influence on increased self-archiving. However, the survey findings contradict this – funder mandates were only important to 17% of researchers when considering OA, and 72% said that they were not important⁴⁴. It may be that mandates have not yet been in place long enough to have affected academics’ publishing decisions.
- 5.15 It is too early to determine the impact of the RCUK mandates on Open Access. The library survey suggested that there were three main areas across which influence could be determined, as follows:
- supporting the development of an institutional policy on Open Access
 - supporting development of an institutional repository
 - raising awareness of Open Access

Block deals to use Open Access journals.

- 5.16 We are aware of two examples of funders seeking to arrange block deals to use OA journals. The first, which has been agreed, is an agreement between HEIs in the Netherlands and Springer for Dutch academics to publish in hybrid journals at no fee. All Springer journals are hybrid at present. The second is still at the planning stage. It is moving forward under the auspices of CERN and entails plans for the particle physics community to contract with major publishers for the latter to make their journals available at no cost. The aim is that current funders of subscription journals would pool their subscriptions and these funds would be used

⁴⁴ Respondents were asked to rate importance on a five point scale where 5 was “not at all important”. 72% rated funder mandates as 4 or 5.

to negotiate with the publishers to convert to OA but with no publication charges. We would note:

in both cases the user community and their funders are relatively small in number

the negotiations are with six journals in the case of physics and one publisher, in the Dutch case.

- 5.17 The potential complexity of deals in other areas may mean they are not feasible and they would also require cooperation between, at least, several major funder funders in the UK and abroad.

Assess the transition from subscription to pay-to-publish models across academic disciplines.

The current state of the Journal market

- 5.18 Open Access journals operate on a different business model from subscription journals. Hybrid journals are a mix of the two. Some publishers now have robust systems to supply scholarly output at the article level rather than at a journal level for their subscription journals. The movement from subscription journal to Open Access journal appears to be challenging probably for cultural rather than technological reasons, and very few journals have made the transition. However, within the Open Access business model, recent developments, such as PLoS One, are changing the landscape.
- 5.19 Review journals, which provide assessments of research areas written by well known experts, have always existed. Review journals are frequently seen as a corollary of a move to green route OA: if academics increasingly deposit their work in repositories, perhaps, though not necessarily with some peer review element, scholars with an interest in the field will need somewhere to turn for guidance on the most up-to-date and impressive research. Review journals can provide that, as could virtual journals selected by, for example, learned societies. The role of learned societies in the changing market is important.

The operation of the funding regime for pay-to-publish

- 5.20 There are a number of different funding models for journal publishing. 'Pay-to-publish' models include:
- Open Access (often referred to as pay-to-publish, which include author-pays, funder-pays and institution-pays models)
 - hybrid models – where a traditional subscription journal offers authors the opportunity for Open Access to their articles on payment of a fee by the author.
- 5.21 In general, the costs of 'Gold' OA are met through pay-to-publish models, and those of 'Green' OA through traditional subscription models. The extent to which Open Access journals are currently able to cover their publication costs, and the level at which pay-to-publish charges should be set, were both contested by consultees.

- 5.22 Respondents to library survey stated that pay-to-publish Open Access was funded through a variety of means at their institutions: 41% by being specified in research funding; 15% from indirect costs administered at faculty/department level; 13% from indirect costs administered centrally; and 18% from the author's own resources. Forty-six percent of respondents stated that they did not have any mechanisms to fund pay-to-publish Open Access. Others noted that a combination of methods was used, and that there was 'no mechanism across the board'. Other means of funding noted included grants from the Wellcome Trust (five institutions), subscription to Biomed Central (three institutions), and transfers from other internal accounts to the library (two institutions).
- 5.23 Librarians who responded to our survey supported 'the principle of Open Access' but were 'unable to afford to support the pay-to-publish model'. Another respondent noted 'concerns about funding publication charges in parallel with subscriptions'. Half of all researchers responding to the survey did not know how to obtain funds for pay-to-publish Open Access, and 17% reported that no funding was available. There was considerable variation between the Research Councils, with AHRC and ESRC respondents least likely to know about sources of funding, and BBSRC and MRC most likely to know, and to indicate that funds were available when included in the research funding.
- 5.24 Relatively few authors had paid a fee to publish – just 357 just 357 of the 1,067 who responded to this question reported having done so, and only 17% of these had paid this personally. The fee was paid by the project funder in 45% of cases Other funders mentioned included sponsor organisation, collaborators, third party funder, and publisher of proceedings. Some noted that fees were included in a wider payment, such as a conference fee or learned society membership. In some cases, fees had been waived due an inability to pay, or remained unpaid.

Drivers and barriers to take up of Open Access journals from both university and researcher perspectives

- 5.25 The reasons most frequently given for not publishing Open Access concerned the Research Assessment Exercise, and the need to publish in high impact journals. Many respondents noted that there were no high impact Open Access journals in relevant fields. Open Access journals were perceived to be of generally of lower quality, with little or no peer review, by some respondents. Cost was also an issue for some, as was unfamiliarity with the concept of Open Access. Co-authors were the most likely to have influenced respondents' decisions whether to publish Open Access research outputs in the last five years.
- 5.26 Authors who had published Open Access papers were asked to rate a series of seven possible reasons for choosing to publish Open Access on a scale from 1 (very important) to 5 (not at all important) (note that this question did not distinguish between 'Green' and 'Gold' Open Access). The most important factor, with 74% of respondents rating this at 1 or 2, was speed of dissemination. This was seen as particularly important by STFC, ESRC and AHRC researchers.
- 5.27 The second most important factor was the principle of free access for all, with 70% of respondents rating this as 1 or 2, while 12% rated it as 5, not at all important. There were no differences between categories of researcher, Research Councils or institution type. Sixty-one

percent of respondents rated the availability of material to researchers with limited access to subscribed journals as 1 or 2, with 14% rating this as 5. The possibility of increased citations to the output was rated as 1 or 2 in importance by 58% of respondents, with 17% rating this as not at all important.

- 5.28 The prestige of the journal was rated as 1 or 2 by almost as many respondents – 57% of the total, although 25% rated this as not at all important. In this case, there were statistically significant differences between the Research Councils, with NERC and MRC researchers most likely to rate it very important, and ESRC researchers as least.
- 5.29 The least important reasons in general were mandates from funders and from institutions. Overall 66% rated mandate from funder as not at all important, while 74% rated mandate by institution as not at all important. There were statistically significant differences in the patterns of response concerning funders' mandates between the Research Councils: no STFC researchers reported the mandate as 'very important', but 27.5% of MRC researchers did, perhaps reflecting differences in the Research Councils' mandates.
- 5.30 A significant minority of researchers (21%) felt that publishing in Open Access journals might adversely affect their careers. Lecturers were most likely to hold this view (32% strongly agreeing or agreeing). ESRC and AHRC researchers were most likely to hold this view (32% and 27%), and BBSRC respondents least likely (11%). The reasons for feeling that Open Access might adversely affect their careers related largely to 'the weight given by funding and promotion and hiring committees to publications. If you actually make those committees give great value to open-access publications they will succeed'.

Determine the impact of repositories for self-archiving research outputs

Changes in university policies on Open Access journals and repositories

- 5.31 Nine institutions responding to the survey had a policy on Open Access, and another thirteen were planning to introduce one (generally over the course of the 08/09 academic year).
- 5.32 Two-thirds of responding institutions had their own repositories, and a further quarter had plans to introduce one. The earliest of the repositories had been set up in 2001, but half had been set up in the last three years. The majority were the responsibility of the library, or a merged information services department.
- 5.33 Forty-two percent of respondents reported that their institution had its own repository, but slightly more – 43% – did not know. Junior researchers were less likely to know whether or not the institution had a repository. Fifty-five percent of MRC respondents did not know whether their institution had a repository – this is an area where there is a high-profile subject-based repository which is widely used.
- 5.34 The majority of researchers (93%) were at institutions which were reported by the library staff to mandate or encourage self-archiving in their institutional repository, but less than half of them – 42% - knew this. Knowledge of policy with respect to self-archiving on a web site was no better – 47% of researchers were at institutions where this was reported by librarians

to be encouraged, and 37% of them knew this. The greatest ignorance concerned policy regarding subject repositories – 65% of researchers were at institutions which were reported by the library staff to encourage self-archiving in a subject repository, but less than one in five of them – 19% - knew this. Just 24% of respondents from institutions with a policy knew about it, and 8% thought there was no policy. In institutions where there was no policy, 11% of respondents knew this, but 17% thought that there was a policy in place.

The potential impact of self-archiving on subscription and pay-to-publish models

- 5.35 Among survey respondents, there was considerable lack of knowledge about repositories, and some confusion as to their role. Eighty-nine percent of respondents were from institutions which had a repository. Eleven percent of respondents thought that their institution did not have a repository, when it did.
- 5.36 Another theme was that there was no incentive to place material in a repository, and that it was a time-consuming and difficult process. Only twenty-two percent of respondents had published in their institutional repository. All the institutions concerned offered mediated deposit by repository staff. Deposit was most likely to occur when it could be mediated by other staff – 32% of authors had deposited material where this was an option.
- 5.37 Issues concerned with copyright, and the availability of different versions of papers which often results from publishers' policies with regard to repository deposit of manuscripts was another key area of comment:
- 5.38 In general, Open Access had a minimal impact on library subscriptions. Just three institutions – all post-1992 universities – said that the availability of Open Access had affected their expenditure on journal subscriptions. In one case, it was suggested that OA had helped to make more resources available than would otherwise have been possible within the allocated budget. Another commented that 'Open Access has not yet affected expenditure on journal subscriptions.... [it's] possible that if we were science based we may have been able to cancel some subscriptions'

The proportion of research council funded research that is ending up in repositories

- 5.39 We do not have information which would enable us to distinguish between research council funded outputs and research supported in other ways, but our consultations suggest that to date the impact of the Research Council's mandates has been limited. To some extent this is because of timing and is likely to increase as additional publications from RC-funded research are produced.
- 5.40 When asked whether they were aware of the Research Councils' policies on Open Access, again almost three quarters were not, and there were significant differences between institution types, researcher categories, and Research Councils. It is perhaps not surprising that postgraduate students should be least aware of their Research Council's policy, although the differences between Councils are more significant, and may be indicative of differing levels of publicity for the policies.

- 5.41 However, where researchers were aware of the policies, they were clear that they needed to comply with them. Of those respondents to the researcher survey who had published research outputs within the last five years, 72% had made at least one open access publication. In publishing their most recent open access publication, 62% of researchers had used a repository.

Assess the effect(s) of Open Access on the quality, efficiency and impact of research outputs.

Visibility and use of research outputs available via Open Access in both academic and non-academic environments

- 5.42 It is in the interests of researchers and funding bodies for their research findings to be disseminated as widely as possible. Initial evidence appears to suggest that OA articles (whether published in OA journals, or self-archived) have increased citation rates immediately after publication compared to subscription-model articles, although resultant impact is more difficult to assess. In general, researchers agreed with the statement that Open Access journals publish material more quickly than other journals (13% strongly agreeing; 26% agreeing; 54% neutral). ESRC researchers were most likely to agree (with 57% agreeing or strongly agreeing).
- 5.43 Researchers used a wide variety of search tools to identify appropriate resources. The most commonly used were bibliographic databases; the library portal; and internet search engines. Very few used SHERPA (0.1% usually, 1.8% sometimes and 6.4% rarely), and even fewer OAIster (0.4%, 0.9% and 4.3% respectively). Used of search tools varied by category of researcher and field. Postgraduate students were more likely than other groups to use library portals, subject-based portals, the library catalogue, and Google Scholar, and less likely to use bibliographic databases to identify appropriate resources. Researchers from STFC were most likely to use subject-based portals, while those from AHRC and ESRC were more likely to use the library catalogue or a library portal than those from other Research Councils. Researchers from BBSRC, MRC and STFC were less likely to use Google Scholar than those from other Research Councils.
- 5.44 Open Access is not equivalent to online access. However, a number of consultees and survey respondents were unclear as to this distinction, and conflated the two. This was largely attributable to the nature of the journal subscription market: in a large number of cases, the users of research (academics) are not those directly responsible for meeting subscription costs (met by institutions). As such, for many academics, online access is perceived as free of cost. Open Access outputs are therefore not necessarily distinguishable from subscription ones for researchers, unless they hit a toll barrier.
- 5.45 Respondents were asked how often they took a variety of options when they identified a resource for which they did not have access to the full text. There were significant differences in the patterns of response between researchers from the different Research Councils, and in some instances between different categories of researcher. Postgraduate students are most likely to seek an Open Access source of the same material (59% would usually do this), and least likely to contact the author for a copy (68% rarely or never do this).

Respondents from STFC are also very likely to seek an Open Access source (75% usually do so), and very unlikely to contact the author (7% usually do this, while 64% rarely or never do so). They are also less likely to use inter-library loan, and more likely to do nothing than respondents from the other Research Councils. Respondents from AHRC are also unlikely to contact the author for a copy, with only 8% usually doing this.

5.46 There is very limited evidence on the importance of access to journals by non-academic users and therefore the value to them of Open Access models. However, anecdotal evidence suggests:

- many non-academic users have, at most, limited interest in original research outputs (articles). Their need is, instead, for synthesis and interpretation of leading edge results
- one important reason for businesses to review publications is to identify expertise rather than to access results, but abstracts are often sufficient for this and these are freely available for traditional subscription journals
- where specific access is required, for example when leading edge results need to be referenced, businesses have alternative means including commissioning information consultants
- subscription costs do not appear to be an obstacle for large corporate R&D labs, which do require access to articles
- some public sector organisations we consulted have satisfactory access through inter library loan mechanisms and/or on-line subscriptions
- there are, nevertheless, some specific areas where free access could be important. We have not been able to identify any studies to validate these views but the following were mentioned during consultations:
 - access to medical research by the general public (or more accurately individuals with specific interests)
 - access by the voluntary sector, especially in relation to social science, where budget constraints are particularly important.

Perceptions of the quality of Open Access publications by academics and non-academics

5.47 In the survey of researchers, the reasons most frequently given for not publishing through Open Access routes concerned the Research Assessment Exercise (RAE), and the need to publish in high impact journals. Many respondents stated that there were no high impact Open Access journals in their fields. Open Access journals were perceived to be of generally of lower quality, and as 'easier to get into' by some respondents. A number also perceived Open Access journals as having little or no peer review.

5.48 Overall, 15% of respondents strongly agreed with the statement 'there are Open Access journals with high status in my field of research'; and a further 20% agreed. However, 22%

disagreed and a further 12% strongly disagreed. There were differences by subject areas, with BBSRC and MRC researchers most likely to agree, and AHRC researcher most likely to disagree.

- 5.49 However, researchers tended not to agree with the statement that ‘Open Access outputs are likely to be of lower quality than non Open Access outputs’: overall, 63% of respondents disagreed or were neutral. There was a relationship between seniority and response, with more senior respondents generally tending to be more likely to agree. Responses also varied by research area: researchers in STFC subjects were last likely to agree, but those in EPSRC/ESRC areas more likely.

6: Scenarios

Introduction

- 6.1 This section discusses the implications of three scenarios, defined by the client. The three are:
- A majority of major world-wide funders move to a mandate similar to that taken by the Wellcome Trust and the MRC⁴⁵, and as a result the other research councils adopt a similar position
 - Business as Usual – this scenario would see all RC's with mandates of one form or another – some fairly tough and some more flexible and less monitored
 - A majority of major world-wide funders start to remove mandates because of pressure from various sectors e.g. publishers, academics, HEI's, Governments.
- 6.2 The purpose of the scenarios is to enable possible developments to be explored, both in terms of their impacts but also encouraging and restraining influences. They are not intended as alternative projections of how the scholarly communications system might actually evolve. Nevertheless, there are undoubtedly cultural and other pressures emanating from the research community in the direction of open access. As a result we think that the third scenario is unlikely in practice and some combination of the first two is more likely.

World wide funders move to a Wellcome Trust (WT) position

Introduction

- 6.3 The WT mandate is as follows; the WT:
- expects authors of research papers to maximise the opportunities to make their results available for free
 - requires electronic copies of any research papers that have been accepted for publication in a peer-reviewed journal, and are supported in whole or in part by Wellcome Trust funding, to be made available through PubMed Central (PMC) and UK PubMed Central (UK PMC) as soon as possible and in any event within six months of the journal publisher's official date of final publication
 - will provide grantholders with additional funding, through their institutions, to cover open access charges, where appropriate, in order to meet the Trust's requirements
 - encourages - and where it pays an open access fee, requires - authors and publishers to license research papers such that they may be freely copied and re-used (for

⁴⁵ The current methods of providing funds to researchers to meet pay-to-publish costs differs between The Wellcome Trust and the MRC.

example for text and data-mining purposes), provided that such uses are fully attributed

6.4 There are three key aspects of the mandate:

- insistence on placement of peer reviewed articles in a repository
- an ‘embargo’ period of six months
- specification of which repository is acceptable to the Trust.

6.5 The key assumptions are:

- compliance is monitored and enforced; for example, non-compliance on previous project would disqualify researchers from future funding.
- research councils in the UK, and other significant research funders adopt a common policy requiring OA to journal articles produced from their funded research, and provide funds, directly or indirectly, to support this

Impacts on researchers

6.6 International adoption of the mandate is likely to have a profound impact on researchers’ behaviour through the distribution of project grants:

- if enforced, then leading researchers in the UK would have little option but to follow
- Researcher attitudes would change as OA publication becomes the norm, and OA/hybrid journals are seen to maintain their quality
- this would be reinforced by international practice, within which we would include EU funds, and our survey suggested that co-author pressure is already the main incentive influencing OA publication

6.7 This would leave three major funding sources potentially outside the mandate:

- business (and other non-public) and government (project funds)
- core funding (QR) from the HE funding councils
- charities, especially the smaller ones.

6.8 Business funders are unlikely to have much interest in OA one way or another. At present, they often seek a delay in publication in order to protect any IP over which they have control and this is likely to continue. The delay period varies, but we believe that six months is not uncommon and should be sufficient for businesses to protect any IPR they hold. Government, the HE funding Councils and charities, raise a different set of issues. Much of the government funded research is joint with business and similar comments to those made above apply. However, we think it likely that the following trends would emerge:

- where government, or other public funding agencies, are the sole funders there is likely to be a move to adopt similar mandates. We have not discussed this issue with

government departments but the general thrust is to disseminate research outputs as widely as possible in the hope that this will contribute to the adoption of results and the promotion of innovation more generally. In addition, government funders have, historically, been sympathetic to academic requirements and if an OA mandate became the norm it seems unlikely that this would be resisted by government departments. At the very least, we believe that government funders are unlikely to resist any move to OA publication of results from the research that they fund. There may be significant exceptions where research is related to national security, for example, but such research is unlikely to be published in any form. We would note that the Department of Health already requires articles to be deposited in UKPMC within six months of publication

- the HE funding councils are in a different position. QR (and other Council) funding can be, and is, used to support researcher time so that publications in some disciplines may be generated without specific project funding. However, it also seems likely that the HE funding Councils would adopt a similar mandate to the RCs and insist that research outputs from Council supported staff are made available through repositories (after an embargo period). There would appear to be some reluctance to direct researchers to publish in specific journals, but the HE funding councils are also interested in making research outputs as freely available as possible. In addition, if and when the REF comes to rely more heavily on metrics, institutional mandates could become more important to researchers
- some of the smaller charities we consulted were reluctant to themselves support OA because it would mean diverting funds from research and this was perceived to be unacceptable to donors. However, we would make three points. First, some charities have already followed the WT mandate and will provide additional funds. Second, many, but not all, these charities are relatively small and this is reflected in the volume of research they support⁴⁶. Third, there will be pressure on the organisations to support OA as such journals become the norm. In particular, as the highest quality journals become OA it will be more difficult to attract high quality proposals unless financial support is also provided for publication.

6.9 We therefore think it likely that if the mandate was adopted widely, other funders would follow and there would be a substantial increase in researchers seeking to publish in journals which would permit peer reviewed articles to be placed in suitable repositories.

Publisher responses

6.10 Publishers could comply with the mandate in three ways:

- OA journals which are free to use, electronically, with articles uploaded to a repository either by the publishers or by the author (Gold)
- subscription journals with the articles uploaded to a repository within six months (Green)

⁴⁶ The British Heart Foundation and the Arthritis Research Campaign will provide funds but CRUK did not at the time of writing although the policy is under review

- hybrid journals under which authors can pay a fee for their article to become OA, (while access to other articles requires a subscription); such articles may be uploaded to a repository within 6 months.
- 6.11 One of the key elements of this scenario is that pay-to-publish costs are met by the research funders. This is important because it will give publishers confidence that the OA business model can be sustainable. Our understanding is that the costs of producing OA and subscription journals are broadly similar⁴⁷ and if this is the case we would expect the strengthened mandate to promote the conversion of subscription journals to OA (Green or Gold) as researchers demand OA channels and also have access to funds to cover publishing charges. Under this scenario, we would expect similar responses from commercial publishers and learned societies. Many consultees suggested that the reluctance of (some) learned societies to adopt OA business models reflected uncertainties as to whether sufficient revenues could be generated to at least cover costs, but a commitment by funders would do much to overcome this uncertainty.
- 6.12 In practice, we would expect the main movement to be towards Gold rather than Green open access. This is mainly because the Gold route gives greater certainty over revenue streams. It seems unlikely that hybrid journals would be sustainable over the longer term, at least as a significant source of articles. If researchers have access to funds for pay-to-publish then they are likely to opt for the Gold or possibly Green routes (assuming the journals are of required quality) since this will guarantee as wide a readership as possible at no additional costs to the researcher or their institution.
- 6.13 We would also note that the scenario could also provide new commercial opportunities for both commercial publishers and learned societies. If (virtually) all articles are placed quickly in repositories under licenses which permit their reuse then there is enhanced potential to produce review journals, or more accurately catalogues of articles, which may be sold. However, we have no information on the potential revenues which might be so generated.
- 6.14 There is uncertainty as to whether either Green or Gold OA is likely to predominate but we think the latter is more likely. The Green route enables publishers to generate revenues because early access to results is important and libraries are therefore willing to pay a subscription. The importance of this factor varies between disciplines; in the life sciences, for example, we have been told that immediate access is required; in other subjects, for example law and humanities, articles can have a value for several years and certainly much longer than six months. We might therefore expect differences between disciplines to emerge but some publishers we have consulted have stated a general preference for Gold as a more viable business model. Given the availability of funds to support pay-to-publish we think it likely that this would become the norm. Institutional repositories, at least, would also contain the articles and pre-prints and other methods used by different disciplines are likely to continue.

⁴⁷ Costs are saved on maintaining subscriptions but additional costs will be incurred through collecting pay-to-publish charges.

Transition phase

6.15 It seems unlikely that a WT-type mandate would be adopted simultaneously by funding bodies internationally. Many look favourably on OA but there are also many policy statements which ‘encourage’ rather than mandate and which do not provide funding to support OA. However, we would speculate that it could be possible to coordinate approaches between UK, US and EU funding bodies. This would account for a significant proportion of global research funding and would be sufficient to kick-start a transition to OA. We assume that any change in policies would be announced sometime in advance and given the time between new projects starting and articles emerging there could be at least three years between the announcement of policy changes and their effect. This should be sufficient for publishers to consider their responses and also for institutions to design funding frameworks in cases where pay-to-publish charges would not be covered by project funders.

6.16 Under these circumstances we would expect a smooth transition encompassing:

- market research by publishers and decisions on Green and Gold routes for selected journals
- the initial conversion of some subscription journals to hybrid form in order to comply with the mandate and to further test the market. However, over the longer term we would expect hybrid journals to disappear as Gold OA becomes established amongst researchers and libraries become unwilling to pay subscriptions as there is a growing volume of high quality articles with free access
- where pay-to-publish routes are adopted, an increasing recognition within the research communities that these journals are high quality (and high impact)
- increased propensity on the part of researchers whose funders have not introduced the mandate to publish in these high impact journals resulting in pressure on those funding bodies to provide financial support where required
- over time, the establishment of OA models as the norm for the majority of disciplines. As mentioned above, we would speculate that the Gold route will predominate because of publishers’ preferences.

Impacts on scholarly communication

6.17 The main impacts on the research community are likely to be:

- wider access to articles, since library budgets are a constraint in some institutions (but probably less so in the research intensive HEIs).
- easier access to papers via repository searches and access, although version control issues may remain

6.18 This enhanced access may come at a cost to the UK science budget because the UK produces a relatively high share of articles. However, the RIN study estimated additional costs of around £100m to the UK from a (90%) OA system. This is approximately 2% of research

council and HE funding council expenditure on research. There would, however, be a redistribution of payments:

- research intensive institutions would contribute relatively more to costs, but under a system of project funders meeting costs the increase is likely to be very small
- non-academic organisations currently contribute around 17% of subscriptions (RIN) but publish significantly less. They, and in particular large corporates, would therefore gain at the expense of the research community.

6.19 Research users outside the science base would also have wider and no-cost access. However, as was discussed in [NBSQW] there is no hard evidence to indicate that this would represent a significant benefit.

Business as Usual

Introduction

6.20 We interpret this as reflecting the current situation which so far as the research councils are concerned encompasses:

- a general commitment to the principles of the RCUK statement
- a willingness to contribute to the costs associated with OA publication (Green Gold or hybrid) either through direct costs if they are incurred during the lifetime of the project or through fEC
- variations in the strength of the mandate between councils ranging from insistence that articles are made freely available within a specified time period to freedom for the researcher to decide on where, and how, to publish
- variations from identification of specific repositories to freedom for the researcher to decide.

6.21 In addition, we assume there will be no radical changes in the policies of foreign-based funders. If there was to be a movement towards the previous scenario, especially in the US, then we believe that OA journals would become increasingly important globally in major disciplines and that UK researchers would increasingly wish to publish via these channels. The result would be pressure on the research councils to provide financial support and 'business as usual' would not be tenable over the longer term.

6.22 Similarly, we would not expect major changes in the policies of other research funders (government, charities and HE funding councils). BERR and DIUS, which could be most influential in this respect, consider the present mandates represent an important move towards improving access to research outputs and are mindful that there might be risks to the current scholarly communication process in moving further towards OA. This is not, however, intended to imply that they would not consider seriously the benefits, and risks, of strengthened mandates

6.23 This scenario is therefore largely concerned with a continuation of existing trends, but with divergences between disciplines. In part reflecting differences in the strength of mandates, but also historical differences between disciplines in the extent to which they have embraced Open Access. Our main findings with respect to recent trends are:

- an increased volume of OA publications over recent years (Green, Gold and hybrid)
- significant differences between disciplines (and sub-disciplines). These reflect differences in research practices and modes of scholarly communication rather than differences in mandates which have been introduced too recently to have noticeable impacts in most cases
- increases in the number of institutional repositories; 95% of respondents to the institutional survey had, or intended to, establish a repository or policies towards self-archiving
- limited awareness amongst researcher of polices, institutional and research council⁴⁸, towards OA. Seventy-five per cent of to the researcher survey were unaware of their institutions' policies
- limited awareness of funding sources for OA publication; Half of respondents to the researcher survey were not aware of potential funding sources
- amongst those which had considered OA publication, the chief reason for not taking this route is a perception that such journals are of poor quality, with low impact factors, and that they will be given lower ratings in the RAE (and the REF in the future) The main driver for considering OA publication is pressure from co authors (30% of respondents) and the most important reason for choosing this route (75% of respondents) is a perception that articles will be quickly available and widely accessible.

Impacts on researchers

6.24 We believe that there would be significant differences between subject areas. As has been mentioned several times in this report, there are currently differences between disciplines in their attitudes towards, and use, of open access channels. These tend to be mirrored in the current mandates with, for example the MRC taking the strongest line, and we assume this would continue under this scenario. Under these circumstances we would expect a generally increasing propensity to use OA routes as:

- OA journals become more established and some are recognised widely as high quality and high impact. This would be especially true of those disciplines where the mandate was strongest, but we would also expect OA journals to increase in importance in other fields, not least because of the demonstration effects provided by the fastest moving disciplines

⁴⁸ It is possible that the low levels of awareness of research council polices reflect respondents not having applied for grants since the statements were introduced. The limited awareness of institutional policies is, however, more surprising.

- more individuals with a high profile in their subject area opt for OA for a variety of reasons (including self-commitment to free dissemination). This reinforces the previous point and is important as a demonstrator and in spreading awareness. We do not have any hard evidence, but we would speculate that some disciplines, especially bio medicine, are close to a ‘tipping’ point where OA becomes the norm
- institutional repositories expand in number as HEIs wish to publicise and monitor their research. Policies are progressively introduced and enforced to mandate self archiving in institutional or thematic repositories. The increase in repositories increases awareness of their strengths and weaknesses within research communities and helps to establish the infrastructure for Green OA
- there is no evidence so far that libraries are cutting subscriptions because of OA but eventually savings should arise and this will free up resources which could support open access routes. However, as is discussed below, there is no guarantee that these will be redirected towards pay-to-publish models.

6.25 However, there will also be some inhibiting factors, the most important of which is likely to be securing funds for pay-to-publish journals. Although these costs will be covered through fEC it will require researchers to obtain funding from their institutions, at least for publications after the project is completed, or negotiate agreements for Green OA which is even more onerous. The survey indicated that very few institutions have, as yet, established payment systems and even where these do exist there is limited awareness amongst researchers. As such the traditional subscription journal will always be an attractive option where this is permitted by the mandate,

There will be significant differences between subject areas reflecting the strength of the mandate. Developments are likely to be fastest in the medical area reflecting recent history, the MRC (and Wellcome) mandates and the well established PMC. Developments are likely to be slower in the arts and humanities, in part reflecting the lower profile of journal articles as a research output.

Impacts on publishers

- 6.26 This scenario is more complicated than the previous because there is no direct link between financial support for OA publications and actual publications. Comparatively few articles will be published during the lifetime of a project and institutions will need to recover costs through fEC and distribute these to academics who are publishing. Publishers will therefore be less confident that Gold OA routes are viable but, as was mentioned above, there are also concerns over the viability of Green routes at least amongst some publishers.
- 6.27 This applies particularly to learned societies, some of which will find it more difficult to adapt to a new business model than commercial organisations.
- 6.28 Outcomes are likely to include:
- subscription journals continue as the norm in some disciplines where this is permitted by the mandate

- hybrids become more prevalent as publishers seek low risk options which nevertheless enable researchers to meet research council mandates
 - Open access journals continue and establish a niche in a limited number of disciplines, based largely on the impact factors of the journals.
- 6.29 The development of institutional repositories enhances their usefulness to researchers and encourages researchers to self-archive because of the wide exposure their work may have. Their may therefore be increased pressure from research communities to adopt the Green route. However, some publishers will resist embargo periods of less than six months and in some cases will require longer. If the research council(s) are not prepared to accept a longer embargo period then Gold is the only way that of ensuring compliance with mandates.
- 6.30 We would note that there may be scope for new OA Gold journals to emerge where existing journals are slow to adapt to research council mandates and researcher requirements. In particular, is may be feasible for groups of academics to launch Gold journals with out any pay-to-publish journals. These already account for a significant share of OA publications and if there are no charges for publication then they will avoid a significant administrative cost. It would, however, depend on senior academics devoting their time freely to the journal and the availability of administrative support from their HEIs.

Impacts on scholarly communication

- 6.31 The final outcome is likely to be complex involving a mix of publishing mechanisms and funding methods. The development of OA will be significantly slower than under the previous scenario but will no doubt increase, driven by cultural factors as well as the mandates. The benefits would mirror those under the previous scenario but would be smaller in magnitude, and take longer to realise.

A majority of major world-wide funders start to remove mandates

- 6.32 The key consideration under this scenario is whether project funders, either through fEC or through direct funding, would continue to provide financial support for pay-to-publish models. If the mandate was withdrawn then this would imply limited or no interest in OA and we assume funding would also be withdrawn. If this did occur on a global scale then we believe that it would reverse the trends outlined in the first scenario. There would still be an interest in some disciplines in open access dissemination, but quality of journal be the dominant consideration and unless researchers have the funding to cover costs, OA journals are unlikely to increase substantially. Some OA Gold journals which do not charge for publication would continue, but given the costs of production we think it unlikely that they would increase substantially their share of the market.
- 6.33 We would also note that withdrawal of the mandate would be a powerful signal that research funders do not attach much importance to OA. It seems likely that this would discourage researchers which may have been considering OA publication routes from taking it seriously. It would also send a signal to publishers that it would be difficult to generate revenues from Gold OA business models.

- 6.34 Institutional mandates for repositories may still become more widespread as a tool for presenting research outputs. However, they would contain less peer reviewed material and would therefore become less useful to many researchers.
- 6.35 We believe that this scenario could reverse many of the trends underway at present and the impacts would therefore be the reverse of under the first scenario.

7: Conclusions

Introduction

- 7.1 This chapter briefly summarises the key conclusions from the study. The scholarly communications landscape is complex and fast moving and gaps in the evidence base remain, so we have not sought to make projections, in any detail, of where the system will move to nor how quickly. Nevertheless, we have confidence in stating some broad conclusions from our research.

Trends

- 7.2 There is undoubtedly a trend towards increased acceptance and use of OA amongst the UK research community. In the main this reflects global developments rather than resulting from the RCUK policy statement more directly. Our survey, in fact, suggested limited awareness of the statement and council mandates, but this may reflect the possibility that many respondents had not applied for funding since the mandates were introduced. The trends instead reflect:

- globally, encouragement from research funders for results to be made freely available, although the introduction of mandates has, in most cases been more recent
- researcher attitudes - in some subject areas open access is now considered the preferred method of publication, if not yet the norm
- the wider availability of options for OA publication, not least because of responses from publishers. The number of OA (Gold) journals has increased and Green access is now relatively common. This has also been accompanied, and stimulated, by the growth of institutional and subject repositories.

- 7.3 We expect these trends to continue as awareness spreads within research communities and more HEIs adopt policies towards institutional repositories and self-archiving. We would note, however, that there are substantial differences between subject areas in this respect.

- 7.4 The main obstacles to continued expansion are:

- a perception amongst many disciplines that OA journals lack impact and, in some cases, are prepared to accept poor quality submissions
- limited awareness amongst researchers of funding sources for pay-to-publish models so that the traditional subscription journal is often the most convenient route to publication. There are, however, examples of HEIs developing new models for providing funds
- non-compliance with institutional policies which mandate self-archiving in institutional repositories – often associated with a lack of awareness of such policies rather than wilful defiance.

Impacts on the UK

7.5 The underlying rationale for OA is that use of codified knowledge by one individual does not prevent use by another. A socially optimum allocation of resources requires it be made available at marginal cost which, given on-line access, is virtually zero. More specifically OA has enabled:

- research outputs to be accessed by a wider academic constituency, for which subscriptions would otherwise be a constraint. We have no evidence to suggest that staff in research intensive universities currently experience widespread difficulties in this respect, but library budgets are restricted across the sector as a whole
- wider access by the non-academic community of users, although it is unclear whether this is a substantial benefit in practice
- quicker (free) availability of research results under Gold OA
- more efficient searching, and therefore research, in at least some disciplines.

7.6 The costs of scholarly communication, notably quality control, are, however, still incurred. A recent study sponsored by RIN estimated that there would be a net cost to the UK of a movement to a pay-to-publish model which we estimate to be around 2% of the research and HE funding councils research budgets. This arises from the high relative productivity of UK researchers reflected in their propensity to publish.

Risks

7.7 The point has been made that the current scholarly communication system is largely fit-for-purpose in that it meets the needs of researchers in disseminating quality controlled research outputs. The eventual outcome of a move to OA is uncertain, but our general conclusion is that there is no inherent reason why such a movement should jeopardise the position of existing publishers to the detriment of the academic community; especially under a funded system of Gold publications. The two caveats we would make are:

- learned societies may find it difficult to adapt to a new business model. At present, many subsidise activities which are integral to scholarly communication from their publishing activities and this may be threatened
- probably of less significance, new OA Gold journals could arise supported by charitable donations and/or academic good will and time. These might compete with existing publishers but prove unsustainable over the longer term.