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**TOWARDS OPEN ACCESS:
MANAGERIAL, TECHNICAL, ECONOMIC AND CULTURAL
ASPECTS OF IMPROVING ACCESS TO RESEARCH
OUTPUTS FROM THE PERSPECTIVE OF A LIBRARY AND
INFORMATION SERVICES PROVIDER IN A RESEARCH
UNIVERSITY**

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**Published works submitted to the University of Nottingham
for the degree of Doctor of Philosophy**

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Abstract

For academic research to release its value, it has to be communicated. It is essential, if research is to flourish, that the various forms of research communication, including journal articles and similar research outputs, are as easily and widely available as possible. The publications in this submission, produced between 1998 and 2010, all discuss major aspects (managerial, technical, economic and cultural) of improving access to research outputs in order to support research activity in higher education institutions. The later works focus in particular on the issue of ‘open access’ (OA) publishing and dissemination.

The publications investigate the *why* and *how* of OA. Firstly, they examine the potential benefits (and dis-benefits) of OA for the research community and other stakeholders. Secondly, they discuss how OA systems and services might operate in practice. The earlier works on OA focus on repositories, particularly institutional repositories. Some of the later publications bring into consideration OA journals and their (potential) ongoing relationship with repositories.

The publications are written from the perspective of a library and information services provider in a research university. They report on ground-breaking action-based research-and-development work: setting up innovative demonstrator systems, developing new business processes, and designing novel organisational policies. Possible future scenarios are modelled and analysed. It is shown that these activities have made a significant impact on wider professional practice, as well as contributing to the research literature, as OA has become more mainstream.

Major themes discussed include managerial challenges associated with implementing OA services; technical issues relating to the development of systems and standards; economic factors covering costs, funding streams and business models; and cultural issues, including disciplinary differences. These are examined in relation to different stakeholder groups at institutional, national and system-wide levels. Other key themes include intellectual property rights and quality assurance. A clearer picture of possible research-communication futures incorporating OA is developed.

Acknowledgements

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including the European Union, Open Society Institute, Research Libraries UK, SPARC Europe and the Wellcome Trust.

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I should also like to give my particular thanks to all of my fellow authors in these publications. Without exception, they have been a pleasure to work with.

I am also indebted to a number of open access advocates for their work in compiling OA-related resources. In particular, the bibliographies of Charles W. Bailey Jr and reports of Prof Peter Suber have been useful.

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1. List of Submitted Published Works

1.1 On Open Access

1.1.1 Overviews

1. Pinfield, S. (2004). What do universities want from publishing? *Learned Publishing*, 17 (4), 305-311. <http://dx.doi.org/10.1087/0953151042321626>.
2. Pinfield, S. (2005). Self archiving publications. In G.E. Gorman and F. Rowland (eds.), *Scholarly Publishing in an Electronic Era: International Yearbook of Library and Information Management 2004-2005* (pp. 118-145). London: Facet Publishing. E-print <http://eprints.nottingham.ac.uk/142/>.

1.1.2 Open Access Research and Development

3. Pinfield, S. (2001). How do physicists use an e-print archive? Implications for institutional e-print services. *D-Lib Magazine*, 7 (12). <http://www.dlib.org/dlib/december01/pinfield/12pinfield.html>.
4. Pinfield, S., Gardner, M. and MacColl, J. (2002). Setting up an institutional e-print archive. *Ariadne*, 31. <http://www.ariadne.ac.uk/issue31/eprint-archives/>.
5. Pinfield, S. (2003). Open archives and UK institutions: an overview. *D-Lib Magazine*, 9 (3). <http://www.dlib.org/dlib/march03/pinfield/03pinfield.html>.

6. Pinfield, S. and James, H. (2003). The digital preservation of e-prints. D-Lib Magazine, 9 (9).
<http://www.dlib.org/dlib/september03/pinfield/09pinfield.html>.

7. James, H., Ruusalepp, R., Anderson, S. and Pinfield, S. (2003). Feasibility and Requirements Study on Preservation of E-Prints. Joint Information Systems Committee. http://www.jisc.ac.uk/uploaded_documents/e-prints_report_final.pdf.

8. Pinfield, S. and Hubbard, B. (2004). Free for All? Science and Technology – Tenth Report, HC 399-II. Appendix 51: Memorandum from Hallward Library, University of Nottingham, SHERPA project.
<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsstech/399/399we62.htm>; Appendix 143: Supplementary memorandum from Hallward Library, University of Nottingham, SHERPA project.
<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsstech/399/399we173.htm>; House of Commons Select Committee on Science and Technology – Fourteenth Report, HC 1200, Appendix 4: Response from Securing a Hybrid Environment for Research Preservation and Access (SHERPA) project.
<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsstech/1200/120002.htm>.

9. Pinfield, S. (2005). A mandate to self archive? The role of open access institutional repositories. *Serials*, 18 (1), 30-34.
<http://dx.doi.org/10.1629/1830>.
10. Pinfield, S. (2006). A Wel(l)come development: research funders and open access. *Learned Publishing*, 19 (3), 219-225.
<http://dx.doi.org/10.1087/095315106777877548>.
11. Pinfield, S. (2007). Libraries and open access: the implications of open-access publishing and dissemination for libraries in higher education institutions. In R.A. Earnshaw and J.A.Vince (eds.), *Digital Convergence – Libraries of the Future* (pp. 119-134). New York: Springer. E-print
<http://eprints.nottingham.ac.uk/697/>.
12. Pinfield, S. (2007). Can open access repositories and peer-reviewed journals coexist? *Serials*, 20 (3), 163-171. <http://dx.doi.org/10.1629/20163>.
13. Pinfield, S. (2009). Journals and repositories: an evolving relationship? *Learned Publishing*, 22 (33), 165-175. <http://dx.doi.org/10.1087/2009302>.
14. Pinfield, S. (2010). Paying for open access? Institutional funding streams and OA publication charges. *Learned Publishing*, 23 (1), 39-52.
<http://dx.doi.org/10.1087/20100108>.

1.2 On Improved Access

15. Pinfield, S. (1998). The use of BIDS ISI in a research university: a case study of the University of Birmingham. *Program*, 32 (3), 225-240.
16. Dalton, P., Hampson, A., Nankivell, C. and Pinfield, S. (1998). The hybrid library and university strategy: a consultative exercise with senior university managers. *New Review of Information and Library Research*, 4, 43-52.
17. Pinfield, S. (1999). The hybrid library: a view from the UK. *Bücher, Bytes und Bibliotheken: Integrierte Information im Internet*, Proceedings of the conference at Carl von Ossietzky University Oldenburg, Germany, 3-6 March 1999 (pp. 55-63). Dortmund: Universitätsbibliothek Dortmund. E-print <http://eprints.nottingham.ac.uk/5/0/InetBib.pdf>.
18. Pinfield, S. and Hampson, A. (1999). Partnership and customer service in the hybrid library. *New Review of Information and Library Research*, 5, 107-119.
19. Pinfield, S. (2001). The relationship between national and institutional electronic library developments in the UK: an overview. *New Review of Academic Librarianship*, 6, 3-20. Revised version published in T.V. Ershova. and Y.E. Hohlov. (eds.) *Libraries in the Information Society* (pp. 134-148). Munich: K.G. Saur, 2002. IFLA Publications 102.

20. Pinfield, S. (2001). The changing role of subject librarians in academic libraries. *Journal of Librarianship and Information Science*, 33 (1), 32-38.
Pre-print <http://eprints.nottingham.ac.uk/33/>.

21. Pinfield, S. (2001). Managing electronic library services: current issues in UK higher education institutions. *Ariadne*, 29.
<http://www.ariadne.ac.uk/issue29/pinfield>.

22. Pinfield, S. (2004). eLib in retrospect: a national strategy for digital library development in the 1990s. In J. Andrews and D. Law (eds.) *Digital Libraries: Policy, Planning and Practice* (pp. 19-34). Aldershot: Ashgate. E-print
<http://eprints.nottingham.ac.uk/131/>.

2. Extended Abstract

2.1 Introduction

In order for academic research to release its value, it has to be communicated. Those communications may take a number of different forms, but whatever form they take, it is essential, if research is to flourish, that the outputs of research are as easily and widely available as possible. The published works in this submission all discuss major aspects (managerial, technical, economic and cultural) of improving access to research outputs in order to support research activity in universities and other research-based institutions. The later works focus in particular on the issue of ‘open access’ (OA) publishing and dissemination.

OA has the potential to make research communication more efficient and effective. The published works in this submission help to clarify and test that potential. In doing so they break new ground, reporting on research-and-development work to set up innovative demonstrator systems, develop new business processes, and design novel organisational policies. All these activities were designed to examine the rationale for OA and to model what OA systems and services might look like in the future.

The aim of improving research communication is an important one both for the research community and more widely. As far as the research community is concerned, improved research *communication* potentially means improved *research*. Research progress is likely to be accelerated, interdisciplinary connections identified, and unnecessary duplication avoided as a consequence of an improved

communication system. There are also potential wider societal benefits. Enhanced knowledge transfer from the research community to the commercial sector, improved dissemination to the medical and social care professions, and a strengthened evidence base for policy makers are all possible benefits. The prospect of delivering greater value for money from research activity – another ostensive argument for OA – is also attractive to government, research funders and university managers alike, especially as most academic research is funded with public money.

The works in this submission discuss these issues from the perspective of a library and information services (LIS) provider within a research-intensive university. They were produced when the present author held various positions in the Information Services departments at the Universities of Birmingham and Nottingham. All of these roles involved work of different kinds to improve access to research information resources. From 2002 onwards, the responsibilities of the present author included Directorship of SHERPA (Securing a Hybrid Environment for Research Preservation and Access), a cluster of externally-funded projects carrying out research-and-development work in OA areas. SHERPA was subsumed within the Nottingham Centre for Research Communications in 2009, with Pinfield again as Director. Much of the work dating from 2002 onwards in this submission reports on and is informed by these activities and engages with the LIS community but also with the other stakeholders involved in scholarly communication and information services provision.

This submission is divided into several sections:

- Section 1 (above) presents a full list of the published works in this submission
- Section 2 (this section) is an extended abstract designed to introduce and contextualise the published works
- Section 3 is a bibliography of key works in the field and list of the abbreviations used
- Section 4 provides a statement regarding the responsibility of each of the authors in the jointly-authored published works
- Section 5 presents the published works themselves

Section 2, the extended abstract, is divided into a number of parts:

- 2.1 (this part) is a general introduction to the submission as a whole
- 2.2 provides an overview of key concepts and terminology in the field
- 2.3 surveys major OA developments seen particularly through the professional literature and puts the submitted published works on OA into context
- 2.4 summarises the methodological approaches adopted in the published works
- 2.5 highlights the major themes emerging from the published works
- 2.6 outlines the contribution made by the published works to the literature and to OA developments
- 2.7 looks at the background to the works on OA by providing a brief survey of the other works in this submission, on ‘improved access’
- 2.8 discusses possible future developments and research areas that need to be further investigated

Following the bibliography and list of abbreviations, and the statement of joint authorship, the published works themselves are presented in two major groups:

- ‘On Open Access’
- ‘On Improved Access’

The publications ‘On Open Access’ present research-and-development work focusing on OA publishing and dissemination. They are introduced by two general works which provide a broad perspective on the field, and are followed by the main body of works presented in chronological order, from 2001 onwards. The publications ‘On Improved Access’ date for the most part before 2001, and present selected work by the present author about ways of improving access to the research resources. In many cases, they focus on similar themes to the works on OA, covering related technological developments, managerial issues and cultural challenges later developed in the works on OA.

2.2 Key Concepts and Terminology

The published works on OA which follow make use of a number of key concepts which have emerged and evolved in recent years. This section is designed to provide a brief commentary on the terminology in the field and its development. The concepts discussed include:

- ‘scholarly communication’
- ‘publishing’
- ‘research outputs’
- ‘journals’
- ‘open access’
- ‘open archives’
- ‘repository’
- ‘e-prints’ (‘preprints’ and ‘postprints’)
- ‘self archiving’
- ‘institutional repository’
- ‘author pays’
- ‘hybrid journals’

The terminology in this (or any) field is not static. The published works in this submission themselves reflect shifts in the semantics of the field, an early example of which is in fact the term ‘open access’ itself. This term was not commonly used until about 2002 to 2003, and does not therefore appear in the earliest work on OA in this submission, Pinfield (2001d).

The broad field in which all of the works on OA are located is often referred to as **‘scholarly communication’**. ‘Scholarly communication’ is defined by Borgman (1990, 13-14) as “how scholars in any field...use and disseminate information through formal and informal channels.” As such, it includes a wide range of activities. The definition adopted by SPARC (the Scholarly Publishing and Academic Resources Coalition), which is equally wide-ranging, provides further detail: “Scholarly Communication refers to the formal and informal processes by which the research and scholarship of academic staff, researchers, and independent scholars are created, evaluated, edited, formatted, distributed, organised, made accessible, archived, used, and transformed” (SPARC Europe, 2003; quoted by Jubb, 2008, 39).¹ Defined in these terms, scholarly communication (also called ‘research communication’) is a crucial component of the research process. Research results need to be recorded and placed in the public domain so that they can be read, used and cited by other researchers (and also consulted by other appropriate user groups).

One major form of scholarly communication is scholarly **‘publishing’**. At its most general, ‘publishing’ may simply mean ‘to make public’ or ‘place in the public domain’ and therefore encompasses a broad range of activities. However, the word is often used more specifically in a scholarly context to describe content which is formally produced either in printed or electronic form having been through quality-control processes, such as peer review and editing, and which is made available in a definitive way so that it can be unambiguously identified, cited and quoted (see Halliday, 2001). Many contributors to the literature refer only to these sorts of

¹ This definition was adopted by the Scholarly Communications Group of CURL (the Consortium of University Research Libraries) and SCONUL (the Society of College, National and University Libraries), under the chairmanship of the present author, to define its remit, and subsequently used as a working definition for a number of professional activities in the UK.

outputs as ‘published’, distinguishing them from more informally ‘disseminated’ content. In a number of the published works in this submission, the former category is often referred to as ‘formal publication’ to distinguish it from other forms of ‘dissemination’. Generically, these various ways of reporting research results are sometimes referred to as ‘**research outputs**’. Research outputs may take the form of formal publications, including monographs, journal articles, conference proceedings and book chapters, as well as more informal communications, such as reports and blogs.

Graham (2000, 3-4) provides a description of scholarly communication which involves a number of stages and includes a variety of outputs: some “formally published”, others using more informal channels of “dissemination”:

“It is based on three processes. The first is that of informal networks, which often start locally and gradually move outwards to be international – the old ‘invisible college’ concept. Now this is handled via e-mail, listservs, web archives, etc. Secondly, there is the initial public dissemination of research, which may take place, e.g. at conferences or via preprints. Finally, the research may be formally published in, it is hoped, prestigious journals. The Internet is now an overarching element to all three, since it may provide the transport for all of these.”

The various processes of scholarly communication and the range of outputs produced may not always be as distinct as this definition implies, but it is, nevertheless, a useful starting point for thinking about different aspects of scholarly communication. It makes the important point that the Internet is now the delivery mechanism for many of these forms of research outputs. The Internet creates an

environment where new business models can develop and also where greater fluidity around the outputs being produced can evolve. Online delivery, more than anything else, has meant that many of the previously distinct categories of output are becoming increasingly blurred in contemporary scholarly communication (something which has continued since Graham's analysis was published). Many of the published works in this submission touch on this important issue.

Nevertheless, formal publication remains a critical part of scholarly communication occurring most commonly in peer-reviewed journals. Pinfield (2009, 166) provides a working definition of '**journals**' and a description of their key features:

“A journal may be defined as a type of publication containing a cumulative collection of quality-assured articles, normally within a particular subject area, added to at regular or irregular intervals under a single ongoing title. Within the research community, the quality assurance component of this definition is particularly important. Quality assurance, typically through peer review, is an essential feature of scholarly communication which is valued by researchers as a means of improving the research outputs of authors and also as a filtering and timesaving mechanism for readers. The frequency of publication of journals varies, with some electronic journals now making articles available as soon as they are ready (whether or not they are retrospectively grouped into an issue). But, however often it is published, the fact that a journal has a single ongoing title is important, not least because it allows the journal to act as a brand. Researchers within particular subject communities recognize and trust certain journal brands. Publishing in a

certain journal might be, for example, an important ‘esteem indicator’ in a given subject community.”

Reference to “esteem” here points to a crucial fact about research journal publishing: it is royalty-free. Authors do not receive any direct income from their publications, rather they are motivated to publish to achieve (amongst other things) visibility, to make an impact in their disciplinary field and beyond. This key fact underlies many of the discussions on cultures of communication and publishing business models which have taken place in the scholarly communication field over the last decade.

Traditional journal publishing is based on business models which limit access to content to paying customers only. Customers may either purchase copies of physical journal issues, normally by subscription, or rent access to electronic content, normally in the form of a site licence. Other business models include purchase of physical copies of individual articles (‘offprints’) or electronic pay-per-view access. What these models have in common is the process of charging the readers of content (or their proxies) before the content can be consumed. Typically in academic institutions, libraries purchase or rent access to content on behalf of their users by paying an annual subscription fee. In this case, access is normally limited to members of the institution only.

Many of the publications in this submission investigate the alternative approach of ‘open access’ and the associated business and funding models. **‘Open Access’ (OA)** may be defined in the following way: where content is fully, freely, immediately and permanently available and can be accessed and reused in an unrestricted way (based on Pinfield, 2009, 166). The “content” referred to in this definition may be in a

number of different formats, including text, data, and rich media (such as video). This content is “*fully... available*”, meaning that the content is accessible in its entirety rather than in a partial form (in the case of a journal article, for example, this would mean the full text is available and not just an abstract). It is also “*freely... available*”, meaning that there are no costs charged at the point of access (although costs are of course incurred in generating and disseminating the content). The content is also “*immediately... available*”, meaning there are no formal delays or embargos on its availability. It is also “*permanently... available*”, meaning it is available on an ongoing basis so that it can be accessed and cited (usually involving a commitment to maintaining persistent access paths as well as preservation of the content itself). The content may not only be “*accessed*” but also “*reused* in an unrestricted way”. “Access” to the content allows it to be read (by humans) and “reuse” of content allows it to be mined, processed, analysed, indexed and re-distributed (often by machines).

The definition of open access provided as part of the Budapest Open Access Initiative (BOAI, 2002) emphasises this second aspect of OA, reuse, as well as straightforward access:

“By ‘open access’ to this [research] literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain,

should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.”

Suber (2008) uses two terms to distinguish these different aspects of OA: “Gratis open access” and “Libre open access”. “Gratis” OA is used “for the removal of price barriers alone”, where access itself is free of charge. “Libre” OA is used “for the removal of price and at least some permission barriers”, allowing extensive reuse of content. These definitions represent a growing sophistication of the concept of OA which has taken place in recent years, and in particular, a growing awareness of the value not only of making content free at the point of access but also allowing it to be reused (see, for example, MacCallum, 2007). A number of the publications in this submission provide evidence of this development with a greater emphasis on the removal of permission barriers coming to complement the removal of price barriers.

The term ‘open access’ itself only achieved common currency around 2002 and 2003 with developments such as the Budapest Open Access Initiative (February, 2002), along with the Bethesda Statement on Open Access Publishing (June, 2003) and Berlin Declaration on Open Access Publishing (October, 2003), both major statements of support for OA by research funders. Before then, a number of terms were in common use, including “free online scholarship” (Suber, 2003) or “free access” (Walker, 2001), as well as “open access”. The term “open archives” was also commonly used around this time although this created some significant ambiguities in the field which needed to be clarified (a number of the early submitted published works on OA which follow, such as Pinfield, 2003a, attempt to do so).

The term “**open archives**” was closely linked to the Open Archives Initiative (OAI) which was launched in 2000 to create open interoperability standards to facilitate the transfer of data. It created the Open Archives Initiative Protocol for Metadata Harvesting (OAI PMH). Although the OAI PMH is the technical underpinning for many OA systems, it can in fact be used as a convenient data transport mechanism in a closed-access environment as much as an open one. The openness referred to in its title is therefore one strictly speaking of systemic rather than content openness. Nevertheless, the development of the OAI PMH always remained closely linked to the early development of OA itself and the implementation of a growing number of OA repositories which were OAI-compliant (and therefore sometimes referred to as “open archives”) during the period covered by the publications in this submission represented significant progress in the OA movement.

Some confusion amongst practitioners in the early 2000s was undoubtedly caused by the similar terminology and acronyms associated with different developments: the Budapest Open Access Initiative (BOAI), the Open Archives Initiative (OAI), plus the Open Archival Information System (OAIS), a digital preservation framework. Of these, only the BOAI was *necessarily* connected with OA, but both the OAI and OAIS were also in practice often closely linked with OA systems (but could also be used in other ways). Some of the earlier published works in this submission attempt to explain some of the distinctions as well as connections between these initiatives.

The BOAI was one of the first documents to define explicitly two routes to OA. These were characterised as firstly, “open electronic archives” and secondly, “open-access journals”. These two routes have become known as the ‘green’ and ‘gold’

routes respectively (see, for example, Harnad et al., 2004). Both require further explanation.

The first, “open electronic archives”, are now often referred to as OA ‘repositories’. The term ‘**repository**’ is favoured by many practitioners and contributors to the literature since ‘archive’ carries with it the implication of proactive and systematic curation and preservation, which may not always be appropriate for OA repositories.

“A repository may be defined as a set of systems and services which facilitates the ingest, storage, management, retrieval, display, and reuse of digital objects. Repositories may be set up by institutions, subject communities, research funders, or other groups. They may provide access to a variety of digital objects, including peer-reviewed journal articles, book chapters, theses, datasets, learning objects, or rich media files.” (Pinfield, 2009, 165).

This definition reflects a growing interest in the literature and in professional practice in the use of OA repositories for a wider set of digital files associated with both research and teaching activities in universities. However, until recently, much of the debate associated with OA repositories has focused on research outputs, particularly so-called ‘e-prints’.

‘E-prints’ (a term which obviously derives from the analogy of “offprints”) may be defined as:

“...electronic copies of research articles or similar outputs. An e-print may take the form of a ‘preprint’, a version of a paper prior to peer review, recently designated by NISO [the National Information Standards

Organization] as the ‘author’s original’ or ‘submitted manuscript under review’. Alternatively, it may be a ‘postprint’, a version of a paper in which changes have been made in response to peer-reviewers’ comments, either in the form of the ‘accepted manuscript’ produced by the author or the ‘version of record’ produced by the publisher (using the NISO terminology). Such material may be deposited in the repository in a variety of ways, but one common characteristic of repositories is a workflow that allows authors to deposit their content themselves (known as ‘self-archiving’).” (Pinfield 2009, 165-166; see also, NISO, 2008).

The term ‘**self-archiving**’ is then closely associated with OA repositories and the two labels are sometimes used interchangeably to describe ‘green’ OA. For example, in the text of the BOAI, the heading describing the ‘green’ OA route is “self-archiving”. Crow (2002, 12) describes ‘self-archiving’ as “...a broad term often applied to the electronic posting, without publisher mediation, of author-supplied research.” The term is still widely used. However, since the mid-2000s, a great deal of work associated with repositories has been about simplifying submission for authors by mediating deposit in repositories either by library or administrative staff in institutions taking on the role or, more recently, publishers themselves depositing articles (arrangements are now in place, for example for publisher deposit into the UK PubMed Central repository). In this case, strictly speaking, the term ‘*self-archiving*’ is too narrow to encompass all of the various methods of deposit into repositories, although some attempts have been made in the literature to retain the term in phrases such as “self-archiving by proxy” or “mediated self-archiving” (despite the somewhat oxymoronic implications of these phrases).

Along with the method of deposit, other key technical, managerial and cultural issues associated with OA e-prints repositories are the main focus of many of the published works in this submission (especially the earlier ones). They focus in particular on **‘institutional repositories’** (IRs), those created and managed by institutions such as HEIs in order to support, disseminate and preserve the outputs of their members. Other repositories, run by subject communities, for example, are also considered in the publications. The relationship between subject and institutional repositories is a theme picked up in a number of the works.

Some of the major issues associated with the other potential route to OA, **OA journals**, are also discussed in several of the submitted published works, particularly from an institutional perspective. OA journals usually retain the main characteristics of traditional scholarly journals, including peer-review, but also make the content available on OA. Some OA journals have become well known for innovative approaches to academic processes, such as peer review, or business processes, such as automated article submission workflows; but these are not *necessary* characteristics of OA journals. Innovation is, however, normally required with regard to business and funding models in order to replace the traditional models based on payment for access to content.

The most common alternative business model associated with OA journals involves the payment of ‘author-side’ charges, sometimes referred to as **‘author pays’** or ‘producer pays’. This is where a fee is paid by the author (or the author’s representative) before a paper is published in order to cover article processing costs

(such as peer review management and editing) so that the article can be made openly available when published without the necessity of subscription charges to recover publication costs. Charges are normally levied on a per-article basis or, allowing for bulk pre-payment, relate directly to the number of articles published. Several of the published works in this submission discuss the implications of this business model, particularly from an institutional perspective. Both OA repositories and OA journals in fact require new funding streams to be set up and managed within institutions and new policies and processes to be developed and maintained to support researchers making their work OA. These are discussed in the later works in this submission (particularly Pinfield, 2010).

From the mid-2000s, a number of mainstream journal publishers introduced a 'hybrid' OA business model. **'Hybrid journals'** are those which are sustained through subscription but which also make some articles available on OA on payment of a per-article fee. A number of the works in this submission analyse this business model and discuss the possibility of it being a transition mechanism to move publications from restricted to open access. In its current implementations, it is a model which often involves both OA journals and repositories since OA articles made available in journals are often also deposited in repositories (see Pinfield, 2009).

A major focus of several of the later publications in this submission is the relationship between the two routes to OA, repositories and journals. Although the BOAI describes the two routes as "complementary", much of the discussion during the past decade has assumed that they are distinct parallel tracks, alternatives rather

than complements. However, it has become clear recently that there is considerable potential for OA repositories and journals to interact and between them to form a coherent OA scholarly communication system. A number of different models and working exemplars of this have emerged and are examined in the later published works in this submission.

2.3 Open-Access Developments and Literature

The published works on open access in this submission were produced between 2001 and 2010, a period when OA was generating growing interest and gaining wider acceptance. The OA idea can, however, be traced back much further than this, although it may not have been called “open access” at the time. Peter Suber’s timeline on OA (now a community-maintained wiki as part of the Open Access Directory) begins in 1966 with the development of the US Educational Resources Information Center database. However, it was in the late 1980s and early 1990s that many of the important early recognisably-OA developments occurred. This period saw:

- The setting up of early OA journals, such as *Psycology*, the psychology journal which includes open peer commentary
- The establishment of OA repositories, such as arXiv, the high-energy physics repository

The published works in this submission were written in this context and have as much of their background the two routes to OA (represented by the two developments above) which were beginning to become clear in the early 2000s. Most of the earlier published works in this submission focus on OA repositories in particular, whilst the later ones also bring OA journals into the consideration.

The research-and-development activities reported in the publications were aimed at addressing two generic research questions:

- *What are the potential benefits (and dis-benefits) of open-access publishing and dissemination for the research community and other stakeholders?*
- *How can OA systems and services operate in practice?*

These questions cover the *why* and *how* of OA. They are not approached sequentially but rather are discussed in dynamic relation to each other. In the published works, the investigations of why OA may be beneficial and how it can be implemented interact with each other in a mutually-informing way, often through identifying learning outcomes from early systems deployments and process innovations.

The published works on OA are presented in section 5 in chronological order of publication apart from two articles which provide an overview of two key areas associated with the field; these are presented first:

- Pinfield (2004b) ‘What do universities want from publishing?’: an overview of the key requirements of different stakeholders in HEIs
- Pinfield (2005a) ‘Self-archiving publications’: a review of the past developments, current position and future possibilities of self-archiving in OA repositories

Many of the other published works discuss the issues raised in these two papers in more detail. The two papers are described here first as an introduction to all of the submitted works.

Pinfield (2004b) addresses the question:

What do HEIs want from research publishing in general, and in particular, do they want OA?

It identifies four major “wants” of universities:

- Impact
- Affordability

- Access
- Quality

In their capacity as producers of publications, universities want *impact*: they want the publications of their researchers to be read, used and cited by other researchers in the academic community (academic impact) and also want where possible their work to be used more widely (economic and societal impact). In their capacity as purchasers of publications, universities want *affordability*: they want a scholarly communication system that is sustainable as a whole. In their capacity as consumers of publications, universities want *access*: they want to be able to locate, read and use publications without unnecessary barriers. In their capacity as producers, purchasers *and* consumers, universities want *quality*: they want a system of publishing that includes robust quality control and well-understood quality markers. The argument put forward in the paper is that OA publishing and dissemination potentially addresses these major “wants” in some ways more adequately than traditional publishing.

The article was written in the context of a specific debate of the time around the question, ‘do *researchers* want open access?’ This debate took place in various fora involving different stakeholders organised at the time to discuss the major issues, such as conferences, or in online communication venues, such as e-mail discussion lists. Pinfield (2004b) was originally an invited presentation given at a conference organised by the Association of Learned and Professional Society Publishers (ALPSP) on ‘scholarship-friendly publishing’ and included papers from the perspective of various stakeholders in the scholarly-communication chain. At the time, a number of people sceptical about OA, some of whom were publishers, tended

to frame the key argument in terms of *authors'* requirements (hence the ALPSP commissioned report by Swan, 1999, *What authors want*), although others were taking a broader perspective (for example, Rowland, 2002, *What do users want?*). It was observed by some sceptics that 'authors do not want OA, because they are not *asking* for it'.

It is true to say that in 2004 the majority of researchers (whether in their capacity as authors or readers of publications) were not asking for OA. A minority were; and other stakeholders in HEIs, particularly librarians, were also beginning to do so (for the variety of views, see the *Nature* web debates of 2001 and 2004; Nature, 2001, 2004). However, Pinfield (2004b) makes the important point that "wants" can be of different kinds:

- 'Explicit' or 'stated' wants: requirements which are expressed and therefore often reflected in surveys and customer consultations
- 'Tacit' or 'implicit' wants: needs which are unexpressed and of which individuals may not necessarily be conscious themselves

Bearing in mind these definitions, the argument that OA is not required simply because authors are not *asking* for it is questionable, since OA may address tacit wants which have not yet become explicit. OA may have the potential to address many of the requirements of different stakeholders in universities (including the key 'wants' of impact, affordability, access, and quality), even if some stakeholders in universities are not currently asking for it. Across many sectors, innovative goods and services may not be explicitly demanded by potential customers before those products become available on the market, but are definitely wanted when they do. It takes vision and leadership on the part of those who recognise the potential to bring

the innovations to production *before* they are being explicitly demanded. In this context, it is argued in Pinfield (2004b) that it may be necessary for some stakeholders in universities to provide leadership in advocating a particular approach, such as OA, in advance of it becoming an explicit want for many, recognising that it will bring benefits to the institution and its constituent stakeholder groups.

The requirements of universities in relation to publishing (and particularly factors such as impact, affordability, access and quality), identified in Pinfield (2004b), and the relationships between different stakeholders in institutions, are important themes to a greater or lesser extent in all of the published works in this submission.

The other overview paper, **Pinfield (2005a)**, is a summary of the key issues associated with one of the two routes to OA: self-archiving in OA repositories. It addresses the question:

What are the major past developments, current features, and potential futures of self-archiving in OA repositories?

Drawing on the literature and identifying key developments in the field, this work presents an overview of self-archiving. It engages with key advocates of OA repositories including Ginsparg (2001), who led the creation of arXiv, and Harnad (2001a, etc), who set up CogPrints (a repository covering cognitive science) and was (and still is) a well-known advocate of self-archiving. Pinfield (2005a) uses arXiv as an exemplar and then describes the features and benefits of self-archiving in general. The features of repository systems are described in terms of key business processes associated with self-archiving and how these relate to the traditional journal publishing workflows. Key technical issues, including system design and

interoperability (including the OAI PMH), are also covered. Benefits are described for the major stakeholders both within and outside the HE community.

One key issue discussed is that of disciplinary differences and varying cultures of communication leading to differences in take-up of OA channels of communication. This leads on to a discussion of subject versus institutional approaches to repository development. Key developments from the previous few years are also discussed including major funding initiatives such as those led by the Joint Information Systems Committee (JISC) in the UK. The main barriers to continued development of repositories are then analysed, which the JISC initiatives were partly designed to address. The analysis is based on development work carried out at Nottingham lead by the present author as well as interaction with the earlier works in this submission some of which made a contribution to the field in attempting to describe systematically the barriers to OA. Many of the barriers relate to concerns about OA voiced by researchers from across disciplines and others (see also, Singer, 2000; Garner, Horwood and Sullivan, 2001; and Björk, 2004). They include concerns about the following:

- Quality
- Intellectual Property Rights (IPR), particularly copyright
- Workload
- Disturbing the status quo

One important way of understanding these concerns is to see them specifically from the personal perspective of the researcher:

- Concern about how *my* papers will be assessed and ‘branded’ for quality, and concern about how the papers of others are filtered and ‘quality stamped’ to help *me* deal with the literature
- Concern about how *my* intellectual property will be protected and about what rights *I* have to reuse my own publications or those of others
- Concern about the additional processes *I* am expected to carry out and the incentives for doing so
- Concern about disturbing *my* relationship with *my* publisher, learned society and subject community

These very rational concerns are addressed in this paper and also feature as major themes in a number of the other publications in this submission.

The final contribution of Pinfield (2005a) is that it discusses key unresolved issues and possible futures. Both of these are discussed in several of the other published works (for example, Pinfield, 2009). Issues requiring further work are highlighted in a number of the publications in this submission and the publications, building on each other, in fact show how these issues develop over time. The discussion on possible futures is also taken forward in more detail in some of the other published works (and discussed in section 2.5). Pinfield (2005a) represents an early discussion on those issues which draws on a variety of views including those of Crow (2002) and Guédon (2002).

Pinfield (2005a) uses arXiv, the first highly successful OA repository, as a starting point. This approach was partly informed by earlier work reported in Pinfield (2001d), as well as other papers analysing arXiv, such as Brown (2001). **Pinfield**

(2001d), ‘How do physicists use an e-print archive? Implications for institutional e-print services’, is the earliest work in this submission specifically on open access and a very early work in the literature on institutional repositories (although at the time “open access” and “repositories” were not yet commonly accepted terminology). It was set in the general context of Harnad’s “subversive proposal” (Harnad, 1995), first advanced on the Electronic Journals mailing list at Virginia Polytechnic Institute (June, 1994) that every research output should be made available in “a globally accessible local ftp archive”. By 2001, this had been refined into a proposal that “universities install and register OAI-compliant Eprint Archives” (Harnad, 2001a); a call for web-based *institutional* repositories.

With very few working examples of institutional repositories in existence, Pinfield (2001d) was written explicitly to address the question:

How could a multi-disciplinary OA institutional repository work in practice?

It begins by investigating how physicists use arXiv, based on interviews carried out with Nottingham physicists in summer 2001. Taking into account their working patterns, the paper attempts to assess how these academic and business processes would operate for other disciplines and in an institutional repository context. Using an action-research approach, the analysis is based on experiences of setting up a pilot IR at Nottingham in 2001 led by the present author (the first OAI-compliant institution-wide repository in the UK²). It identifies a number of key managerial issues which would need addressing in a successful IR implementation.

² The University of Glasgow set up a pilot IR at about the same time as Nottingham. Nixon (2002) reports that it was launched in November 2001, whereas the Nottingham pilot IR was released in July that year. Southampton had a repository in 2001 but this was limited to a particular School rather than being institution-wide.

Central to this paper, and underlying a number of the other publications in this submission, is the question of whether it is feasible that different disciplines with varying scholarly communication practices could converge on the use of the OA repository as a vehicle for communication. There is a keen awareness throughout the publications of disciplinary differences; an awareness which is grounded in experience and informed by the literature. The work of Kling and McKim (2000) identifies a number of significant disciplinary differences that contribute to varying research communication practices which are likely to be “durable features of the scholarly landscape”. Research by Fry and Talja (2007) demonstrates significant variation across disciplines in the use of informal internet-based channels of communication such as pre-prints and mailing lists. However, even taking into account these marked differences, there are also significant commonalities between disciplines. Most importantly, all disciplines in the science, technology and medicine areas have long used peer-reviewed journals as their predominant scholarly communication vehicle, whilst *at the same time* maintaining some differences around this central core. Advocates of OA repositories, such as Ginsparg (2001) and Warner (2003), have argued that a variety of disciplines with different scholarly communication practices could all accommodate the use of e-prints, with repositories acting as discipline-neutral platforms. In this context, it is reasonable to test the hypothesis that many or all disciplines may make common use of OA repositories, even if the precise way in which they come to engage with repositories may vary.

Many of the issues raised in Pinfield (2001d) are further addressed in **Pinfield, Gardner and MacColl (2002)**, ‘Setting up an institutional e-print archive’. This

paper was the first guide worldwide to setting up an OA IR written from a service provider perspective. It addresses the question:

What are the key practical issues associated with setting up an OA IR?

It is based on the experiences of library services at both Nottingham and Edinburgh universities. By that time, four UK institutions had some form of IR implementation: Nottingham, Edinburgh, Glasgow, and Southampton. Information provided here was supplemented later in the same year by the accounts provided by Nixon (2002) and Crow (2002), and further expanded by Jones, Andrew and MacColl (2005). Pinfield, Gardner and MacColl (2002) provides a somewhat more technical view of an IR implementation than other publications in this submission but already identifies the major challenges to implementers as managerial and cultural rather than technical.

Pinfield (2003a), 'Open archives and UK institutions: an overview', sets some of the work at Nottingham in its national and international context. It deals with the question:

What are the key features of the research-and-development work in the UK focusing on creating an OA e-prints repository infrastructure?

It describes early work in the development of repositories as part of the FAIR (Focus on Access to Institutional Resources) programme, funded by JISC. The FAIR programme was set up in 2002, and prompted a significant amount of international interest. The paper was originally presented at the now annual OAI conference at CERN (in October 2002) and provides a review of a number of international OA initiatives looking at the green route (OA repositories) in particular. It focuses on two specific projects in which the present author was involved and which illustrate some of the major features of the FAIR programme:

- SHERPA: at the time, an early IR project focusing on e-prints, led by Nottingham and involving a consortium of research-led institutions
- ePrints UK: a so-called ‘OAI Service Provider’ project looking at the feasibility of harvesting data from various UK e-print repositories (using the OAI PMH) and presenting them in a searchable form, led by the University of Bath and involving the present author on an advisory group

One potential role of an IR introduced in this publication is the preservation of content. This key issue is discussed in more detail in the two works which follow, both published in 2003.

Pinfield and James (2003), ‘The digital preservation of e-prints’, deals specifically with the issue of the preservation of e-prints in OA repositories. It was the first publication worldwide to do so. In particular, it addresses the question:

Should e-prints be preserved, and, if so, what are the key issues associated with their digital preservation?

It approaches this question by engaging with Harnad, whose views on this issue are reported having been assembled from his formal publications and informal communications (such as e-mail discussion list postings). Harnad argues that OA repositories should be designed to deliver immediate access to, rather than long-term preservation of content. In response, Pinfield and James argue that the apparent dichotomy between access and preservation is not a real one. They set out the case for selective preservation of e-prints *for the purpose of* long-term access: “preservation for access”.

With the benefit of hindsight, it is perhaps worthwhile considering what may have lain behind these disagreements about preservation and repositories. It is reasonable to assume from his other work that Harnad has a particular view of the relationship between repositories and the scientific literature in mind; a scenario later described in Pinfield (2009) as “Repository to Journal”, where a pre-print is placed in the repository, followed by a post-print, before the paper is formally published in a peer-reviewed journal. In this model, responsibility for peer review and content preservation remain clearly in the domain of the journal rather than the repository. Whereas the view taken by Pinfield and James on digital preservation assumes a wider range of possibilities associated with the future of repositories and their relationship with journals, including the other models described in Pinfield (2009). In these other models, preservation is taken on by repositories as a core function. It is reasonable to conclude that it is these different assumptions about the actual and potential role of repositories implicit in the arguments of 2003 (and which became more explicit over time) which gave rise to different views of the importance of preservation.

Pinfield and James (2003) is based on a paper given by Pinfield in March 2003 at a conference at the Library of Congress in Washington, DC. It also reports some of the early results from the research work published later in James et al. (2003), a detailed analysis of the technical and managerial aspects of e-prints preservation. Pinfield and James (2003) pre-empts the later report by pointing to some key technical and organisational issues. In the technical area, it discusses the application of OAIS digital preservation framework to e-prints. In the organisational area, it discusses

ways in which the OA repositories network needs to be set up if they are to include digital preservation of content amongst their core functions.

James et al. (2003), 'Feasibility and requirements study on preservation of e-prints', follows on by setting out these issues in more detail, putting them in both an institutional context and also in the context of UK-wide strategy and policy (the report was commissioned by JISC to inform its own strategic planning). In particular, it addresses the question:

What are the main issues associated with the digital preservation of e-prints for both institutions and national policy?

It draws a number of conclusions:

- E-prints do not present unique technical challenges for digital preservation since they tend to have well-known file formats and do not usually make use of rich media or complex embedded files
- The preservation of e-prints does, however, present significant challenges in terms of organisational policy and business processes
- There are also a number of key issues which need to be addressed for the preservation of e-prints to be successful, including metadata production (particularly administrative and preservation metadata) and preservation licensing issues

Several of these issues were taken up in the later work carried out within SHERPA (specifically in the SHERPA DP project) looking at the implications for institutional as well as national policy (see, for example, Knight and Hedges, 2007).

The role of national policy in this and in other areas becomes particularly prominent in the later published works in this submission. Up until 2004, the publications concentrated on the technical and managerial issues associated with setting up and maintaining OA e-print repositories in institutions. At the same time, they state and refine the wider case for OA e-print repositories and for OA more generally.

However, by late 2003, it was becoming increasingly clear that activity based only in individual institutions would not be sufficient to generate anything but gradual change. There was strong inertia in the scholarly communication system which meant that change would not be easily driven by initiatives at institutional level alone. There was a need to develop more co-ordinated policies at supra-institutional or national level in order to encourage change in the scholarly communication system as a whole.

2004 presented a major opportunity to affect policy at a national level in the UK with the setting up of an inquiry into scientific publishing by the House of Commons Select Committee for Science and Technology. The Committee announced its investigation and called for evidence in December 2003. It heard oral evidence between March and May 2004, and also considered written evidence from a wide variety of organisations, before publishing its report in July of the same year. The Select Committee's work (the conduct of the investigation and its final report) was one of the most influential OA-related developments in the last decade, certainly in the UK. It helped to crystallise arguments for (and against) OA. It also helped to ensure a much wider range of stakeholders engaged with those arguments. It was an important factor, for example, in encouraging research funders in the UK (who were invited to make submissions to the Select Committee) to give serious consideration

to their stance on OA, leading ultimately to the adoption of policies promoting OA by most large UK funders. The report of the Select Committee made a significant impact in the UK. There was also considerable interest internationally (see Guterman, 2004).

Pinfield and Hubbard (2004) is the written evidence submitted to the Select Committee on behalf SHERPA, written by the authors in their roles as Director and Manager of the project respectively. It focuses on OA IRs in particular (which were then the main area in which SHERPA worked) and addresses the particular question:

How can OA IRs contribute to an improved scholarly communication system and what benefits might such a system generate for the research community and more widely?

It makes three related recommendations:

- The UK government and other relevant agencies should encourage the ongoing development of OA repositories in the UK
- They should discourage the signing over of exclusive rights by researchers to publishers so that works can be self-archived
- They should introduce policies mandating OA to research outputs

The case put forward for OA, specifically as it can be delivered through IRs is presented, drawing on the literature and lessons learned from SHERPA project activity:

- OA benefits the research community by making research communication more effective and efficient

- OA makes publicly-funded research publicly available, ensuring society in general can benefit from research
- OA enables improved knowledge transfer between the scholarly community and the commercial sector and other sectors, such as health
- OA promotes the public understanding of science by making scientific literature more easily available to people who can act as intermediaries between scholars and the general public, such as scientific journalists

The case is presented in an intentionally broad way in order to illustrate the potential benefits of OA beyond as well as for the research community.

The evidence presented to the Select Committee by SHERPA was demonstrably influential. The Committee consulted Pinfield and Hubbard several times during the investigation and also requested additional information on costings associated with repositories (presented in the Select Committee report's appendix). SHERPA also featured prominently in the final report and recommendations, which referred extensively to evidence presented by Pinfield and Hubbard. The report's conclusions were wide-ranging (see Oppenheim, 2005) but a number related directly to the recommendations put forward in the SHERPA evidence (covering repository development, copyright management and funder mandates) summarised as:

“We have recommended that the UK Government fund the establishment of an inter-linked network of institutional repositories on which all research articles originating in the UK should be deposited and can be read for free. SHERPA has already carried out some valuable work in this area and needs to be funded to enable it to play a central role in the future. In order to ensure that the repositories are well-populated, we have recommended that Research

Councils mandate their funded researchers to deposit copies of all their articles in this way. Universities and other research institutions will need to build up their capacity to manage the copyright that might in future be retained by authors as a result of this system. We conclude that these are the essential first steps in the direction of a more fundamental change to the way in which researchers publish their findings.” (House of Commons, 2004a, 97).

Following the publication of the Select Committee’s report, *Scientific Publications: Free for All?*, in July 2004, the government formulated its response, published in October 2004 (House of Commons, 2004b, appendix 1). At that time, there was significant debate about scholarly communication policy, now involving a wider set of stakeholders, including, for example, contributions from Dr Evan Harris, MP (Harris, 2005), a member of the Select Committee. **Pinfield (2005b)**, ‘A mandate to self archive? The role of open access institutional repositories’, was written in this context. It was originally presented as an invited conference paper given in 2004 at a meeting arranged for the purpose of discussing the Select Committee report and the government response. The same conference also included a presentation by Dr Ian Gibson, MP, chair of the Select Committee (Gibson, 2005).

Pinfield (2005b) discusses one of the key recommendations of SHERPA and others which was taken up by the Select Committee: that research outputs should be made OA as a requirement of funding. The government’s response to this was to reject it as a government responsibility but to acknowledge that funders (including the UK Research Councils) could consider it. The paper deals with the question:

What is the case for mandating the use of OA IRs and how might mandates improve scholarly communication?

Pinfield (2005b) sets out the case for mandating deposit of research outputs in IRs in particular. It argues that the development of OA IRs should be actively encouraged and that OAI-compliant service providers, such as those providing search services, should also be supported. Both of these developments combined would significantly improve the OA repository infrastructure. When these developments could be added to an OA policy mandate they may significantly enhance scholarly communication in the UK and internationally.

Pinfield (2005b) engaged proactively with a number of the major discussion points of the time. One of these was the assertion by OA sceptics that the Select Committee inquiry was ‘a solution in search of a problem’. The paper argues that the evidence suggests that the Select Committee did not prejudge its own conclusions (as the accusation implies it did). This is illustrated by the fact that some of the issues that the Committee expected to feature prominently in their investigation, particularly scientific fraud, did not, since their investigation showed that this was not a major problem. On the other hand, OA, which was not even mentioned in the Select Committee’s initial call for evidence, featured heavily in the report itself. This is an important indication that OA *emerged* as a key issue during the investigation itself even though it was not initially expected to be one.

A year after the Select Committee report was published, the Wellcome Trust introduced an OA mandate; the first major UK research funder to do so. **Pinfield**

(2006), ‘A Wel(l)come development: research funders and open access’, analyses this development, addressing the question:

What are the key features of the Wellcome Trust approach to OA and how might these be more widely implemented?

As Terry and Kiley (2006) describe, the Wellcome Trust introduced a very robust policy, “requiring”, rather than just “encouraging”, Wellcome-funded authors to make their work OA; a significant step beyond the US National Institutes of Health (NIH) policy of the previous year which only “encouraged” authors to make their papers publicly accessible. However, like the NIH, Wellcome directed its grant recipients to deposit their work in a particular repository – PubMed Central (PMC), and later UK PMC (which was itself funded by the Trust). At the same time, Wellcome was unique in embarking on a series of negotiations with major publishers to secure licence agreements which would allow papers to be placed in PMC for immediate access, ongoing reuse, and long-term preservation on the basis of a per-article OA charge. In parallel, Wellcome also established clear policies and processes for paying article OA fees. It was the combination of the introduction of a strong policy mandate, the funding of a repository infrastructure, the setting up of publisher licensing agreements, along with the creation of clear funding streams which made the Wellcome Trust approach so powerful.

Pinfield (2006) analyses this and discusses how such an approach might be more widely adopted by research funders. It also discusses how the developments involve and benefit other major stakeholders in the scholarly communication arena. It argues that the potential benefits for a wide range of stakeholders mean that the Wellcome Trust approach might be deployed as a transition mechanism for scholarly

communication (following Prosser, 2003) towards a new system which explicitly involves both journals and repositories, and includes a new business model based on author-side payment.

Some of the potential beneficiaries of such an approach are repository managers, a role increasingly taken on in institutions by librarians. **Pinfield (2007a)**, 'Libraries and open access: the implications of open-access publishing and dissemination for libraries in higher education institutions', provides a wide-ranging analysis of the role of HE libraries in the light of OA developments. It addresses the question:

What would be the major impacts of OA on library services in HEIs if OA was to become mainstream, and how would these affect the role that libraries play in the future?

As such, Pinfield (2007a) was one of the first publications in the professional literature to consider the specific question of the impact of OA on library services (but is augmented by a number of publications from around this time, including Lougee, 2007 and Bailey, 2008). It does also relate to the larger question of the future role of libraries in general on which there is a more voluminous literature.

The paper begins by presenting some significant refinements to the arguments for OA informed by a number of developments in the field including the work of the Select Committee but also incorporating arguments from the work of Houghton and others (Houghton, 2005; and Houghton, Steele and Sheehan, 2006). It also responds to a number of issues being raised in professional debates at the time. It defines the major areas of benefit created by OA as:

- Dissemination

- Impact
- Use
- Economics

Benefits in the area of *dissemination* are described in terms of “deepening narrowcasting” and “widening broadcasting”. This addresses the arguments at the time that scholarly communication was predominantly about “narrowcasting” (communication aimed only at a very narrow audience such as a particular subject community) and that widening access to research communication was therefore not required. Views like this one were expressed in some of the evidence presented to the Select Committee. John Jarvis of Wiley in oral evidence to the Committee even suggested that widening access to medical information might be harmful (House of Commons, 2004, Oral Evidence, Q19). Pinfield (2007a) identifies a number of areas where widening access creates significant advantages.

Impact is described in terms of both academic impact (including emerging evidence of a ‘citation advantage’ for OA works) and wider societal impact (economic, cultural and policy impact). This acts as a background to an analysis of an issue identified in the Select Committee report as the “free rider problem” – where some commercial organisations, such as pharmaceutical companies, benefit from OA to scientific publications but do not contribute to their funding (whereas previously they had contributed through paying journal subscriptions). In contrast, Pinfield (2007a) turns the argument around by seeing the “free rider problem” as the “knowledge transfer advantage”. One of the major benefits of OA is that it enables more effective knowledge transfer; this, it is argued, should be seen as a major benefit for society and the economy, rather than a problem.

Use is discussed in terms of both free access to and unrestricted reuse of works, the latter including automated analysis, “open computation” (Lynch, 2006). Reuse was beginning to emerge as a significant factor in the OA debate as technologies enabling text and data mining were being more widely deployed.

Finally, the discussion on *economics* picks up a number of issues highlighted by Houghton on the potential economic benefits of OA. Houghton et al. (2009) followed this early work with a very influential and controversial report on the economic costs and benefits of different publishing models including green and gold OA. Its conclusion was that:

“It seems likely that more open access would have substantial net benefits in the longer term and, while net benefits may be lower during a transitional period they are likely to be positive for both open access publishing and self-archiving alternatives (i.e. Gold OA) and for parallel subscription publishing and self-archiving (i.e. Green OA). This suggests that there are gains to be realised from moving towards open access publishing models and, despite the lag between the costs and the realisation of benefits, the transition may be affordable within existing system wide budgetary allocations.” (Houghton, et al., 2009, XXII, emphasis original).

Most of the work on the benefits of OA has been concentrated on research outputs. More recently, however, work has been carried out on OA to research data (for example, Piwowar, Day and Fridsma, 2007) and learning objects (for example, Caswell et al., 2008). Pinfield (2007a) takes into account all of these information

resources and also grey literature, monographs and other institutional information assets, such as theses. When the possibility of OA to all of these resources is considered, the potential impact on library services becomes significant. Libraries could assume new roles, such as managing institutional information assets in the IR (an issue already discussed in the literature by Pinfield and others, including Horwood et al., 2004), and also facilitating access to OA electronic books through services such as print on demand. In addition libraries could take on the role of managing OA business processes, particularly payment of OA publication charges and deposit of content in repositories, on behalf of the institution. Library managers could also, it is suggested, play a significant role in their institutions in providing leadership on OA issues, encouraging policy development and devising workable processes to manage OA services (Pinfield, 2010, presents later evidence that it is in fact the library that tends to lead on these issues in institutions).

These roles potentially carried out by libraries if OA becomes mainstream fit alongside a range of other key roles not directly related to OA which libraries could perform in the future as key functions, such as those outlined by Campbell (2006), including providing quality learning spaces and offering virtual reference services. However, a number of major roles traditionally carried out by libraries in institutions are in contrast likely to diminish in importance. In general, it is argued, less work in areas such as selection of materials and provision of indexes will be carried out by libraries in individual HEIs and more work will be needed to be done at a supra-institutional or national level.

Major aspects of the institutional response to OA are the focus of Pinfield (2010) but in the meantime there are two publications providing system-wide perspectives on OA, particularly the fundamental question of the relationship between repositories and journals. Pinfield (2007b) examines the empirical evidence about the relationship between repositories and journals, and Pinfield (2009) analyses the different models emerging from that relationship.

Pinfield (2007b), ‘Can open access repositories and peer-reviewed journals coexist?’ directly addresses one of the main systemic questions related to OA (as summarised in the title):

Can OA repositories and peer-reviewed journals coexist?

The paper was written and published as part of a debate with Sally Morris, then CEO of the ALPSP (Morris, 2007). It questions the assumption made by many (including Morris) that repositories and journals are necessarily in competition, dealing initially with the relationship between OA repositories and subscription journals. It engages with the available empirical evidence of either coexistence or competition, looking at the impact of OA repositories on the usage of journals and on subscription levels. The available data shows little significant impact of OA repositories on journals, indicating that they have coexisted to date (in the case of arXiv, for a number of years). It argues that it is therefore reasonable to assume that this can continue for the foreseeable future. However, it recognises that the evidence available (from Ware, 2006, and Beckett and Inger, 2007) of library managers’ attitudes to the future is equivocal, with some librarians suggesting that the availability of a substantial part of the literature in OA repositories might prompt them to cancel subscriptions.

However, this view is by no means overwhelming, suggesting that coexistence in the immediate term is still possible.

In the medium and long term, however, Pinfield (2007b) suggests that although the character of and relationship between OA repositories and journals will change, both can continue to coexist. A number of scenarios including those of long-term coexistence are analysed. Each of the major scenarios are assessed against the framework put forward by Roosendaal and Geurts (1998) and Roosendaal, Geurts and Van der Vet (2001) on the four functions of journals: “registration”, “certification”, “dissemination” and “archiving”. This framework has been used by a number of contributors to the literature (for example, Van de Sompel et al., 2004) as a way of assessing the potential role of various models of scholarly communication in future.

The same framework is also deployed in **Pinfield (2009)**, ‘Journals and repositories: an evolving relationship?’, to assess three models of scholarly communication which are outlined. The framework is augmented by a fifth function, “reward” (as suggested by Van de Sompel et al., 2004, and Prosser, 2005). Pinfield (2009) addresses the question:

How might journals and repositories interact in potential future scholarly communication systems?

It does so by setting out three key models of scholarly communication which involve the interaction of OA repositories and journals. These models systematise much of the discussion in the previous published works in this submission (one model, for example, builds on the analysis in Pinfield, 2005b). The models presented are,

however, not just theoretical constructs. They all have working exemplars showing they can operate in sustainable ways. The analysis is presented in a series of simple business process maps concentrating on the specific section of the research process which involves publishing and dissemination of research outputs (for a much broader scholarly communication life-cycle model, see Björk, 2007). The descriptions of the models help to identify key aspects of the debate about OA (such as funding and preservation) and show how they are addressed in different ways and at different stages in each of the models. This analysis makes a contribution to the discussion of how OA systems can play a sustainable role in scholarly communication in the future.

Pinfield (2010), ‘Paying for open access? Institutional funding streams and OA publication charges’, turns the focus again on institutional responses to OA. It is written in a context where it can be reasonably assumed that research institutions have already pursued certain OA developments relating to the green route (and in particular the setting up of IRs), which is certainly the case in the UK. It therefore addresses more explicitly the currently unresolved issue of institutional policies and processes that need to be put in place to facilitate gold OA (OA publication in journals). In particular, it addresses the question:

What policies, processes and systems should institutions put in place in order to facilitate the payment of OA publication charges?

It argues the case for institutionally co-ordinated solutions, such as central OA funds. It shows how these can be established in line with funder policies and discusses practical experience of running them.

The paper examines the published evidence for the existence of centrally-co-ordinated OA publication funds in the UK and also presents new data derived from a survey carried out in 2009 which adds to the body of knowledge on such funds. It discusses the experience of HEIs in setting up funds, presenting in particular case-study evidence from the University of Nottingham on creating and managing a central fund (a development initiated and led by the present author). The processes associated with setting up a fund are discussed and lessons learned are presented. Usage of the fund at Nottingham over the period 2006 to 2009 is analysed, looking at costs and take-up across subjects. This was the first significant longitudinal analysis of usage of a central fund in the literature. It shows a gradual increase in uptake but one which has to date been focused in the medical and life sciences.

2.4 Methodological Approaches

Galliers (1992) has provided an influential taxonomy of information systems research approaches which has been used and adapted in a number of ways to support subsequent analyses of information systems research methodologies (for example Mingers, 2001, and Choudrie and Dwivedi, 2005). It divides research approaches into “two camps”:

- “Scientific”
- “Interpretivist”

The former (also characterised as “positivist”) comprises laboratory experiments, field experiments, surveys, case studies, theorem proof, forecasting and futures research, and simulation game/role playing. The latter comprises other forms of futures research and game/role-playing, plus subjective/argumentative research, action research, and descriptive/interpretive research. The publications in this submission take a variety of approaches, including those from both “positivist” and “interpretivist” camps, with a preponderance of the latter.

Most of the published works in this submission fall into particular categories in the interpretivist area:

- Subjective/argumentative research
- Action research
- Descriptive/interpretive research

The first of these, “**subjective/argumentative research**” is described by Galliers as a creative process, as much about “opinion and speculation” as observation.

Although often subjective, it can make “a valuable contribution to the building of

theories which can subsequently be tested by more formal means. Its strengths lie in the creation of new ideas and insights.” Most of the publications in this submission fall into this category, attempting to identify new solutions to current problems, and to build conceptual models to illustrate potential. They mostly argue a case based on early results and also often identify areas where more empirically-based research needs to take place. Pinfield (2006) exemplifies this approach. It analyses a series of new initiatives taken by the Wellcome Trust in the area of OA and identifies emerging benefits. It argues for the wider adoption of such policies by other funders and outlines significant potential benefits.

The second category, “**action research**”, is perhaps the best documented and most widely used of the interpretivist approaches outlined by Galliers. He defines it as “applied research where there is an attempt to obtain results of practical value to groups with whom the research is allied, while at the same time adding to theoretical knowledge.” Baskerville (1999) provides an additional helpful definition when he describes action research as “a technique characterized by intervention experiments that operate on problems or questions perceived by practitioners within a particular context.” This action-based approach has been at the heart of much of the work described in the submitted publications, with its emphasis on “problem-solving” and addressing the findings of problem-solving activities (characterised by Chiasson, Germonprez and Mathiassen, 2008, as a “problem-solving dominant” approach). The work typically followed the classic process of: problem diagnosing – action planning – action taking – evaluating/assessing – reflecting/learning (see Baskerville, 1997 and 1999). Underlying much of this work was the assumption which Baskerville (1999) identifies as fundamental to action research: “action brings understanding”.

Specifically, the action-based approach applied in the published works focuses on the setting up of innovative demonstrator systems and processes which are then used as vehicles for investigating new approaches to scholarly communication – approaches designed to address particular problems in the existing publishing system. The demonstrators allowed ‘what if...?’ questions to be asked. Possible answers were then developed through further action, stakeholder discussion and scenario modelling. In most cases, the systems and processes piloted as part of the research have then been further developed into operational services incorporating lessons learned.

Most of the earlier works on OA focusing on repository development (such as Pinfield, 2001d, and Pinfield, Gardner and MacColl, 2002) involve this action-based approach. Pilot IR systems and associated processes were set up using intentionally iterative techniques in order to allow specific actions to be evaluated, lessons to be learned, and learning outcomes to be tested in further development work. Pinfield (2010) provides a somewhat different example of an action-based approach, this time in the area of policy development in relation to the Nottingham experience of setting up a central OA publication fund.

The third category identified by Galliers is “**descriptive/interpretive research**” which attempts to describe phenomena themselves and how they are experienced. Often this involves interaction with the literature or past developments as well as “actual, current happenings”, and corresponds closely to a number of methodologies adopted in the humanities. This approach has been important in most of the

submitted works in order to provide context to the investigative work, supplementing the action-based and argumentative approaches with a grounding in the literature and professional environment. Pinfield (2004b) and Pinfield (2005a) both fall into this category bringing together as they do a number of strands of activity for analysis with an overview of the literature and assessment of contemporary professional practice.

In addition to these techniques, a number of the publications in this submission incorporate more **positivist** approaches. Pinfield (2001d) incorporates data from semi-structured interviews, Pinfield (2010) presents data from surveys, and James et al. (2003) uses data from both interviews and surveys. A case-study approach is deployed in these and most of the other publications, referring in particular to the Nottingham experience.

The publications are aimed primarily at information professionals, publishers and policymakers, and designed to impact directly upon professional practice and policy development. Their originality consists mainly in “the critical examination of existing facts or ideas,” and also “in devising and conducting investigations into ideas supplied by others” (as defined in the University of Nottingham research-degree regulations) often through innovative development work designed and led by the present author. However, these ‘examinations’ and ‘investigations’ are always carried out, using an eclectic range of approaches, with a view to their potential application amongst practitioners.

The intended audience of practitioners and policymakers was an important consideration in determining the publishing venues. Venues were chosen which were OA-compliant, practitioner-oriented, and with rapid publication timescales. For the earlier publications, the options of outlets matching these criteria were very limited and publications were placed in the few OA online-only professional publications such as *Ariadne* and *D-Lib*, partly since many of the major early works on OA were appearing there (such as Harnad, 1999, 2001b; Harnad et al., 2003; Liu et al., 2001; Van de Sompel et al., 2000, 2004). As time went on, more formal journal publications became available in an OA form and more mainstream monograph and journal publishers allowed self-archiving, and so papers were placed in a wider range of publication venues. The tone of the publications varies but they often deploy the more immediate language sometimes favoured in business and management literature appropriate for a professional audience.

2.5 Major Themes

The published works in this submission consider a range of multilayered and interrelated themes associated with the *why* and *how* of open access. These include themes in the following areas:

- Managerial
- Technical
- Economic
- Cultural

The Managerial themes are associated with the setting up and running of OA-related services. Technical themes relate to the development of major systems and standards. Economic themes cover areas such as costs, funding streams and business models. Cultural themes include issues such as disciplinary differences in the area of scholarly communication.

Running throughout these thematic areas are two other major themes:

- Stakeholders
- Levels

The first of these relates to the interactions and perspectives of the major stakeholders in the scholarly communication process. The second is about the relationship between different ‘levels’ of activity – institutional, national and system-wide levels.

These thematic areas are discussed in turn below, beginning with the managerial.

Major issues within the **managerial** thematic area include the setting up and running of institutional (and other) repositories which feature particularly in the earlier works on OA from Pinfield (2001d) onwards. Key business processes associated with repositories, especially the e-print submission process, are considered in some detail. Other managerial aspects of OA within institutions, such as those associated with central funds, feature in a number of (particularly later) publications, such as Pinfield (2010). These issues are discussed from the perspective of a library and information services provider in an HEI – and in fact the role of the LIS provider is itself a theme implicit or explicit in a number of the publications (particularly in Pinfield, 2007a). Nevertheless, running throughout the publications is an awareness of the roles and interests of a wider set of stakeholders, both within and outside HEIs, all of whom make a contribution to scholarly communication at various levels of activity (institutional, national and system-wide).

One important subset of the managerial thematic area is policy development. The policies of key stakeholder organisations, including HEIs, consortia of institutions, publishers and research funders, are an important focus for the publications. A number of the publications from around the time of the Select Committee inquiry, such as Pinfield (2005b) and Pinfield (2006) feature policy development prominently.

Issues within the **technical** thematic area are perhaps more prominent in the earlier publications when standards were still being developed and OA system implementations still unusual. In particular, the implications of the OAI PMH and related interoperability standards are an important feature of the earlier publications in particular, such as Pinfield, Gardner and MacColl (2002) and Pinfield (2003a).

Other standards associated with preservation and metadata are also discussed.

Analysis of the significance of the standards is grounded in most of the publications in a particular context of LIS provision and development within HEIs.

Economic issues are prominent in a number of the publications in a variety of ways.

There is an early concentration on costing and funding models for repositories (especially institutional repositories). Later there is a particular emphasis on the development of business models for OA publishing at a system-wide level and on their impact in individual institutions. In particular, the key issue of how institutions can make OA business models work in practice is particularly important in Pinfield (2010). In addition, there is some discussion of the economic *benefits* of OA, both for the research community (for example, in terms of potentially lower costs) and beyond (for example, through knowledge transfer).

Cultural issues are a consistent theme throughout the published works in this submission. Prominence is given to the practices of researchers in particular. Since many of the major barriers to take up of OA are identified as cultural, the priorities and concerns of researchers and how they might be addressed in an OA environment, are especially important.

One crucial cultural theme is that of disciplinary differences. The response of many of researchers to the issues discussed in the publications varies across subject disciplines, and so running through the publications is an acute awareness of different cultures of scholarly communication across different subject communities. The differences are seen, for example, in the acceptance of preprint circulation, take-

up of repositories, and adoption of OA journal publishing. These are amongst the most important cultural issues considered in the publications and remain central to the OA debate. Understanding why academics operate differently in different disciplines (as well as what commonalities there are between disciplines), and what incentives and concerns researchers have, is crucial for addressing both the why and how of OA.

These thematic categories are certainly not independent. Rather, they are enmeshed in a number of complex ways. For example, underlying many of the managerial discussions on business process design in institutions is the aim of minimising the administrative workload on researchers in order to achieve cultural acceptance of OA (as well as improving the efficiency of the system as a whole). Discussion of the issue of digital preservation of OA material is not only a technical concern but also involves important managerial questions (for example, to do with workflows and organisational structures) and economic issues (such as the management of preservation costs).

In addition to the major thematic areas already identified, there are a number of further cross-cutting themes which have managerial, technical, economic and cultural aspects to them *and* include a variety of stakeholder perspectives and operate at a number of levels. These are:

- The case for OA
- Intellectual Property Rights (IPR)
- Quality
- The future of scholarly communication

The question ‘why implement OA?’ is central to a large number of the publications in this submission. **The case for OA** is approached from a number of directions but emphasis is given to the benefits for researchers in HEIs in particular and the research community in general. The case for OA is refined progressively as the research-and-development work described in the publications is carried out and as the environment changes. The case for OA is also widened out in the publications over time, with the initial concentration on the benefits for the research community (such as increasing the productivity of research), such as in Pinfield, Gardner and MacColl (2002), being extended in the later publications to include wider economic and societal benefits (such as making publicly-funded research publicly available), as in Pinfield (2007a).

The publications do not just contribute to building the case but also *communicating* the case for OA. Emphasis here is given to the role of information professionals in communicating with other stakeholders in HEIs, particularly researchers and institutional managers. A key theme is the management of change in the research community and how change affects the major stakeholders. In some cases, the publications also articulate the views and interests of the HE community *to other* major stakeholders in the field, such as publishers, learned societies and policy makers (such as Pinfield, 2004b).

Intellectual Property Rights (IPR) are implicit in many discussions of OA and have significant managerial, technical, economic and cultural implications. At the centre of this theme are the legal issues of copyright transfer agreements with

individual authors and licensing agreements with institutions. As part of its work, SHERPA set up an online service, RoMEO, providing information on the self-archiving policies of major publishers articulated in copyright transfer agreements for authors (this was based on the earlier RoMEO research project based at Loughborough University funded by JISC as part of the FAIR programme). RoMEO assigns colours to different self-archiving rights, with the ability to self-archive both pre-and post-prints represented by the colour green – the origin of the ‘green route’ to OA. However, just as important as the legal details are the cultural *perceptions* of these issues. Behaviours of researchers are often determined by community-accepted norms rather than the actual legal position in relation to copyright (a point featured as early as Pinfield, 2001d).

In many ways, this also applies to the issue of **quality**. Quality control, typically through peer review, is a central feature of scholarly communication and one major consideration in the OA debate is how it can be protected or even enhanced. Nevertheless, as well as quality-control itself, *perceptions* of quality are also particularly important. The publications, therefore, discuss the issue of quality ‘flags’ or ‘indicators’, such as journal titles as brands, and how these might translate into an OA-based system. Also, a number of the publications refer to additional types of quality measures, such as post-publication citation and usage analysis, which might in future be made easier in an OA environment (see for example Pinfield, 2009).

Finally, the question of **the future of scholarly communication** is at the centre of many of the publications. A number of different scenarios are explored in the published works. Particular emphasis is given to the relationship between the two

routes to OA. The earlier publications focus on the case for OA repositories, but this is widened out in the later publications to incorporate OA journal publishing.

Crucially, the later works (such as Pinfield, 2007b and 2009) deal with the still-open question of the ongoing interaction of repositories and journals in a potential coherent scholarly communication system of the future.

In addition, several of the publications (particularly Pinfield, 2005a, 2007b, and 2009) identify a number of specific issues which relate to these general thematic areas and which require further work. Some of these issues are common between publications, including:

- Version identification
- Digital preservation standards
- Business and costing models

Understanding of these issues was progressed over time through contributions by Pinfield and others. The issue of version identification (a technical and managerial question) was partly addressed by the development of a NISO standard in 2008 (NISO, 2008), which took into account the terminology developed for OA repositories (such as ‘e-prints’). Another technical issue, digital preservation standards for OA material, was also taken forward during the period covered by the submitted publications, including the work carried out within the SHERPA DP project (see, for example, Knight and Hedges, 2007). Finally, the economic issue of business and costing models was discussed as a major issue in a large amount of the professional literature; a strand of which was addressed, for example in Pinfield (2010).

2.6 Contribution

The submitted publications report on pioneering work in the area of open-access publishing and dissemination carried out at the University of Nottingham under the direction of the present author. The work took several forms. Firstly, it involved building innovative demonstrator systems and services in order to learn lessons, followed by communicating those learning outcomes to key stakeholders.

Developments included institution-centred systems (such as the Nottingham IR) and community-wide services (such as RoMEO). Secondly, the work involved new policy development, once again at both institutional level (such as policies associated with Nottingham OA publication fund) and wider (such as research funder policies). Thirdly, the work involved novel technical investigations (including research in the area of digital preservation) and building the evidence base associated with OA activity (through various data gathering exercises).

The submitted publications represent a number of firsts. The University of Nottingham was the first UK institution to set up an OAI-compliant institution-wide e-print repository (a development led by the present author). Pinfield (2001d), which reports on that development, was one of the earliest works in the literature to discuss OA IR implementation issues. Pinfield, Gardner and MacColl (2002) was the first publication worldwide to provide an overview of the process of setting up an IR based on the early experiences of two of (what was then) only a handful of UK implementers. Pinfield and James (2003) was the first publication to focus on the digital preservation of e-prints, arising from the research-and-development work carried out as part of the SHERPA DP project (of which Pinfield was Co-Director). In 2007, Nottingham was the first UK institution to set up an institution-wide central

OA fund (and one of the first globally). This initiative was again led by the present author, and Pinfield (2010), which reports on the activity, was the first publication to provide a longitudinal analysis of usage of such a fund. Pinfield (2007a) was one of the first works to discuss the potential impact of OA on the broader role performed by library and information services.

The research-and-development work undertaken and publications describing it were specifically designed to make an impact on professional practice: to inform information professionals and others about the issues and how they might respond to them. They were also designed to make a significant contribution to the scholarly record. It can be shown that they have made an impact on a number of levels.

Evidence of impact is seen, for example, in the fact that the work carried out by Pinfield and colleagues attracted funding and other forms of community recognition during the period covered by the publications. Much of the work reported was carried out as part of SHERPA, which was funded between 2002 and 2009 (when it was succeeded by the establishment of the Centre for Research Communications at Nottingham, also externally funded) by a number of agencies, including JISC, the European Union, the Wellcome Trust, and SPARC, who recognised the initiative's potential and actual impact. During this time, SHERPA became influential both in the UK and internationally. SHERPA's work was recognised internationally in 2008 when it won the annual SPARC Europe award for its contribution to open-access developments. In 2009, Nottingham also won the BioMed Central Open Access Institute of the Year award for 2008 for work initiated by SHERPA and University of Nottingham Information Services led by the present author. OA services such as

RoMEO are now used globally, with formal partnerships in place with organisations in nine other countries to contribute to the RoMEO database and deliver the RoMEO data through locally-designed interfaces.

Nottingham's and SHERPA's direct impact on professional practice is illustrated by the fact that it was directly responsible for creating a situation where all of the Russell Group, research-led, universities set up IRs, some as project partners, others informed by the project work reported in the publications. Later project work, the Repositories Support Project, funded by JISC and led by Nottingham (under the Directorship of Pinfield), extended support to all UK HEIs setting up repositories. By 2009, all universities with any major research profile, with only a handful of exceptions, had established IRs.

The published works in this submission, partly informed by SHERPA and other project work, also made a contribution to the building of the general case for OA which has been used by library and information professionals in their institutions – a direct contribution to professional practice. Pinfield (2002), for example, was an early summary of the case for OA institutional repositories. Also, a number of the individual published works in this submission have been included in guidance documentation for information professionals. For example, Crow (2002) includes reference to Pinfield, Gardner and MacColl (2002) in his early guide on institutional repositories. The same publication has also been translated into other languages to provide guidance in different countries; it is available for example in Japanese on the National Institute of Informatics of Japan website (Pinfield, Gardner and MacColl, 2002, Japanese version). More recently, Pinfield (2010) has been included in

guidance provided by SPARC on setting up an institutional OA central fund. The Nottingham experience of setting up a fund was also included in a case study as part of Universities UK (UUK) and Research Information Network (RIN) guidance on this issue published in 2009 (UUK, 2009, 22-24).

The published works aimed to influence policy as well as professional practice – policy at institutional, national, funder and publisher level. They therefore not only report on innovative work and engage with the literature, but also participate in contemporary professional and policy debates. These debates often took place outside the formally-published literature using informal channels of communication such as conference presentations, e-mail discussion lists and, more recently, social networking sites. Many of the published works respond to issues being raised in these fora as well as to the literature.

A number of the works were demonstrably influential at policy level. Perhaps most importantly, the work presented in the early publications influenced the Select Committee investigation of 2004 (House of Commons, 2004a). The Select Committee report quotes the evidence provided by Pinfield and Hubbard on a number of occasions and presents the work of SHERPA as exemplary. In addition, some of the published works in this submission have been cited in key policy-oriented reports produced in recent years. These include the report by Swan et al. (2004) for JISC on the potential of OA, the report commissioned by Research Councils UK reviewing its OA policies (RCUK, 2008), the Houghton et al. (2009) report on economic costs and benefits of OA commissioned by JISC, and the EU-funded PEER project baseline report (Fry et al., 2010).

The works in this submission describing the benefits of OA and possible policy responses were influential both in their own right and also because they created an opportunity for the present author to work with a number of funders and other agencies on their policy developments relating to OA. Based on the strength of project work and published outputs, the present author was invited to advise organisations such as the Russell Group, UUK, RCUK and the European Universities Association (EUA) on their policies in this area. Pinfield drafted the policy position on scholarly communications adopted by the Russell Group in 2005, and was also heavily involved with the UUK Research Committee in the drafting of a similar statement for that organisation (published in 2005). Pinfield was also a member of the advisory group convened by RCUK to review its OA policy in 2008. In addition he was on the European working group which drafted the EUA position statement on open access, adopted by the EUA Council in 2008.

The publications have also, of course, added to the literature in significant ways by recording empirical data and constructing conceptual models which contribute to an overall understanding of the field. They have been cited in the scholarly literature as well as in policy-related reports. For example, one of the few studies to date to analyse IR development through an information systems theoretical framework, Kennan (2008), cites a number of papers by Pinfield in order to illustrate key developments in the field.

Perhaps most importantly, the publications in this submission and the work they describe have made a contribution to the general awareness and acceptance of OA in

the research community and beyond. In 2001, OA had very little profile in HEIs or elsewhere. By 2010, this had changed, with a much greater awareness of the OA idea and much greater support for OA services. The publications in this submission and the work they describe have contributed to this. At the same time, there has been widespread debate on the issues outside the HE community, which has included contributions from Pinfield in the press (for example, Pinfield, 2003b, and Pinfield and Ayris, 2005) and other media (including an interview of the present author in the 2005 Radio 4 documentary, *Publish or be damned*).

As awareness has been raised, on-the-ground services have developed, meaning that a growing proportion of the scholarly literature is now OA. Evidence presented by Björk et al (2010) shows that from a random sample of 1837 journal articles published in 2008, 20.4% were available in an OA form (8.5% on publishers' websites and 11.9% in repositories). Although there were considerable disciplinary variations in this figure, it still shows considerable progress in the direction of making the scholarly literature openly available compared with a decade earlier when very little of the literature would have been available in this way. The publications presented here and the project work they report have made a contribution to this trend by raising the profile of the OA idea and also creating real OA services.

2.7 On Improved Access: Background to Open Access

The published works ‘on improved access’ presented in this submission mostly date from before those ‘on open access’. However, in many respects they provide early views of themes later taken up by the papers on OA. They are presented in this submission in order to provide some background on the development of the OA idea from a library and information services provider perspective.

Although studies had been carried out by Morrow (1995a, 1995b) on the overall national usage of the ISI citation indexes delivered by BIDS (Bath Information and Data Services), **Pinfield (1998)**, ‘The use of BIDS ISI in a research university: a case study of the University of Birmingham’, was the first study to be carried out at an institutional level and by subject discipline. It presents data from 1991 to 1997 collected at the University of Birmingham and analyses them at faculty level and also by user type (undergraduate or postgraduate student and staff). It makes two important points relating to themes which resurface in the later OA work presented in this submission.

Firstly, the paper shows the success of an online information service where usage is free at the point of access (at least from the end user perspective) rather than charged on a ‘pay-as-you-go’ basis. Until the late 1980s, the majority of online services could only be accessed on a timed charged-for basis and so usage tended to be very limited. BIDS was one of the first services to be made available via a site licence paid on the basis of a flat annual fee. In retrospect, it may be seen to show the potential of information made available without limitations on access from the user perspective (albeit within a restricted site). When combined with the development of the web as

a delivery platform for content during the 1990s, developments such as this undoubtedly affected the thinking of many researchers and information service providers about the potential of online delivery of research outputs.

Secondly, Pinfield (1998) provides an early discussion on disciplinary differences in relation to information usage and publishing cultures. It provides evidence of such cultural differences which come to play an important part in the OA discussions.

Dalton et al. (1998), 'The hybrid library and university strategy: a consultative exercise with senior university managers', also deals with cultural issues, concentrated this time on acceptance of and resistance to changing information resources delivery mechanisms. Based on semi-structured interviews of senior academic managers, it illustrates a number of inertias built into the system associated with uptake of online resources and particularly concern about quality indicators in the online environment. It is written in the context of discussion about the 'hybrid library', one which is designed to provide a more integrated user experience across both print and electronic resources (see Pinfield et al., 1998, and Oppenheim and Smithson, 1999). It also discusses issues to do with the interface between information usage and institutional policies. All of these issues figure prominently in the discussions on OA.

Pinfield (1999), 'The hybrid library: a view from the UK', also deals with the hybrid library concept, providing an overview of research and development in this area sponsored by JISC. It includes discussion of themes such as access management, systemic interoperability, metadata management, digital preservation and

information presentation. It also deals with the issue of the relationship between service provider and users within HEIs. All of these issues resurface in the published works on OA in this submission and show some significant continuities from a service provider perspective even when the fundamental access issues change but where the basic aim remains that of maximising access to high-quality resources.

The service provider – user relationship is again discussed in **Pinfield and Hampson (1999)**, ‘Partnership and customer service in the hybrid library’. This publication makes an important point about the roles played by library and information services (LIS) in HEIs in general. LIS organisations play three key roles: service provider, partner, and leader of innovation. ‘Service provider’ is about getting basic services right and delivering them to customers effectively; ‘partner’ is about working with colleagues to align developments in the LIS department with those of the parent institution; and ‘leader of innovation’ is about developing services which will be important in the future, where possible pre-empting stated demand. All of these are important and need to be balanced in delivering the LIS portfolio of services and projects. This tripartite approach to organisational mission underpins many of the discussions on OA service development within institutions in later publications. Service provision features prominently within discussions on the design and delivery of online systems and business processes (in, for example, Pinfield, 2001d, 2010, and Pinfield, Gardner and MacColl, 2002). Partnership-working with other stakeholders in institutions and beyond is also important (Pinfield, 2007a). In addition, the leadership role of information professionals is emphasised both in terms of encouraging cultural change, policy development, and system and service provision (Pinfield, 2004b, and 2010).

Pinfield (2001a), 'The relationship between national and institutional electronic library developments in the UK: an overview', deals with the relationship between information services development and delivery at institutional and national level. It looks in particular at the work of JISC in the UK both in terms of information provision and sponsoring of research-and-development activity. It deals specifically with issues arising from the eLib programme which funded a number of projects in UK HEIs aiming to improve digital information provision, including the development of the e-prints open-source software (which originated as the technical infrastructure for the CogPrints repository) at the University of Southampton, the deployment of which at Nottingham for an OA IR is described in Pinfield (2001d) and Pinfield, Gardner and MacColl (2002). The relationship between national policy development and institutions is an important theme taken up in a number of the publications on OA (including James et al., 2003, and Pinfield, 2005b).

Pinfield (2001b), 'The changing role of subject librarians in academic libraries', deals with the developing role of information professionals through an investigation of subject librarians. This paper relates only indirectly to the question of OA but it is worth noting that much of the institutional advocacy associated with OA in general and IRs in particular in the last decade has been designed and delivered by subject librarians (this has certainly been the case at Nottingham and in other SHERPA institutions). This role has proved to be important as a means of relating to different subject communities in HEIs in order to encourage uptake of OA-related services and also to identify concerns and barriers to development.

Pinfield (2001c), ‘Managing electronic library services: current issues in UK higher education institutions’, is the first publication by the present author to deal specifically with IRs. It places the management of repositories alongside a wide range of other service priorities for LIS departments. It is a very early assessment of the possible role of libraries in delivering OA services to their institutional users and beyond. This theme is taken up in more detail in Pinfield (2007a).

Pinfield (2004a), ‘eLib in retrospect: a national strategy for digital library development in the 1990s’, was published later than many of the other works ‘on improved access’ and provides a detailed evaluative account of the eLib programme. Apart from observing that eLib funded a number of significant scholarly communication developments relating to electronic journal provision and OA-related systems developments, the paper draws out a number of lessons about the relationship between institutional and national policy and activity. The approach supported by the eLib programme of action-based experimentation in the area of systems development (“demonstration is better than description”) was followed through in JISC’s FAIR programme which sponsored a large amount of OA-related work and is described in Pinfield (2003a).

These published works ‘on improved access’ cover the period from the early 1990s, when web-based information resources supporting research were in their infancy, to the period a decade later when the potential of open-access information delivery was beginning to be recognised. They cover a wide range of themes (managerial, technical, economic and cultural) which feed into the OA debate. They have in common the fundamental aim of lowering the barriers to effective information

transfer, an aim which was carried forward and underpins all of these works in this submission on open access.

2.8 The Future

It is sometimes commented that ‘people usually overestimate what can be achieved in one year and underestimate what can be achieved in ten’ (a version of this maxim is quoted in Odlyzko, 2002). This is perhaps true of open access. In the early 2000s, many people in the field expected that rapid disruptive change in scholarly communication would be possible. That view now looks naive. However, a great deal has been achieved in the last decade. New technologies have been developed and new systems deployed. New business models have been launched and new business processes introduced. The policies of governments, funders, publishers and institutions have been significantly altered. Cultural change has begun amongst researchers. There is a growing understanding of the (potential) benefits of OA for the research community in particular and society in general. Most importantly, information resources have become available in greater numbers in OA form.

However, there is still some way to go. Whilst work carried out in the last 10 years has defined key concepts, identified major benefits, and deployed new technologies, OA has yet to reach a tipping point which leads to it becoming mainstream in most disciplines. More work is required across the HE sector in different countries and disciplines to design and introduce systems and services which can encourage the continued growth of OA. At the same time, more data needs to be gathered and analysed which can provide an evidence base for further development in this area.

In the immediate future, research-and-development work will be needed on a number of important topics. Work is required to inform systems and service design and policy development. Work is also needed to understand better the usage of OA

systems by researchers and the implications of these usage patterns for different stakeholders and their roles in the scholarly communication process. The success (or otherwise) of particular funding and business models associated with OA also needs to be analysed so that costs and benefits (economic and wider) can be properly assessed. The incorporation of data and rich media in an OA scholarly communication environment, and the development of tools to use and analyse them, also need to be a major strand of future research-and-development work.

In particular, the success of the two routes to OA, repositories and journals, and the relationship between them need to be examined in order to ensure that a coherent and stable scholarly communication system incorporating OA can be allowed to develop which will benefit the research community in particular and society in general.

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3.2 Abbreviations

ALPSP: Association of Learned and Professional Society Publishers

BIDS: Bath Information and Data Services

BOAI: Budapest Open Access Initiative

CERN: Conseil Européen pour la Recherche Nucléaire, or European Council for Nuclear Research

CURL: Consortium of University Research Libraries (renamed Research Libraries UK in 2009)

EUA: European Universities Association

FAIR: Focus on Access to Institutional Resources

HE: Higher Education

HEI: Higher Education Institution

IPR: Intellectual Property Rights

IR: Institutional Repository

JISC: Joint Information Systems Committee

LIS: Library and Information Services

NIH: National Institutes of Health

NISO: National Information Standards Organization

OA: Open Access

OAI: Open Archives Initiative

OAI PMH: Open Archives Initiative Protocol for Metadata Harvesting

OAIS: Open Archival Information System

PEER: Publishing and the Ecology of European Research

RCUK: Research Councils UK

RIN: Research Information Network

RLUK: Research Libraries UK

RoMEO: Rights METadata for Open archiving

SHERPA: Securing a Hybrid Environment for Research Preservation and Access

SHERPA DP: SHERPA Digital Preservation

SPARC: Scholarly Publishing and Academic Resources Coalition

UUK: Universities UK

4. Statement of Authorship

The following are statements of authorship for the jointly-authored works in this submission in chronological order. These statements have been authorised by the other authors involved.

Dalton et al. (1998):

Dalton, P., Hampson, A., Nankivell, C., and Pinfield, S. (1998). The hybrid library and university strategy: a consultative exercise with senior university managers. *New Review of Information and Library Research*, 4, 43-52.

The research reported in the paper was jointly designed and conducted by all of the authors. Dalton and Nankivell carried out the initial analysis of the data and the results were then discussed by the research team as a whole who agreed on key issues arising from the fieldwork. Dalton and Nankivell then wrote the first draft of the paper with detailed revisions provided by Pinfield and Hampson. Further revisions were incorporated by all of the authors before completion of the paper.

Pinfield and Hampson (1999):

Pinfield, S. and Hampson, A. (1999). Partnership and customer service in the hybrid library. *New Review of Information and Library Research*, 5, 107-119.

The substance of the paper was conceived by Pinfield with input from Hampson as part of their work in the BUILDER project. It was based on a conference

presentation prepared jointly by Pinfield and Hampson and delivered by Pinfield.

Pinfield was the primary author of the article with additional comments by Hampson incorporated to the paper before completion.

Pinfield, Gardner, MacColl (2002):

Pinfield, S., Gardner, M. and MacColl, J. (2002). Setting up an institutional e-print archive. *Ariadne*, 31. <http://www.ariadne.ac.uk/issue31/eprint-archives/>.

Pinfield wrote the first draft of this paper reporting on activity jointly carried out by Pinfield and Gardner at Nottingham. Gardner contributed the section on technical issues and made other suggested changes to the paper. MacColl then added information on the Edinburgh experience and also provided revisions on the paper as a whole. Pinfield incorporated these suggested changes into the final version.

Pinfield and James (2003):

Pinfield, S. and James, H. (2003). The digital preservation of e-prints. *D-Lib Magazine*, 9, (9). <http://www.dlib.org/dlib/september03/pinfield/09pinfield.html>.

The content of the paper was initially conceived by Pinfield with input from James. Pinfield wrote the first draft of the article based on a conference presentation written and delivered by Pinfield. James incorporated the information on technical aspects of digital preservation (which had not been included in the conference presentation) and

suggested revisions to the paper as a whole. These changes were brought together in the final draft completed by Pinfield.

James et al. (2003):

James, H., Ruusalepp, R., Anderson, S. and Pinfield, S. (2003) Feasibility and Requirements Study on Preservation of E-Prints. Joint Information Systems Committee. http://www.jisc.ac.uk/uploaded_documents/e-prints_report_final.pdf.

The research was first conceived by Anderson and Pinfield in a funding proposal for JISC. Following confirmation of funding, all the authors worked together to design the project in detail. The research was then carried out by Ruusalepp and James with input at various stages from Anderson and Pinfield who continued to oversee the project. Ruusalepp and James were the primary authors of the report and incorporated comments from Anderson and Pinfield before completion.

Pinfield and Hubbard (2004):

Pinfield, S. and Hubbard, B. (2004) Free for All? House of Commons Select Committee on Science and Technology – Tenth Report, HC 399. Appendix 51:

Written evidence submitted by the SHERPA project.

<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/399we62.htm>; Appendix 143: Supplementary evidence requested by the Committee.

<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/399we173.htm>; SHERPA response to the Report published in House of Commons Select Committee on Science and Technology – Fourteenth Report, Appendix 4.

<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/1200/120002.htm>.

The submission was jointly conceived by Pinfield and Hubbard. Hubbard wrote an initial draft which was then comprehensively recast by Pinfield. Additional work was then carried out by both authors to clarify the recommendations and other details of the paper. The submission was agreed by both authors before completion. Hubbard wrote the appendix on costs, incorporating suggestions by Pinfield. The response to the Select Committee report was written by Pinfield, with comments from Hubbard incorporated before completion.

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