Chapter 6: Open Access

Our world in general is only just beginning to explore the potential of the Internet for virtually every area of human endeavor, including scholarly communication. As discussed in the last chapter, there are two simultaneous potentials at play, the potential of information as commodity, and the potential of information / knowledge as public good. All of the movements towards openness (open access, open data, open education, creative commons) are essentially moves towards information / knowledge as public good. One of the most critical open movements for scholarly communication is open access. Open access fulfills a fundamental value of librarianship, access to information, and is a key to developing an effective, affordable scholarly communication system. Librarians are leaders in the open access movement, both globally and at their own libraries and organizations.

Open access is an elegantly simple concept. As expressed by Peter Suber, in his *Open Access Overview:* **"Open access is literature that is digital, online, free of charge, and free of most copyright and licensing restrictions".**

Like many an elegantly simple concept, there is much more to open access than meets the eye at first. There are sub-concepts within the overall concept, and it can be difficult to separate open access from related and often overlapping movements and trends. As a key area for librarians, it is essential to understand open access, and so this chapter covers the definition of open access in some depth. When talking with faculty and students at the reference desk, or in an information literacy session or scholarly communication workshop, it is important to know that they may have reservations about open access based on misconceptions about what open access *is*, and with little or no knowledge of either the benefits of open access, or the disadvantages to scholarship of the ongoing crisis in scholarly communication.

There are faculty members who are skeptical about online journals, and think that only print journals are quality. People with such beliefs may well express concern about open access, when their real concern is online versus print. There are a number of potentially useful strategies in this type of situation, such as pointing to the possibility of publishing in a quality print journal and self-archiving for open access, discussing the benefits of online journals over print, addressing concerns that the faculty member may realistically have about the online environment, such as preservation and ensuring ongoing access, and pointing to high-impact open access journals.

Faculty need to publish, and so they will often be working with editors, and many are editors as well. Faculty come in contact with publisher viewpoints, whether in conversation with editors or publishers' representatives, or in the journals that they read. There are both friends and foes of open access in the publishing community. Open access publishers obviously support OA. There are also many subscriptions-based publishers that fully support OA in principle, and in practice to the extent that they believe they can, for example by permitting authors to retain their copyright, and/or to self-archive, or by making back issues of their journals freely available. On the other hand, there is a powerful and wealthy anti-OA lobby, supported by some publishers from both the commercial and not-for-profit sectors. It is essential that every librarian have some understanding of this group and their tactics, which sometimes includes deliberate deception. For example, based on advice from Eric Dezenhall, known as the "pitbull of public relations", some in the publishing community have utilized such tactics as attempting to equate traditional publishing with peer review, which is nonsensical as an open access tactic since open access is perfectly compatible with peer review. There is also the truly ludicrous strategy of attempting to equate open access with government censorship. The key point here is that when assessing anti-open-access arguments and research, it is very important to take any potential bias of the source into account, and examine the evidence with particular care.

A librarian may be called upon to help a faculty member decide whether a payment for a hybrid open access option offered by a subscription-based journal is a good deal or not; some such options really are open access, while other options leave authors with only very limited rights.

Open access policy mandates are being discussed and implemented around the world, and librarians may be called upon to help develop local policies. This chapter provides an overview of open access policy developments around the world, and lists key elements of good open access policy.

This chapter provides illustrations of open access, covering the largest open access archives, summarizes a of case study of the environmental sciences section in the Directory of Open Access Journals, and touches on a few of the major standards and projects associated with open access, such as OAI-PHM.

What is Open Access?

The focus of the open access movement, and its associated definitions, is the scholarly, peer-reviewed journal article. Librarians and open access advocates need to repeatedly emphasize this point, until open access is better understood. There is literature that is *not* peer reviewed – some of this literature is in print or behind subscription barriers, and some is freely available online. The fact that there is freely available material online that is not peer reviewed does not mean that online literature is not peer reviewed, just as the fact that there is print material that is not peer reviewed does not mean that print material is not peer reviewed.

Open Access can be described by using a set of basic definitions (the Budapest, Berlin & Bethesda or BBB definitions), by categorizing it into two types (green or open access archives and gold or open access journals), by identifying two levels of open (gratis or free to read and libre or free to read and re-use), and by distinguishing the open access work and open access processes.

Budapest, Berlin & Bethesda: the BBB definition of open access

From 2002-2003, a series of international meetings were held in three cities with names that happened to begin with “B”. The purpose of these meetings was to bring together like-minded individuals and organizations with a common desire to make scholarship freely available online, and hammer out a common term and definitions. The *Budapest Open Access Initiative* (2002), the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities* (2003), and the *Bethesda Statement on Open Access Publishing* (2003), all include very similar definitions of open access, so that collectively this is referred to as the BBB definition of open access. There is more to the Budapest, Berlin, and Bethesda (BBB) statements than defining open access; each statement includes strategies for, and commitment to, implementing open access. Since BBB, there have been other major open access statements of international significance, including the Bangalore and Brisbane declarations, discussed later in this chapter in the section on open access policy.

Details of the definitional elements of the Budapest, Bethesda, and Berlin statements can be found in Appendix A. Following is the first and most succinct of the definitions of open access, from the Budapest Open Access Initiative (February 14, 2002):

> *By "open access" to this 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.
http://www.soros.org/openaccess/read.shtml

The only element considered missing from Budapest is *immediate* open access, addressed in the subsequent Bethesda statement. When publishers make back issues freely available, they are providing a wonderful service and expanding access, but this is not open access.

Two basic approaches to open access: archives (green) and journals (gold)

The BBB definition covers what open access is. There are two basic ways of *providing* open access, called open access archives (or green open access) and open access journals (or gold open access).

- **open access archives**: also called **green** open access. A copy of an article is placed in an archive for open access. If the author places the item in the open access archive, or someone acting on behalf of the author, this is called author **self-archiving**. Publishers of journals can also place articles in archives for open access. For example, many publishers, both open access and subscription-based publishers, place journal contents in PubMedCentral for open access.

- **open access journals**; also called **gold** open access. The journal itself is open access, and an article becomes open access **immediately** as part of the process of publishing. There are fully open access journals, and hybrid journals with some content open access and other content toll access. Gold open access is to be distinguished from journals that make back issues freely available after an embargo or delay period.

These two approaches are compatible. An article can be published in an open access journal, and also deposited in an open access archive.

Two kinds of open access: gratis (free to read) and libre (free to re-use)

There are two key aspects of free in the major definitions of open access, and there are two corresponding sub-definitions of open access, reflecting this distinction:

- **gratis open access**: free to read / free of charge
- **libre open access**: free to read / free of charge, and free of at least some copyright and licensing restrictions / free for re-use

In practice, there are many variations on these themes. There are items that are free to read online, but not to download or print. There are documents that are free to read, print, or distribute, as long as the usage is not commercial in nature. Derivatives are allowed with some open access works, but not others. This distinction is important for two reasons. First, scholarly communication is in transition. The majority of scholarly journals, whether subscriptions-based or open access, are neither fully closed nor fully open. Most subscription-based journals allow authors to self-archive, and many provide free access to back issues. Open access journals range from just gratis, to fully libre, with many shades in between. Second, and more importantly in the longer term, is that it is libre open access that has the much greater potential for transformative change in scholarly communication, and so education and encouragement towards libre open access are appropriate. Peter Suber discusses gratis and libre open access in some depth in the SPARC Open Access Newsletter [August 2008].

Open Access: work and process

The concept of Open Access can be applied to a work or to a process.

Open Access work: a work can be said to be open access when it is, at minimum, free for anyone, anywhere to read online (gratis open access), or, better yet, free to read and free for anyone to re-use (libre open access). A work that has been closed access for the full term of copyright can be made open access after it enters the public domain.

Open Access process: a process, such as publishing, can be open access. The term open access should be reserved for full open access publishing, where a work is made open access (gratis or libre) as part of the publishing process, with no delay.

For example, when a journal employs a transitional strategy such as free back issues, it makes sense to say that the journal is NOT open access, but rather that it uses a free back issues strategy. The issues and the articles, as they become free, however, ARE open access. That is, it is the works that are open access, even though the journal / publisher is not OA. To avoid confusion, it is best to refer to the journal's strategy as free back issues, not open access.

The open access / toll access continuum

Open Access and Subscription or Toll Access can be seen as a continuum, with a fully toll access article, journal or publisher on one end, and a fully open access article, journal, or publisher, on the other end. From this perspective, the vast majority of articles, journals, and publishers, are somewhere in between, for example toll access journals offering free back issues, hybrid journals, and the majority of journals that allow open access through author self-archiving. John Willinsky covers the many flavors of open access in the Access Principle [2006].

The benefits of open access

The first paragraph of the Budapest Open Access Initiative beautifully encapsulates many of the benefits of open access:

> *An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the Internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds. Removing access barriers to this literature will accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge*.

The primary benefit of open access is expanded *access*. A researcher at a large university library will have significant and transparent access to the world's scholarly literature, thanks to the services of the university library. Such a researcher will not be aware of the prohibitively high costs of access for others, including their alumni, local businesses, government employees including the staff of funding agencies, professionals in their communities and the public at large. They may not be aware that when they publish in a subscription-based journal, not even every large research library will subscribe, so that their article may be *accessible* at other universities, but much less *visible* than it might be.

The difference in access is particularly obvious in the developing world. A study by Kirsop et al [2007] illustrates the difference open access makes. Downloads from about 60 Bioline International open access journals reached 2.5 million in 2006. On a per-usage basis, this is very

much greater usage than that reported for the publisher-mediated program HINARI, which provides limited access to developing countries for subscription journals on a charitable basis. The 2006 article downloads for HINARI was about 3 million for about 3,000 journals. Without open access or charitable programs, both of which aim to increase access without the exchange of fees, access to the scholarly literature in most developing countries would be virtually nil.

Open Access is happening around the world. For the developing countries, open access levels the playing field for access to scholarly knowledge, but it also means more equitable opportunities to *participate* in the development of the world's knowledge. Library budgets are stretched to the maximum in the developed world. Subscriptions to the journals of developing countries are not common. However, it is easy to include journals from developing countries in library collections when they are open access.

Open Access and author's rights

Open Access is closely connected with the authors' rights movement, discussed in detail in the chapter on Authors' Rights and Intellectual Property, because authors must retain at least *some* of their rights in order to make their work open access. There are many other practical benefits to authors when they, and their colleagues, retain their rights and make their work open access. When an author retains copyright, they need not ask anyone's permission to hand out copies in their own classroom. Full copyright retention leaves authors completely free to re-use their own work, in other publications, presentations, and so forth. When an author grants libre open access to all, any other faculty member can also hand out copies in the classroom, or place them on reserve, with no need to clear permissions, as long as the author and journal of publication are appropriately acknowledged.

The Open Access citation impact advantage

There is a substantial body of literature illustrating that articles that are open access are likely to receive significantly more citations. This effect has been demonstrated in many different disciplines. There is no exact figure for the citation impact advantage, as citation rates vary considerably from one discipline to another. Steve Hitchcock maintains an excellent bibliography of studies on the open access citation impact advantage, and explains this complex research area. There is some work suggesting that the open access citation impact advantage per se could be conflated with a tendency for the best articles to be made open access. Recent studies by Phil Davis et al. have created some controversy by claiming that there is no citation impact advantage. In evaluating these studies, it is important to understand that the citation impact advantage usually appears at least a year or two after the original publication of an article (after subsequent citing articles have been written and published). Prior to the OA citation impact advantage, an early difference in downloads is usually found. The Davis studies found the early download advantage for open access articles, and there is reason to believe that the results were simply released too early. This, and other methodological limitations of Davis' study, are explained in detailed by Harnad [2008].

OAI (Open Archives Initiative) and OAI-PMH (OAI-Protocol for Metadata Harvesting)

Before we delve into open access archives, a brief overview of the Open Archives Initiative, which develops interoperability standards for archives, is in order. With OAI, materials can be deposited in any one of the thousands of repositories, and metadata can be harvested using the OAI-Protocol for Metadata Harvesting (OAI-PMH), with search results linking to the originating repository. OAI-PMH can be used to gather metadata from open access archives, repositories with openly accessible metadata, or other sources such as open access journals, which support the protocol. Both D-Space and E-Prints support OAI.

This protocol has contributed to the widespread dissemination of metadata describing open access scholarship by providing a robust way of automating the exchange of information used to

discover and describe open access material. Perhaps just as importantly, its goals are consistent with those of open access: to promote the sharing and reuse of information and to reduce the barriers to access that closed, proprietary, or expensive systems reinforce.

Software
Commonly used repository software includes D-Space, E-Prints, and Fedora. *SWORD* is a tool to facilitate cross depositing from one repository to another. DSpace and E-Prints feature built in support for author self archiving and the OAI-PMH.

Green: open access archives

This section presents an overview of a few of the larger open access disciplinary archives (PubMedCentral, arXiv, RePEC, and E-LIS), and a few tools important to disciplinary or institutional open access archives.

PubMedCentral (PMC), an open access / public access archive hosted by the U.S. National Library of Medicine, is the world's largest open access repository. A search of PMC from Entrez PubMed, NLM's free version of Medline, for free fulltext yields over 2.4 million items as of September 2008; over a million of these items are housed in PMC.

PMC expands access by including works that are publicly or openly accessible, but PMC also does more. One of the purposes of PMC is archiving of the medical literature in electronic form. Preservation of the medical literature has long been a mandate of the U.S. National Library of Medicine. PMC carries this function into the online environment. PMC archives materials in XML format, for preservation purposes. Not every format is designed for permanency. It is not clear, for example, whether a word document in a current version will be viewable well into the future. The standards-based XML is more of a known quality for preservation purposes.

Another advantage of XML is that it allows PMC to facilitate linking, from Entrez PubMed to PMC and back, from one article within PMC to another, and to other U.S. National Library of Medicine resources such as the Genome database. This kind of linking is one of the benefits of libre open access.

PMC is designed to eventually become an international collaboration of digital archives specializing in medicine and allied health sciences. This will help to ensure preservation of the medical literature, as archiving is more likely to be successful if there are a number of working copies of an archive; and, it is anticipated that this approach will facilitate archiving in other countries, as medical funders outside of the U.S. may be more comfortable requiring deposit in a local repository. So far, a second PMC is operational in the U.K. (UKPMC); discussions and/or testing are in progress on the creation of more PMC archives in other countries, including China, Japan, South Africa, Italy and soon Canada [PMC Advisory Committee Minutes, 2007].

arXiv.org is an e-prints server for physics, mathematics, computer science, quantitative biology and statistics. Launched is 1991 by Paul Ginsparg, arXiv is the world's oldest and second-largest open access archive, with more than half a million e-prints as of October 2008. The main arXiv server is hosted by Cornell University Library, with 18 mirror sites in 15 countries. Self-archiving in some areas of physics, such as high energy physics, is nearly 100%. arXiv is heavily used; connections statistics of over a million per day on the main server alone are not unusual. arXiv builds on a preprints culture in physics. arXiv e-prints are what physicists tend to read, while relying on the final published version for citation purposes.

RePEc, Research Papers in Economics, is a large, distributed collection of papers in economics, a field which shares with physics a long history of sharing of working papers prior to publication. RePEc relies on a model of volunteer collaborators around the world. Many entries in RePEc contain only metadata, not full text.

E-LIS, the Open Archive for Library and Information Studies, (discussed in detail in the chapter on librarians and libraries), is the world's largest archive in LIS. E-LIS is hosted by CILEA in Italy, and relies on a team of volunteer editors around the world.

Institutional Repositories: there are hundreds of institutional repositories around the world, mostly in universities. The Association of Research Libraries [2006] published a SPEC Kit focusing on ARL Institutional Repositories, edited by Charles Bailey. At that time, more than 30% of ARL libraries had an institutional repository, and it was anticipated that more than 55% would have an operational IR by the end of 2007. Given progress on open access deposit mandates since that time, it appears likely that the percentage of university libraries with IRs has increased since 2006, and will continue to increase.

Institutional repositories may have a variety of different materials, or be limited in type, depending on local policies. It is common to find theses in institutional repositories.

OpenDOAR is a quality-assured list of open access repositories around the world. Each repository is checked by OpenDOAR staff; as of September 2008, OpenDOAR lists more than 1,200 repositories. OpenDOAR is maintained by SHERPA.

Searching for the largest repositories through OpenDOAR quickly reveals the global reach and wide variety of the institutional repository movement. The numbers can be misleading, as some archives are fully open access, while others feature a mix of freely available metadata and open access items. *Dspace@Cambridge* contains close over 180,000 items, mainly from a dataset of small molecules. The *Aristotle University of Thessaloniki Repository* includes more than 50,000 theses, articles, papers and photos from students and faculty at the university. *DSpace at Vidyanidhi*, an institutional repository for the university at Mysore, contains more than 54,000 doctoral theses. The National Taiwan University Repository provides access to the research output of the university, more than 45,000 items.

SHERPA RoMEO Publisher copyright policies & self-archiving provides a summary of permissions normally provided for self-archiving in publishers' copyright agreements. This is a useful tool for authors looking for suitable venues to publish in when they would like to make their work open access, and for authors and archives staff alike to look up publishers' policies. A list of publishers offering paid option access is available as well.

OAIster is a union catalogue for digital resources, searching metadata harvested from open access repositories using the OAI-PMH protocol. OAIster is supported by the University of Michigan. As of September 2008, an OAIster search encompasses more than 17 million items from over 1,000 repositories. Not all items in the repositories are open access; in some cases, only the metadata is open access.

While many of the items in institutional repositories can be found through a Google search, a study by OAIster staffers Kat Hagedorn and Joshua Santelli [2008] illustrates why services such as OAIster are still needed; only 44% of the items available through OAIster, were retrieved through a Google search.

ScientificCommons.Org aims to "provide the most comprehensive and freely available access to scientific knowledge on the Internet". This project of the University of Gallen in Switzerland, still in beta test, as of fall 2008 encompasses more than 22 million items from close to 9 million authors, from over 900 archives.

Issues with green open access: as institutional repositories are new, key issues are education, promotion, content recruitment, copyright / author's rights, and open access policy (see policy section below).

Occasionally, deposit of one item in multiple repositories is seen as an issue. For example, an author may wish to deposit in both an institutional and subject repository; in some cases, authors may have more than one institutional repository with which they are affiliated. Also, a document with multiple authors may be placed in many repositories. While multiple deposits are not necessary due to the availability of searching across repositories using the OAI-PMH protocol, multiple deposits are desirable from the point of view of preservation, following the principle that multiple copies decreases the likelihood that documents will become inaccessible in the future. There are workload issues with multiple deposits, but these may be mitigated with the full deployment of tools such as SWORD and support.

Gold: open access publishing: environmental science case study

Some of the largest and best-known open access publishers (Public Library of Science and BioMedCentral) were discussed in the chapter on Libraries and Librarians.
The major focus of this section is a summary of case study of open access environmental science journals listed in the Directory of Open Access Journals (DOAJ) as of September 2008. The reason a case study approach is used, is because some of the larger publishers in open access are not necessarily typical. As discussed in the chapter on publishing, the vast majority of publishers are small society publishers, often publishing only one to three journals. A focus on larger publishers can easily overlook what is more typical in scholarly publishing.

Let us begin by debunking that myth that open access is synonymous with the "author-pays" model. There are certainly some open access journals and publishers that rely on article processing fees; even here, it is misleading to refer to this business model as "author-pays", because payments are generally not made by authors, but rather by funding agencies, university departments or libraries.

The majority of open access journals do *no*t charge article processing fees; indeed, open access journals are less likely to have author fees than traditional subscription journals, as reported by Kaufman-Wills [2005]. Open access journals rely on a wide variety of business models, ranging from subsidies from their society publishers, libraries, universities, or government, to advertising, to volunteer labor and in-kind support. While the Kaufmann-Wills 2005 study found that 47% of open access journals rely on article processing fees, more recent studies indicate a lower percentage. For example, a recent survey by Hooker [2007] found that of the fully open access journals listed in the Directory of Open Access Journals, 67% do not charge article processing fees. A study by Suber and Sutton [2007] found that 83% of society open access publishers do not charge article processing fees.

DOAJ Environmental Sciences

DOAJ lists 67 fully open access journals under Environmental Sciences as of September 2008. The DOAJ author search, which includes hybrid as well as fully open access journals, lists 75 journals under Environmental Sciences. Of the 75 journals (including hybrids), 44 or 59% do NOT have publication charges; 28 or 37% DO have publication charges; and information on publication charges is missing for 3 journals. This is typical and affirms the findings of the Kaufman-Wills, and Suber-Sutton studies: the majority of open access journals do NOT charge publication fees.

The 75 environmental science hybrid journals listed in DOAJ are published by 59 different publishers. It is not known how many of the 59 different publishers only publish one journal, as some likely publish journals in different subject areas. English is the predominant language in this group of journals; 38 or half are in English only, and 21 feature a combination of languages, most including English as one of the languages. Other languages represented include French, Portuguese, Spanish, Croatian, and Turkish. Most of the journals in this section are new, which is not surprising given the subject matter. The oldest journal is *Current Science*, with a start date of 1932. The largest open access publisher in this area is Copernicus Publications, a not-for-

profit corporation with an interesting approach to article processing fees, which rewards authors who submit in the optimum format and/or according to the technical specifications with substantially lower fees. The full case study, including specific examples of journals and further analysis, can be found in Appendix [B].

Open access policy

Over the past few years, a movement towards requiring open access to the results of scholarly research has been growing, around the world. Librarians and library associations have been among the leaders in advocating for open access policy. There are over 50 open access policies to date, with many more in development. This section will present an overview of open access policies in place and under development at research funding agencies and universities, with a focus on key points.

Open access policy is also described as green open access policy. There are two main reasons why open access policy is almost invariably focused on green, or open access archives, rather than open access publishing. The first is that open access policies apply to the researcher, not the publisher. The second is that green policies support wider choice for the researcher, who can comply with the policy by publishing in either an open access or a toll-based journal, and self-archiving a copy of their article for open access. Green open access policies are consistent with the practices of the majority of publishers.

Research funding agencies, particularly in the medical area, have been early adopters of open access policies. From the point of view of a research funding agency, open access just makes sense; more researchers can read and build on the results of the funded research, advancing discoveries in the areas that are of priority to the research funding agency. The results of funded research are more visible, enhancing accountability. Often, funding agencies have very limited access to subscriptions to scholarly journals, so open access makes the research more accessible, even to staff at the funding agency.
Medical Research Funding Agencies' open access mandate policies

U.S. National Institutes of Health Public Access policy

The U.S.' National Institutes of Health, the world's largest medical research funder with a funding portfolio of about $29 billion per year, was among the first funding agencies to develop a voluntary open access policy, with the *Public Access* policy of 2004. It should be noted that Public Access is not equivalent to OA. One of the most important lessons from the NIH early adoption was the importance of making open access required, not voluntary; under the voluntary policy, compliance was dismal – only 4% in the first year. This has recently been remedied, with a strong public access mandate policy coming into effect in April of 2008. Early indications are that making the policy a requirement has been very successful. According to the NIH [2008], the total public access for 2005-2007 before the policy was 19% of all NIH-funded articles (12% author manuscripts, 7% publishers' final PDF). Estimated compliance to August 2008 is 56% (30% author manuscripts, 26% publishers' PDF).

The NIH requires researchers to deposit a copy of their final peer-reviewed manuscript in PubMedCentral on acceptance for publication. Open access can be delayed for a maximum of 12 months. Many publishers are voluntarily assisting authors in complying with the policy, making deposits on behalf of authors. Many journals are voluntarily contributing *all* of the journal contents to PubMedCentral, some immediately, and others after a delay period.

This immediate deposit / optional release strategy is another essential element for a successful open access policy. If there is an embargo, authors are much more likely to be able to find their final peer-reviewed manuscript just as it is accepted for publication, than months or up to a year later. For the research funder, it is possible to monitor compliance with an embargoed article without waiting until the end of the embargo period. That is, if the researcher is submitting an

application for further funding during the embargo period, proof of compliance with the requirement for public access can be established. The NIH Public Access policy reflects gratis rather than libre open access, although the NIH does encourage libre OA.

As soon as the NIH Public Access policy became a requirement, many universities and their librarians became very busy helping researchers to ensure compliance. This is one of the driving forces behind the authors' rights movement, and many researchers sought to ensure that they would be able to retain the needed rights when seeking publication. This subject is covered in detail in the chapter on Author's Rights and Intellectual Property.

As Peter Suber details in the October 2008 SPARC Open Access Newsletter, six months after the NIH Public Access policy became a mandate, publishers were lobbying for a bill to overturn the policy, the Conyers *Fair Copyright in Research Works Act*, which would change both copyright law and U.S. government procurements practices. Fortunately, as this book is written, this bill did not go through before the 2008 U.S. Election. Open access advocates will be watching carefully to see if it is reintroduced, and in what form.

Other medical funding agencies' open access policies

The Wellcome Trust, a private charitable organization, is the largest medical research funder in the U.K. The Wellcome Trust was an early adopter of a very strong policy, *Open and Unrestricted Access to the Outputs of Published Research*. Wellcome-funded researchers are required to deposit a copy of their work for open access in UK-PubMedCentral as soon as possible, but no longer than 6 months after publication. While the U.S. NIH allows up to a 12-month embargo period, a maximum of 6 months is emerging as an international standard. The Wellcome Trust also makes available a fund for article processing fees for open access. Libre open access is encouraged, and when Wellcome Trust funds are used to pay for OA article processing fees, it is required**.**

Many other funding agencies in the medical area have adopted open access policies, including the U.K.'s Medical Research Council, Canada's Canadian Institutes for Health Research, the Howard Hughes Medical Institute, and Ireland's Health Research Board, to name just a few.

Non-medical research funding agencies' open access policies

The arguments for open access are relatively easy to understand in the area of medical research where the public interest is most obvious. However, the same arguments, for example that open access serves the interests of the public that funds the research, by speeding up discovery, giving the public rights to access the result of the research that they have funded (taxpayer access), apply in every area where public funds are spent on research which is published. The exception is classified research (which is not published). The public interest arguments are just as compelling in the area of environmental science as they are in medical research, for example.

In 2006, a bill called the Federal Research Public Access Act (FRPAA) was introduced in the U.S., which would require every federal department with a funding portfolio of $100 million or more (11 departments) to develop a public access policy. This bill is no longer active, but watch for either FRPAA or a similar bill to be introduced in the near to medium future, now that the details of the NIH Public Access Policy have been worked out.

France's Agence Nationale de la Recherche (ANR) (National Research Agency), a general science funding agency, with a 2007 budget of 825 million Euros, implemented an open access policy in 2007 requiring deposit of results of all ANR funded research in a national archive, HAL, at the earliest possible opportunity.

In the UK, all the Research Councils have committed to developing open access policies, and six of the seven councils already have policies in place. The UK Natural Environment Research

Council requires that a copy of the published peer-reviewed results of any research they fund be deposited at the earliest opportunity in an e-prints repository; datasets must be deposited in one of their data centres.

The SHERPA project maintains a list of Research Funding Agencies' Open Access Policies, called SHERPA JULIET.

Institutional open access mandates

As of October 2008, there are 24 institutional open access mandates, in many countries. Many more mandates are in the works; the reader is advised to refer to the *Registry of Open Access Material Archiving Policies (ROARMAP)* for a current list of institutional mandates.

Australia's *Queensland University of Technology* was among the first to implement a strong university-wide policy, which states: "Material which represents the total publicly available research and scholarly output of the University is to be located in the University's digital or "E print" repository, subject to the exclusions noted." "Exclusions" include material to be commercialized, or of a confidential nature. The effectiveness of the policy can be seen by a spike in deposits in 2004 (available from the Queensland website), just after the policy took effect.

The *European Research Council* is a new body dating from 2005, a new Europe-wide funding agency dedicated to funding research excellence. The funding envelope for a recent granting round (Advanced Grant Competition) is 4 billion Euros. The European Research Council (ERC) adopted a position in support of open access in 2006, recommending open access within 6 months of publication, and no longer than 12 months after publication. The ERC policy is not a requirement, reflecting, according to the ERC Scientific Council Statement on Open Access, practical considerations, such as the need to wait for development of institutional repositories to support open access policy.

The optimum mandate may well be the mandate adopted by the faculty themselves. The first development along these lines was the unanimous adoption of an open access resolution by the faculty of the *Harvard Faculty of Arts and Sciences*. As reported by Mitchell [2008],

> "In a move to disseminate faculty research and scholarship more broadly, the Faculty of Arts and Sciences (FAS) voted Tuesday (Feb. 12) to give the University a **worldwide license to make each faculty member's scholarly articles available and to exercise the copyright in the articles, provided that the articles are not sold for a profit**".

The Harvard legislation was proposed by professor Stuart M. Shieber, and supported by Harvard University Library Director Robert Darnton. It is likely that Harvard University Library will play a lead role in implementing the policy, particularly developing a repository to support the policy.

Similar open access mandates have since been adopted by the Harvard Law School and Stanford University Faculty of Education. The experience at Stanford suggests that this approach could prove a popular one; as reported by John Willinsky at the ELPUB conference in Toronto, June 2008, Willinsky mentioned the Harvard mandate at a faculty meeting and was pleasantly surprised when the Faculty of Education decided to approve a very similar mandate, unanimously, in less than an hour!

Major declarations of open access intentions

That the more than 50 open access mandates around the world as of fall 2008 is merely a hint of what is to come, is illustrated below by a few major, multi-national declarations of intentions to develop and implement open access policy. A 2008 meeting hosted by Queensland University of Technology brought forward a bold recommendation for a national open access policy in Australia called the *Brisbane Declaration*, calling for open access to publicly funded research in Australia,

through digital institutional repositories [Appendix C]. The *Bangalore Statement*, drafted by Alma Swan and Barbara Kirsop with some help from Subbiah Arunachalam, is a model of open access policy for developing countries. The suggested policy calls for developing countries to require open access to government funded research, and encourages open access publishing wherever possible. The model policy can be found in Appendix D.

The *European University Association* (EUA) [2008] **unanimously** endorsed their Working Group on Open Access' recommendations, to set up institutional repository services and open access mandates at every member of the European University Association, a body of more than 700 universities in over 40 countries in Europe. It is only natural that implementation of these recommendations, endorsed in March 2008, will take a little while, as many universities still need to set up institutional repositories services, and it is important to educate local administrators and faculty and engage them in creating the mandates at the university level.

To summarize, there is a worldwide trend towards mandating or requiring open access to scholarly research, by those who fund the research, universities and their departments, and scholars themselves. While developments to date are already very impressive, there are early indications, such as the unanimous commitment to OA policy development by every university in Europe, that there is a very great deal more to come. The most exciting possibility is Harvard-style mandates, created and endorsed by the scholars themselves.

An open access mandate policy is always for green or self-archiving open access (inclusive of gold or open access publishing, as authors can publish in open access journals and self-archive in repositories, too). Libraries do not set open access policy, but may be called upon to help develop draft policies.

Key elements of good open access policy:

- open access is required, not requested. There are publishers who oppose open access, and will take advantage of any loophole to make it difficult for their authors to comply with a policy.
- calls for archiving (green) open access. This is inclusive of open access publishing, as an article published in an open access journal can also be deposited in an open access archive
- immediate deposit / optional delayed release – if an embargo or delayed is permitted, authors should deposit as soon as their article is accepted for publication. It is much easier for authors to find the appropriate copy at this point in time, and much easier to check on compliance.
- keep embargoes to the minimum necessary – 6 months is an emerging standard internationally, and include language to review the policy with a view to decreasing or eliminating the embargo
- include support for implementation whenever possible, such as commitment to build an institutional repository, or support for open access publishing, effective procedures for monitoring and rewarding compliance

Anti-Open Access Lobbying

There has been considerable resistance to open access policy from the publishing community, primarily from the profitable (or highly profitable) segment of scholarly publishing. It is very important for librarians to be aware of these lobbying efforts, and in particular, techniques involving deliberate deception.

Resistance to open access has often taken the form of making claims about open access being something other than what it really is, such as contrasting subscription-based peer review with open access, as if open access were not compatible with peer review. Sometimes, this resistance is genuine misperception, perhaps reflecting fear of change. However, some of the

deception is deliberate. This is illustrated by the Association of American Publishers' hiring of Eric Dezenhall, known as the 'Pit Bull of Public Relations', as reported by Jim Giles in *Nature* [2007]. Giles reports that, according to e-mails leaked to him, several executives from Elsevier, Wiley, and the American Chemical Society, met with Dezenhall, who subsequently sent some strategy suggestions, to focus on simple messages such as "public access equals censorship", and "attempt to equate traditional publishing models with peer review". It is, of course, sheer nonsense to claim that public access equals censorship, and the more than 3,700 fully open access, peer-reviewed journals listed in the Directory of Open Access Journals (DOAJ) are sufficient proof that open access is perfectly compatible with peer review. Officials from the Association of American Publishers confirmed the hiring of Dezenhall. Subsequent PRISM (Partnership for Research Integrity in Science and Medicine) anti-open access lobbying confirms that the publishing industry followed Dezenhall's advice. While the PRISM campaign backfired badly (no publisher ever publicly endorsed PRISM, and a number made a point of distancing themselves), PRISM was merely one example of this deception. Peter Suber offers a thorough rebuttal to the argument that open access threatens peer review in the September 2007 SPARC Open Access Newsletter.

Just to be clear: open access is perfectly compatible with peer review of the same standard as subscription-based publishing. Indeed, there is no logical reason why open access journals could not practice higher standards of peer review. This is not to say that OA journals DO practice higher standards of peer review, just that there is no logical argument as to why this is not possible.

The potential for confusion is not entirely due to resistance to open access. It is not unusual for open access to be mixed up, conflated or confused with other trends that are happening at the same time. Many journals are still published in print, and some scholars are uncertain about the quality and prestige of online journals, whether they are open access or subscriptions-based. There are many initiatives designed to expand access, such as sitewide, regional or national licensing, and it is not unusual for librarians, publishers, and scholars alike to confuse these initiatives with open access. Salespeople have been known to use the term "open access" to refer to a free trial period.

Because open access is one of the keys to transformation of scholarly communication, the basis of many current and emerging initiatives by librarians, publishers, and scholars, and the subject of public policy, it is essential for librarians and indeed, everyone involved in scholarly communication, to develop an accurate understanding of what open access *is*.

The Dramatic Growth of Open Access

Despite the anti-OA lobbying, there are very substantial numbers of open access resources, and the growth rate is phenomenal. As reported by Morrison [2008], as of October 2008, there are more than 3,600 journals listed in the Directory of Open Access Journals; this is more than 15% of the estimated 20-25,000 scholarly peer reviewed journals in the world. DOAJ had added a net total 822 journals from September 30, 2007 – September 30, 2008, for an average growth rate of 2.25 titles per calendar day (up from 1.2 the previous year; even the growth rate of DOAJ had doubled). The average growth rate per day for DOAJ is calculated by dividing the net increase in journal titles by the number of days in a year; for September 30, 2007 – September 30, 2008, this is 822/365 = 2.25 titles added per calendar day. In the third quarter of 2008, more than 3 million publications were added to Scientific Commons.

Learning More and Keeping Up

Not only is open access growing dramatically, progress in the transition to open access is being made on a daily basis. New open access policies are in development; publishers are adjusting, and new publishers and journals are emerging. As open access progresses, so do a number of

related emerging trends, the subject of a future chapter. Here are a couple of resources to learn more about open access, and to keep up.

Open Access Directory (OAD)
A wiki developed by and for the open access community, OAD includes a wide variety of lists on open access, from a bibliography, acronyms, and FAQs, to an OA Speaker's Bureau, jobs in OA, to research questions and research in progress.

Open Access News
Peter Suber's blog is the most comprehensive, up-to-date source of open access news on the planet. Includes information and links related materials, including the monthly SPARC Open Access Newsletter, Peter's Open Access Overview and A Very Brief Introduction to Open Access (translated into 15 languages), Open Access Timeline, and more.

Summary

Open Access is one of many open movements occurring around the world, one of the many potentials opened up by the Internet. Open access is scholarly literature that is digital, online, free to read and free of most copyright and licensing restrictions. Open access can be green, when authors self-archive their work for open access, or gold, when the publisher makes the work open access. Open access can be gratis (free to read) or libre (free to read and to reuse). Open access can apply to the works themselves, or to the process of making works open access. When a publisher or journal provides free access to back issues, this is best described as free back issues. Once the articles themselves become free, it is appropriate to refer to the article (but not the journal or the publisher) as open access.

The growth of open access, on a global scale, is nothing short of phenomenal. There are already millions of open access items in institutional and disciplinary repositories, and over 3,700 fully open access, peer-reviewed scholarly journals.

Research funders, universities, departments, and faculty themselves, are creating open access policies. There are already more than 50 open access mandate policies, with a great many more to come, as illustrated by the unanimous commitment of the European University Association to create open access policies at every university in Europe.

There are roles for librarians in every aspect of open access, from raising awareness of the potential to creating and supporting institutional repositories, to advocating for, and assisting with the implementation, of open access policy, to supporting open access publishing, directly by hosting journals or indirectly through economic support for open access publishing.

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