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Scholar-based innovations in publishing. Part III: Organizational and national initiatives

Science advances when there's a free exchange of ideas. We move faster by being open ... (Young, 2002).

In two previous reviews, select individual, institutional, library and professional scholar-based publishing options were described. In this last of a three-part series, major organizational and national efforts are profiled.

Organizational*BioMed Central: The Open Access Publisher*

Launched in May 2000, BioMed Central (www.biomedcentral.com) is an "independent publishing house committed to providing immediate free access to peer-reviewed biomedical research" (see Figure 1). BioMed Central publishes electronic and print/electronic journals on a wide variety of subjects, with coverage ranging from general topics (e.g. *Journal of Biology*), cardiovascular disorders (e.g. *Current Cardiology Reports*), endocrine disorders (e.g. *Reproductive Biology and Endocrinology*), and genetics (e.g. *Genome Biology*), to immunology (e.g. *Journal of Immune-Based Therapies and Vaccines*), microbiology (e.g. *Annals of Clinical Microbiology and Antimicrobials*), pharmacology (e.g. *Current Opinion in Investigational Drugs*), and women's health (e.g. *Breast Cancer Research*) (www.biomedcentral.com/browse/bysubject/).

The author is most grateful to the following individuals for granting permission to use screen images from their respective projects or Web sites: Figure 1: Julian Rickard, BioMed Central; Figure 2: Hugo Fjelsted Alrøe, Danish Research Centre for Organic Farming; Figure 3: Susanne DeRisi, Public Library of Science; Figure 4: Gerard van Westrienen, SURF; Figure 5: Ruth Martin, UKOLN; Figure 6: Abel Packer, SciELO.

In addition, BioMed Central also publishes nearly 60 titles in its own BMC series that cover the "whole of biology and medicine" (e.g. *BMC Anesthesiology*, *BMC Cancer*, *BMC Dermatology*, *BMC Immunology* and *BMC Physiology*) (www.biomedcentral.com/info/about/thebmcjournals).

All submitted manuscripts to a BioMed Central journal are fully and expeditiously peer-reviewed. In select cases, most notably with all BMC medical journals, referees are requested to provide signed reviews. In addition, pre-publication versions of each paper and associated correspondence (i.e. submitted version(s), reviewer reports, author responses) are made available with the published article for this journal series. Research articles published by BioMed Central are archived in *PubMed Central (PMC)* (www.pubmedcentral.nih.gov), the "digital archive of life sciences journal literature" of the US National Library of Medicine (NLM), and indexed and abstracted in the NLM *PubMed* bibliographic database (www.ncbi.nlm.nih.gov/entrez/query.fcgi). Select BioMed Central journals are also indexed in Biological Abstracts[®] (BIOSIS), Chemical Abstracts[®] (CAS), and in ISI[®] Web of Science, ISI[®] Science Citation Index Expanded, and ISI[®] Current Contents (www.biomedcentral.com/info/libraries/indexing).

In general, all of the original research articles published by BioMed Central are immediately and permanently made available online without charge (www.biomedcentral.com/info/libraries/oajournals). This policy is based on the philosophy that "open access to research is central to rapid and efficient progress in science and that subscription-based access to research is hindering rather than helping scientific communication." In addition, BioMed Central supports "non-exclusive digital archiving of research articles by as many

international archives as possible to ensure the security and permanent accessibility of that research, and will deposit its research articles in other digital repositories as and when they are available." The copyright for original research articles published in BioMed Central journals is retained by the author(s).

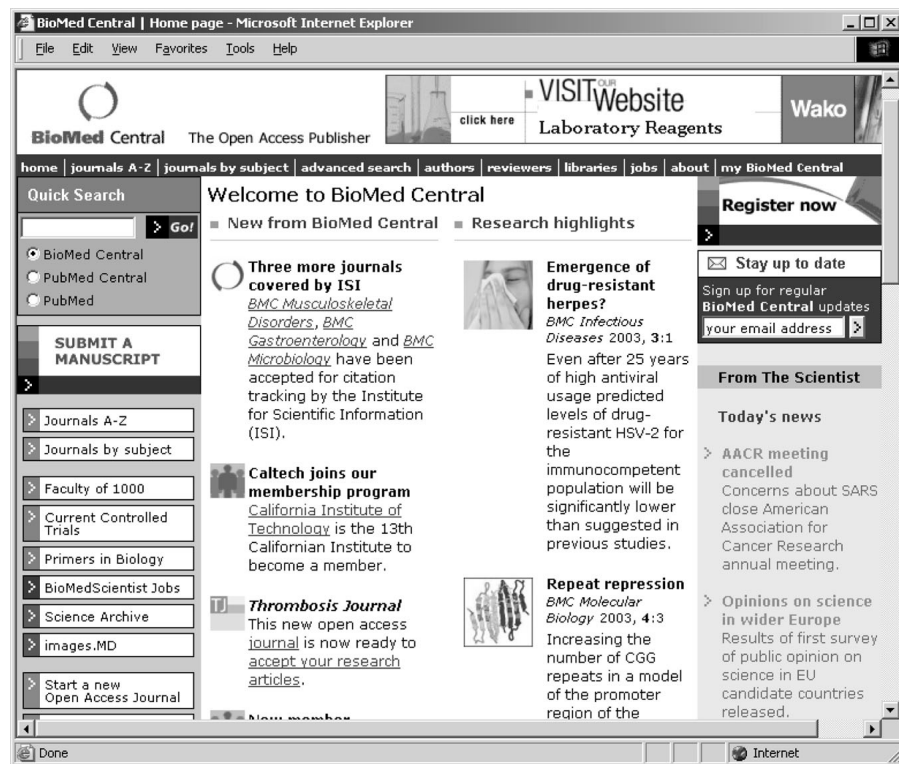
To cover costs, BioMed Central charges a flat processing fee of \$500 for each accepted manuscript; a \$50 discount is provided for those submitted using one of two standard document and bibliographic software packages (www.biomedcentral.com/info/about/apcfaq). BioMed Central also offers an Institutional Membership Program that enables institutions to actively support Open Access scholarly publishing (www.biomedcentral.com/info/about/instmembership). The University of Nottingham became the 100th member of the program in early February 2003, joining other prestigious research institutes and colleges, universities, and other institutions of higher learning from more than 20 nations (www.biomedcentral.com/inst/).

The Scholarly Publishing (SPARC) and Academic Resources Coalition (www.arl.org/sparc/) has also become a partner with BioMed Central, and has recommended that all SPARC member institutions consider a BioMed Central institutional membership. In addition, the Information Program of the Open Society Institute (OSI) has agreed to fund 50 BioMed Central Institutional memberships for institutions in developing and emerging countries where the Soros Foundation Network is active (www.soros.org/openaccess/grants-biomed.shtml).

BioMed Central will make its online submission and peer-review technology available without charge to groups of scientists who wish to manage Open Access, online journals under their own editorial control (www.biomedcentral.com/info/authors/startajournal).

Figure 1

Launched in May 2000, BioMed Central is an “independent publishing house committed to providing immediate free access to peer-reviewed biomedical research”



BioMed Central also publishes *Faculty of 1,000 (F1,000)*, the leading literature evaluation service and “new online research tool that highlights the most interesting papers in biology, based on the recommendations of over 1,000 leading scientists” (www.facultyof1000.com). *F1,000* is managed “by scientists for scientists” ... [and] provide[s] a rapidly updated consensus map of the important papers and trends across biology.” Among its many benefits, *F1,000*:

- systematically organizes and evaluates the mass of information within scientific literature;
- provides scientists with a continuously updated insider’s guide to the most important papers within any given field of research;
- highlights papers on the basis of their scientific merit rather than the journal in which they appear;
- offers the researcher a consensus of recommendations from well over 1,000 leading scientists; and
- offers an immediate rating of individual papers by the authors’

peers, and an important complement to the indirect assessment provided by the journal impact factor.

Within the *F1,000*, the entire field of biology is divided into 16 subject areas (“faculties”) (e.g. “biochemistry,” cell biology, “microbiology”). Each “faculty” is subdivided into three to 12 “sections” (e.g. biochemistry: biocatalysis, molecular evolution, protein folding), with each section comprising between ten to 50 faculty members. *F1,000* seeks to invite the best internationally known scientists in each represented field and to involve both experienced and younger investigators.

In September 2002, The *Faculty of 1,000* was recently recognized by The Association of Learned and Professional Society Publishers (ALPSP) as the most innovative publication of the year.

BioMed Central is part of the Current Science Group (current-science-group.com), a “group of independent companies that collaborate closely with one another to publish and develop information and services for

the professional biomedical community.” Vitek Tracz serves as Chairman of the Current Science Group, and Jan Velterop serves as the Publisher of the BioMed Central Group, a separate company within Current Science. The Group is headquartered in London, UK, with additional offices in Philadelphia, New York and Tokyo.

GNU EPrints software

GNU EPrints is a free software package developed at the Electronic and Computer Science Department of the University of Southampton, UK, that enables the creation of an electronic “archive” or “repository” of departmental or institutional publications (McKiernan, in press). The first version of EPrints (EPrints 1) was released at the end of 2000, and a subsequent version made available on February 14, 2002 to coincide with the formal launch of the Budapest Open Access Initiative (BOAI). The BOAI seeks to accelerate an international effort “to make research articles in all academic fields freely available on the Internet,” and has been supported in part by the Soros Foundation Network (www.soros.org/openaccess/index.shtml). The most recent version of the GNU EPrints software (v. 2.2.1) was released in mid-November 2002.

The EPrints software (software.eprints.org) is made available through eprints.org, a Web site that is part of the Open Citation Project, a DLI2 International Digital Libraries Project funded by the Joint Information Systems Committee (JISC) of the Higher Education Funding Councils, in collaboration with the National Science Foundation. eprints.org was previously supported by CogPrints (cogprints.soton.ac.uk), the cognitive sciences e-print service established by Stevan Harnad, which was initially funded by JISC as part of the Electronic Libraries (eLib) Programme (UK).

EPrints 2 offers a variety of user-friendly features and functionalities that facilitate the establishment of a digital publications repository, most notably:

- a script that automates much of the installation process;
- storage of individual electronic publications in one or more than one document format;

- organization of access to contents in a subject hierarchy that facilitates browsing and searching;
- document submission using a simple Web-based interface;
- inclusion of associated metadata for authors;
- Web-based or e-mail subscription as author or reader;
- Web-based moderation option for administrative review and approval; and
- Web-based system maintenance.

The major expense of managing an EPrints archive could be limited to hardware purchase. The following software and hardware are required for establishing an EPrints service:

- a UNIX[®] computer platform;
- a UNIX[®] (www.bell-labs.com/history/unix/) operating system;
- Linux[®] (www.linux.org), the advanced and free UNIX[®] implementation. Linux[®] was the development platform for the EPrints software and is highly functional;
- an Apache WWW server (www.apache.org), a professional-quality free software product, often included with commercial Linux, such as RedHat[™] (www.redhat.com);
- the Perl programming language (www.perl.com);
- mod_perl module for Apache (perl.apache.org), which significantly increases the performance of Perl scripts;
- the MySQL[™] database software (www.mysql.com), a database system that is free for non-commercial use; and
- the EPrints software itself.

Special software that enables users to upload documents in compressed file formats, or to capture them from a Web site, is also required.

Once the prerequisite software has been loaded, the installation of the EPrints software requires the editing of configuration files and the activation of an installation script. Among the activities involved in establishing the archive are selection of the metadata fields (e.g. author(s), title, journal, etc.), determination of eprint type (e.g. refereed journal article, technical report, unpublished preprint, etc.), and

designation of interoperability that is compliant with the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) (www.openarchives.org/OAI/openarchives/protocol.html). The implementation of the protocol enables third-party service providers to execute searches against a repository, to identify the metadata for its associated documents, and subsequently to retrieve appropriate documents from the associated electronic collection.

While the GNU EPrints system is pre-configured to operate as an institutional eprint archive, it can be reconfigured with different metadata fields for different types of electronic publications. In addition, the GNU EPrint software can accommodate any metadata schema. EPrints 2 is strictly internationalized with all metadata being stored as Unicode, in accordance with the Unicode Standard, the “character coding system designed to support the world-wide interchange, processing, and display of the written texts of . . . diverse languages.”

As of April 2003, more than 66 electronic archives have been established using versions of the EPrints software, nearly half of all known OAI-compliant archives (Brody, n.d.). Among the largest or noteworthy repositories using the latest versions of the GNU EPrints software (v. 2.x) are:

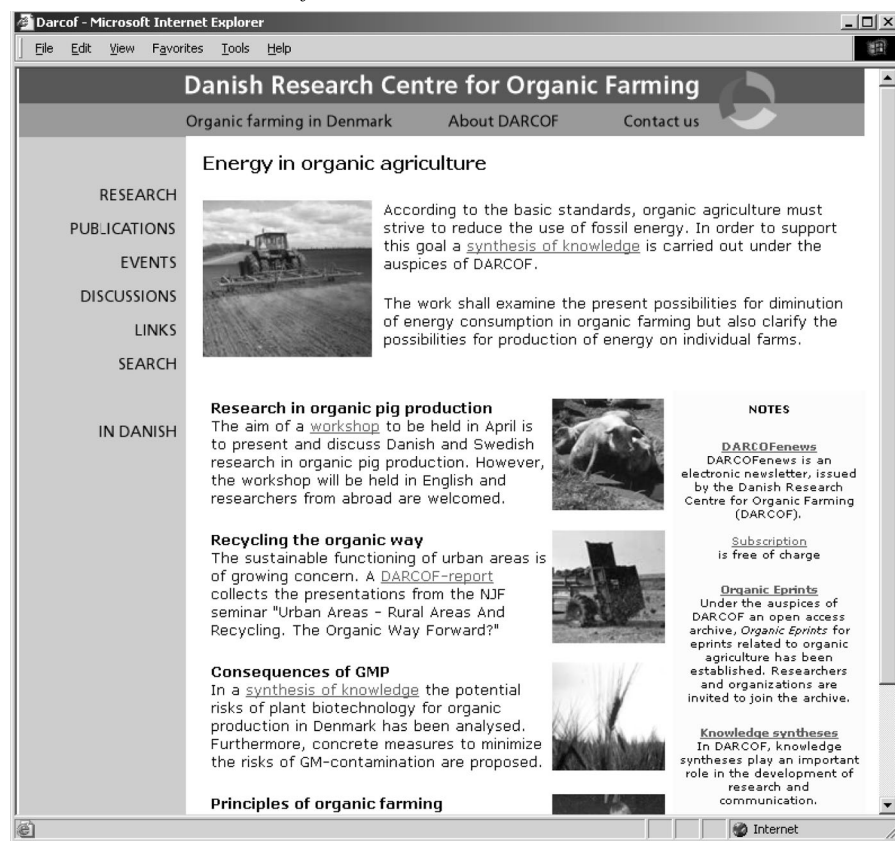
- *AKT Prints* (eprints.aktors.org). The AKT project is an Interdisciplinary Research Collaboration funded by the Engineering and Physical Sciences Research Council (UK) that seeks “to develop and extend a range of technologies to provide integrated methods and services through the knowledge lifecycle of capture, modeling, reuse, publishing and maintenance; services taking knowledge.”
- *CogPrints: Cognitive Science Eprint Archive* (cogprints.soton.ac.uk). CogPrints is an electronic archive of papers in various areas of psychology, neuroscience, and linguistics, and many areas of computer science (e.g. artificial intelligence, robotics, vision, learning, speech, neural networks), philosophy (e.g. mind, language, knowledge, science, logic), biol-

ogy (e.g. ethology, behavioral ecology, sociobiology, behavior genetics, evolutionary theory), medicine (e.g. psychiatry, neurology, human genetics, imaging), anthropology (e.g. primatology, cognitive ethnology, archeology, paleontology), as well as any other portions of the physical, social and mathematical sciences that are pertinent to the study of cognition.

- *DList – Digital Library of Information Science and Technology* (dlist.sir.arizona.edu). The objective of DList is to serve as a repository of electronic resources in the domains of Library and Information Science (LIS) and Information Technology (IT). Creators of materials in all areas of LIS and IT are encouraged to deposit their materials, regardless of format. While all subject areas are encouraged to deposit materials, there are two initial areas of emphasis: Information Literacy and Informetrics.
- *Drexel University Electronic Theses and Dissertations* (thesis.library.drexel.edu). The Drexel University Electronic Theses and Dissertations program was begun in January 2001 and is sponsored by the W.W. Hagerty Library and the Office of Graduate Studies, Drexel University.
- *ECS EPrints Database* (eprints.ecs.soton.ac.uk). ECS EPrints Database is a publications database for the Department of Electronics and Computer Science at the University of Southampton (UK).
- *LU:research* (Lund University, Sweden) (lu-research.lub.lu.se). LU:research is the institutional archive of Lund University, Sweden. Its aim is to publish and archive institutional research, and to provide a single gateway to research from the University, and to distribute information about research.
- *Organic Eprints* (www.orgprints.org). Organic Eprints is an open access archive for eprints related to research in organic agriculture (see Figure 2).
- *Psychology* (psycprints.ecs.soton.ac.uk). *Psychology* is a refereed international, interdisciplinary

Figure 2

Established as a community service by the Danish Research Centre for Organic Farming (DARCOF), Organic Eprints is one of the several dozen services that utilize the GNU EPrints software



electronic journal, sponsored by the American Psychological Association, that publishes articles and peer commentary in all areas of psychology as well as in cognitive science, neuroscience, behavioral biology, artificial intelligence, robotics/vision, linguistics and philosophy.

EPrints 2 was developed under the GNU General Public License (GPL) (gnu.org/copyleft/gpl.html) and is made available free-of-charge subject to the GPL. EPrints 2, also referred to as GNU EPrints, was developed by Christopher Gutteridge, System Administrator with the Systems Group, Department of Electronics and Computer Science, University of Southampton with the assistance of Mike Jewell. EPrints 1.0 was designed and implemented by Robert Tansley with enhancements and corrections by Gutteridge.

Public Library of Science (PLoS)

Founded in October 2000, the Public Library of Science (PLoS) (www.publiclibraryofscience.org):

- “is a non-profit organization of scientists committed to making the world’s scientific and medical literature a public resource” (see Figure 3). In general, PLoS seeks to establish online public libraries of science that will archive and freely distribute the complete contents of every published scientific article;
- greatly expand access to scientific knowledge by giving any scientist, physician, student – or anyone with access to the Internet, anywhere in the world – unlimited access to the latest scientific research;
- facilitate research, informed medical practice and education by making it possible to freely search

the full text of every published article to locate specific ideas, methods, experimental results and observations; and

- enable scientists, librarians, publishers and entrepreneurs to develop innovative new ways to access and use the information in this immensely rich but highly fragmented resource.

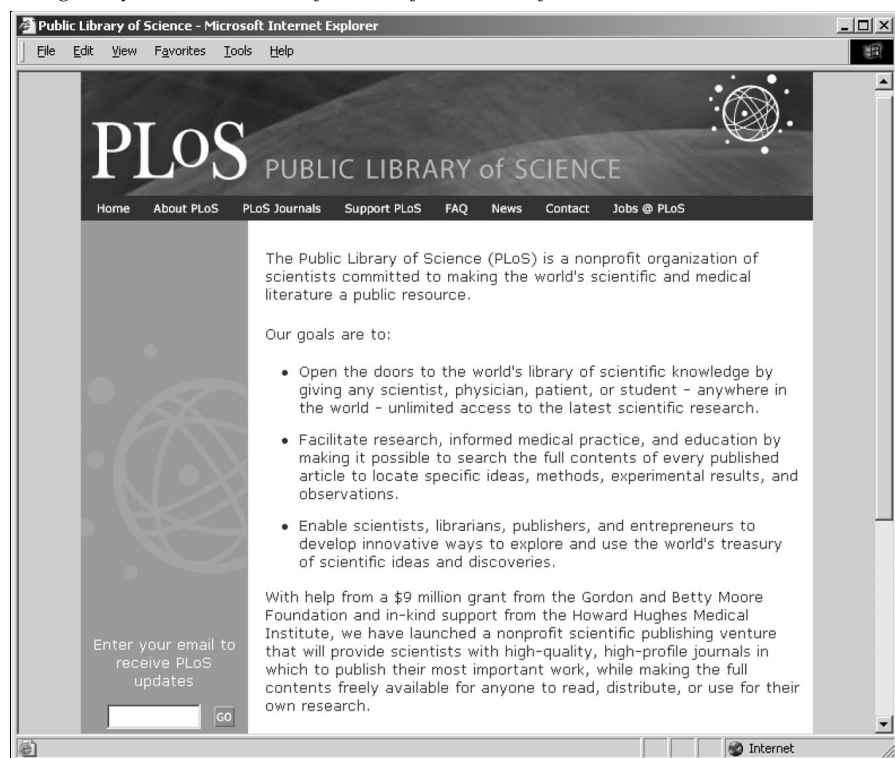
In Spring 2001, PLoS released and began promotion of an open letter that urged publishers to “allow the research reports that have appeared in their journals to be distributed freely by independent, online public libraries of science.” To leverage this initiative, signatories to the letter pledged that, beginning in September 2001, they would “publish in, edit or review for, and personally subscribe to, only those scholarly and scientific journals that have agreed to grant unrestricted free distribution rights to any and all original research reports that they have published, through PubMed Central (www.pubmedcentral.com) and similar online public resources, within six months of their initial publication date” (www.publiclibraryofscience.org/openletter.shtml). As of April 1, 2003 nearly 33,000 individuals from more than 180 countries have signed the letter. Although unsuccessful, the initiative did highlight the interest and concern of the broad scientific community to the varied issues relating to access to the scholarly research.

The PLoS is committed to Open Access to the scientific literature, by which is meant “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.” All material published by PLoS will be published under an open access license that allows “unrestricted use, distribution, and reproduction in any medium, provided that the original work is properly cited” (www.plos.org/openaccess.htm).

In addition to Open Access, the PLoS is committed to several other

Figure 3

The Public Library of Science (PLoS) recently received a major grant that will enable it to “launch a new scientific publishing venture that will expand access to and greatly enhance the usefulness of the scientific literature”



“core principles” (www.plos.org/principles.htm) that include:

- **Excellence.** PLoS seeks to set the highest standards for excellence in content, style, and aesthetics of presentation, as well as in editorial performance, transparency and accessibility to the scientific community and public, and educational value.
- **Scientific integrity.** PLoS is committed to a fair, rigorous editorial process, with scientific quality and importance as the sole considerations in publication decisions.
- **Breadth.** PLoS intends to expand its scope “as rapidly as practically possible, to provide a vehicle for publication of other valuable scientific or scholarly articles.”
- **Cooperation.** PLoS seeks opportunities to work cooperatively with “any group ... and any publisher who shares our commitment to open access and to making scientific information available for the good of science and the public.”
- **No financial barrier to authors.** While PLoS charges authors, the
- “ability of authors to pay publication charges will never be a consideration in the decision whether to publish.”
- **Community engagement.** PLoS was founded as a grass-roots organization and it remains committed to this vision, and central to its publishing philosophy are recognition and acknowledgement of the needs of the constituencies.
- **Internationalism.** Recognizing that scientific endeavors are international, PLoS aims to provide “access to the scientific literature to anyone, anywhere” and is committed to publishing “works from every nation” and “engaging a geographically diverse group of scientists in the editorial process.”
- **Public resource.** The PLoS mission includes not only “providing unrestricted access to scientific research ideas and discoveries, but developing tools and materials to engage the interest and imagination of the public, and help non-scientists to understand and enjoy scientific discoveries and the scientific process.”

In August 2001, PLoS announced that it would establish its own nonprofit publishing initiative to distribute scientific research online and free-of-charge. In this endeavor, PLoS plans to “compete head-to-head with the leading existing publications in biology and medical research, publishing the best peer-reviewed original research articles, timely reviews and commentary.” To cover the costs of peer-review, editorial activities, and production, PLoS has adopted a business model in which an author or research sponsor pays a “modest” publication charge (\$1,500) per article. In December 2002, PLoS received a five-year, \$9 million grant from the Gordon and Betty Moore Foundation to launch its publishing venture. By mid-2003, PLoS plans to begin publishing the first journals, which are tentatively titled *PLoS Biology* and *PLoS Medicine*, respectively.

PLoS is governed by a Board of Directors which currently consists of three of the founders of the organization: Harold E. Varmus MD (President and Chief Executive Officer of the Memorial Sloan-Kettering Cancer Center, and former director of the National Institutes of Health (NIH)); Patrick O. Brown MD, PhD (Professor, Department of Biochemistry, Stanford University School of Medicine, and Howard Hughes Medical Institute); Michael B. Eisen PhD (Computational and evolutionary biologist); and Ernest Orlando (Lawrence Berkeley National Laboratory and the University of California at Berkeley). PLoS is currently assembling an editorial board of specialists affiliated with major national and international universities, research centers, and institutes.

In January 2003, PLoS announced that Vivian Siegel, former editor of the respected journal, *Cell*, would be appointed Executive Director of the PLoS publishing venture. In addition to directing the open-access publishing initiative, Siegel will also recruit editors for PLoS journals, develop policies, and public education activities.

National Digital Academic Repositories (DARE)

The Digital Academic Repositories (DARE) project (www.surf.nl/download/

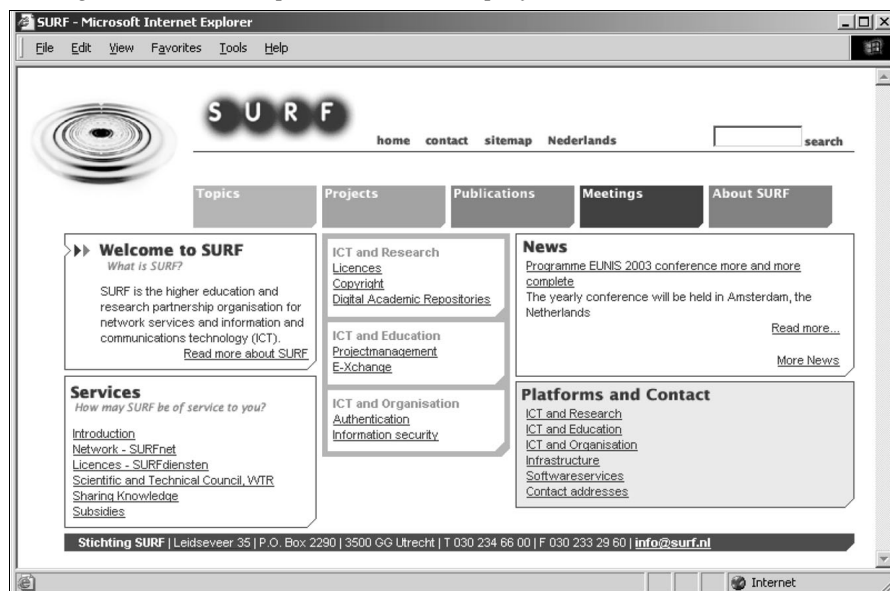
DARE-summary.pdf) is a new collaborative initiative among select Dutch universities that seeks to develop the necessary infrastructure and platforms required for the long-term storage, distribution, and access to the individual and collective scholarly and educational digital assets of participating institutions. The Koninklijke Bibliotheek (Royal Library), the Koninklijke Nederlandse Academie van Wetenschappen (Royal Netherlands Academy of Arts and Sciences) and the Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO) (Netherlands Organisation for Scientific Research) are also DARE participants.

At the core of DARE is a distributed network of institutional “repositories,” “information systems for academic output such as working papers/pre-prints, theses, research reports, data sets, conference contributions, multimedia presentations, etc.” Within this framework, individual participating institutions will oversee and manage their respective digital activities and assets. It is expected that the initiative will significantly increase the overall visibility and use of the intellectual assets of each institution. Other benefits include the development and implementation of international communication and data exchange standards between and among repositories, collaboration among experts, cost efficiencies, and the use and reuse of institutional assets. It is expected that DARE will expedite the creation of value-added services, separately or in collaboration with other parties such as academic associations or publishers. Overall, it is expected that the successful implementation of the DARE project will not only increase the efficiencies of research, but also significantly enhance the visibility and reputations of the participants.

Funded at €2 million, DARE will be implemented over a four-year period (2003-2006). The project will be coordinated by SURF (www.surf.nl), the higher education and research partnership organization for network services and information and communications technology (ICT) in The Netherlands (see Figure 4). Additional information about DARE may be obtained by contacting Mrs Lilian van der Vaart, Project Manager

Figure 4

SURF, the Dutch higher education and research partnership organization for network services and information and communications technology, will coordinate the Digital Academic Repositories (DARE) project



(vandervaart@surf.nl) or Gerard van Westrienen, Programme Manager, SURF, ICT and Research (vanwestrienen@surf.nl).

Focus on Access to Institutional Resources Programme (FAIR)

The Joint Information Systems Committee (JISC) (www.jisc.ac.uk) is the strategic advisory committee that works on behalf of funding bodies for further and higher education in England, Scotland, Wales and Northern Ireland, and promotes the innovative application and use of information systems and information technology. In late summer 2002, JISC awarded funding to 14 projects under its Focus on Access to Institutional Resources Programme (FAIR) (www.jisc.ac.uk/index.cfm?name=programme_fair).

The specific objectives of FAIR are to:

- explore the OAI protocol (OAI-PMH) as a mechanism for disclosure and sharing a range of resource types (e.g. images, video clips, learning objects, finding aid);
- explore other mechanisms for disclosure;
- explore the challenges associated with disclosure and sharing, including Intellectual Property Rights (IPR);

- test out the delivery of disclosed information through established JISC services; and
- inform the work for developing the Information Environment.

FAIR projects included partnerships among more than 50 institutions and teams, involving universities, libraries, JISC services, art galleries, colleges, museums and commercial companies. To focus the impact of related fields, JISC has grouped the projects into clusters: Museums and Images, E-Prints, E-Theses, Intellectual Property Rights and Institutional Portals. Among the notable programs in the E-prints and e-Theses cluster are the following projects (Pinfield, 2003):

- *DAEDALUS* (www.lib.gla.ac.uk/daedalus). ‘DAEDALUS’ “seeks to provide exemplars for the development of a network of different data providers for a range of institutional assets to be exploited by a local harvesting service. This project will explore, identify and evaluate the necessary standards to achieve institutional interoperability across a range of distinct digital assets. These assets will include academic papers, e-theses and research resource-finding aids. They will be disclosed to the wider academic community and will

form an integral part of the JISC information.”

- *ePrints UK* (www.rdn.ac.uk/projects/eprints-uk). ePrints UK “plans to develop a national service through which the HE (Higher Education) and FE (Further Education) communities can access the collective output of e-print papers available from compliant OAI repositories provided by UK universities and colleges. EPrints UK will harvest metadata from available OAI e-print repositories at UK HE and FE institutions into a single central metadata database, and provide access to these materials through the nine subject centres of the RDN (Resource Discovery Network)” (see Figure 5).
- *HaIRST: Harvesting Institutional Resources in Scotland Testbed* (hairst.cdrlr.strath.ac.uk). The goal of the HaIRST project is “to support research into the design, development and implementation of a pilot service to provide stable ongoing UK-wide access to locally created learning and research resources in HE and FE institutions

in Scotland. The project will investigate and advise on requirements regarding changes in institutional cultures, policies, strategies and organisational structures, as well as on technical and metadata level considerations. Collection level metadata on the materials produced by the project will be added to the SCONE Scottish collections database and will also be made available for harvesting on a UK-wide basis.”

- *SHERPA* (www.sherpa.ac.uk). “Project SHERPA aims to create a substantial corpus of research papers from several of the leading research institutions in the UK by establishing e-print archives which comply with the OAI-PMH using eprints.org software. The contents of these archives will be freely available to all of the HE and FE communities and beyond; the creation, population and management of these archives will be the core of the project. Learning outcomes from these activities will also be shared with the community in a variety of ways, including the

establishment of an advisory service to assist others in setting up and managing archives.”

- *TARDIS* (tardis.eprints.org). The TARDIS project will “investigate strategies to overcome the technical, cultural and academic barriers, which currently restrict the development of institutional e-print archives and will develop a working model of a multi-disciplinary institutional archive. This archive will be accessible through the University Library’s Web portal as part of an integrated institutional and subject-focused information resource. The potential for delivery through an external service provider will also be assessed.”

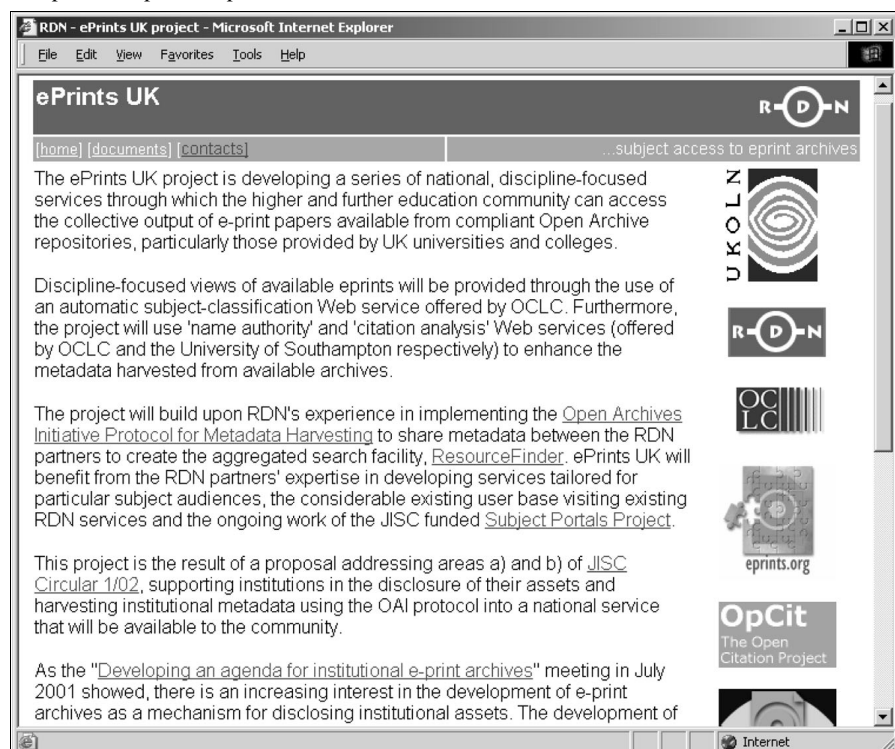
In addition, the JISC has also funded RoMEO (Rights METadata for Open Archiving), a project that will “address some of the key rights issues surrounding the disclosure of documents and metadata under the OAI protocol.” For the project, stakeholders will be surveyed to “ascertain how ‘give-away’ research literature (and metadata) are used, and how they should be protected.” RoMEO (www.lboro.ac.uk/departments/lis/disresearch/romeo/index.html) will build on existing schemata and vocabularies, such as Open Digital Rights Language (odrl.net), to develop a series of rights elements. Recommendations for the protection of the intellectual property rights of the metadata themselves will also be proposed.

SciELO: The Scientific Electronic Library Online

Since the 1960s, the United Nations Educational, Scientific, and Cultural Organization (Unesco) (www.unesco.org), among other agencies, and organizations, has sponsored or supported a variety of initiatives to strengthen the research infrastructure, management, and associated information systems within developing countries. Among the most notable software packages developed by Unesco is CDS/ISIS. Originally developed as a database management system for textual data running on mainframe computers, the software has been adapted to run on PCs in the DOS operating environment, and more recently on the Unix and Microsoft

Figure 5

The ePrints UK project will develop subject-based, national information services that will enable users to access the collective content of British OAI-PMH-compliant e-print repositories



Windows environments. CDS/ISIS software is a database management system with especially strong support for textual data, typically used in document management systems, libraries, documentation centers and archives.

Historically, the Latin America and Caribbean Center on Health Sciences Information (BIREME) (www.bireme.br/bvs/bireme/I/homepage.htm) used CDS/ISIS for all its network and system applications for data entry, information retrieval, and bibliographic data interchange. Recognizing the limitations of CDS/ISIS in the Web environment, however, led BIREME to develop software tools, libraries, and utilities that significantly extend the original features of CDS/ISIS, notably WWWIsis (productos.bvsalud.org/product.php?id=wwwis&lang=en), a tool for Web management of CDS/ISIS databases, and iAH, a powerful Web information retrieval interface (www.productos.bvsalud.org/product.php?id=iah&lang=en). Among its uses at BIREME, ISIS software is used for formatting and maintaining the database metadata for SciELO, the Scientific Electronic Library Online (www.scielo.br) (Marcondes and Sayão, 2003). SciELO is the result of a partnership among the State of São Paulo Science Foundation (FAPESP), BIREME, and national and international institutions involved with scientific communication.

With the aim of developing and evaluating an adequate methodology for electronic publishing on the Internet, SciELO began as a pilot project that sought to develop and evaluate alternative approaches to Web-based publishing. With the completion of the 15-month project (March 1997 to May 1998), SciELO became formally operational, and subsequently incorporated new titles and expanded its operation to other countries. Today, several SciELO gateways that provide access to academic journals from Brazil and other Latin-American and Caribbean countries, as well as from Spain and Portugal, are in operation. As of March 2003, the SciELO gateway provided access to nearly 10,000 articles from nearly 100 academic journals (see Figure 6.)

Journal titles may be browsed alphabetically or by broad subject, or

Figure 6

Materials Research: Revista Ibero-americana de Materiais is one of the several dozen open access e-journals provided through the SciELO gateway



searched by title keyword. Journal articles may be browsed by author surname(s) or by subject term or phrase, or searched using a “basic” or “free” search form; the latter enables the user to limit a search to one of several standard fields (e.g. author, subject, publication year, etc.).

In addition to electronic publishing of complete editions of scientific journals, SciELO methodology also includes journal evaluation criteria based on international scientific communication standards, and value-added services that link article records to bibliographic databases such as MEDLINE; the CVLattes system, the database of the curriculum vitae of Brazilian researchers maintained by the Brazilian Council for Scientific and Technological Development (CNPq); and to the Brazilian Digital Library of Theses and Dissertations (BDTD) maintained by the Brazilian Institute for Scientific and Technological Information.

As a result of the Brazilian Digital Library in Science and Technology Project which sought to identify problems associated with interoperability and unified access to a variety of Brazilian scientific, technical, and

medical databases and information systems, a Web gateway to provide unified access to the metadata of these databases, through the interoperability protocol OAI-PMH, was proposed. As a principal partner in the project, BIREME decided to enhance the SciELO services and facilities in order to increase the accessibility of journals and their respective content by supporting an OAI-compliant configuration. The SciELO-Open Archives server is currently compliant with OAI-PMH (v. 2.0).

The SciELO Open Archives project began in 2002 with a feasibility study that used the WWWIsis XML IsisScript Server, a tool for Web manipulation of CDS/ISIS databases. While the Dublin Core metadata format (dublincore.org) is the standard default format of the Open Archives Initiative, the SciELO default metadata format is the Latin America and Caribbean Health Science Literature (LILACS), a regional information system which has a metadata format that includes the title in English, Portuguese and Spanish for every record. The LILACS metadata format was developed from MeSH (Medical Subject Headings) of the US National Library of Medicine with “the

aim of permitting the use of common terminology for searching in three languages, thus providing a consistent and unique environment for the retrieval of information regardless of the language." The Health Science Descriptors (DeCS), a tri-lingual and structured vocabulary, was created by BIREME for "indexing articles from scientific journals, books, conference proceedings, technical reports, and other similar types of materials, as well as for searching and retrieving subjects from scientific literature in LILACS, MEDLINE and other databases. In LILACS methodology, all descriptors assigned to a record are automatically translated into English, Portuguese and Spanish."

Conceived to meet the scientific communication needs of developing countries, particularly those of Latin America and the Caribbean, SciELO, through the World Wide Web, provides an "efficient way to assure universal visibility and accessibility to the scientific literature" of select countries in these regions, and is a "model for cooperative electronic publishing of scientific journals on the Internet."

"Appropriate excitation"

I believe that the collective behavior and information exchange pattern of any community depend on their culture, their shared values and their past and current practices. These things are very difficult to change but, given the *appropriate excitation* (emphasis added) they can change very fast (Simon, 2002).

It is widely recognized that the Internet and World Wide Web have revolutionized the nature and scope of scholarly communication. Each has enhanced not only informal communication among scholars, but also formal communication (McKiernan, 1999). Through the Internet, scholars are able to engage in near real-time discussions with colleagues a continent away using e-mail; through the World Wide Web they are able to post drafts of their manuscripts, as well as final or

published versions. Concurrently, with the rise of the electronic journal, scholars are able to distribute their work to the desktops of a world-wide community.

The Net and the Web have also empowered scholars to establish new forms of communication and publication. While, in many cases, these can be considered expressions and extensions of existing practices, an increasing number transcend traditional and current paradigms and represent real alternatives to the predominant publishing model. Such initiatives are not, however, limited to personal initiatives. At various levels, scholars and their associated institutions, organizations, professions, and nations, are transforming the nature of twenty-first century scholarship. While focused specifically on institutional repositories, the observations of Clifford Lynch, Executive Director of the Coalition for Networked Information (CNI), on this type of infrastructure for "scholarship in the Digital Age" apply as well to other scholarly-based innovations in publishing:

It is clear that the institutional repository is a very powerful idea that can serve as an engine of change for our institutions of higher education, and more broadly for the scholarly enterprises that they support. If properly developed, it advances a surprising number of goals, and addresses an impressive range of needs. Some of the results seem clear, though there are also likely to be any number of unexpected consequences. This is an area where I believe universities need to invest aggressively, but where they also need to implement thoughtfully and carefully, with broad consultation and collaboration across the campus community (with intellectual leadership from the faculty and the library working in partnership) and with a full understanding that if they succeed they will permanently change the landscape of scholarly communication (Lynch, 2003).

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