An Overview of

Institutional Repositories©

Association of Academic Health Sciences Libraries (AAHSL)

Charting the Future Committee

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Introduction

The purpose of this white paper is to present an overview of the issues related to establishing an institutional repository (IR), including the state of IRs today, what's currently happening in higher education institutions, and where we appear to be heading (i.e., charting the future).

This white paper has been commissioned by the AAHSL "Charting the Future Committee for AAHSL institutions. A number or informative articles and papers are presented to outline the myriad of issues related to IRs.

This paper is written from the perspective of how libraries might develop an IR for their institution, but only after asking some hard questions. Some institutions have already developed an IR, while others have not even considered developing one and may be wondering what IRs are all about. A limited literature review forms the basis of the paper and presents a broad-brush stroke on select issues. Several professional associations (e.g., ARL, EDUCAUSE, SPARC, Open Archives Initiative) are on the forefront of advocating the development of IRs. This white paper should be considered a work in progress, because the field is changing so rapidly.

Depending on whether you are a librarian, administrator, researcher, clinician, publisher, vendor, author, or teacher, your view of an IR may be different.

Definition

There are various definitions of institutional repository (IR), ranging from very simple to very complex and broad. For our purposes, an IR is defined as a formally organized, digital collection of the intellectual output of an academic campus community and comes directly from the faculty, staff, and students of the university. The breadth of this digital collection can be thought of as a continuum, with some institutions having only limited and very specific items centrally included in the IR (e.g., journal articles), while other institutions may not limit what is included their IR, including virtually all of the scholarly output of the institution as well as programmatic, archival, and a range of other materials. Anything printed or mediated could be included—but it must be digitized. At risk are materials only in digitized format that could be lost if not placed into a central IR.

Historical Perspective

A historical perspective is important regarding the evolution and development of an IR in order to understand where we are today.

In the early 1990s, primarily within the high-energy physics community, there existed a need to share preprints of journal articles.

> The field of science, including physics, astrophysics, and computer science, is one of the oldest areas for digital repositories. The repositories found in this subject area grew out of the e-print archive movement started by Paul Ginsparg in August 1991 with the ArXiv respository for high-energy physics papers. ArXiv was

originally created at Los Alamos National Laboratory but later moved to Cornell University with Dr. Ginsparg. (Info653 Paper 3, April 22, 2003) http://www.keepinsite.net/~denise/paper3.htm)

These scientists deposited their unpublished work (e.g., journal articles) into computer servers for access by colleagues. Much as the Advanced Research Projects Agency (ARAPNET) of the Department of Defense in the early 1970s provided the first email network, the early 1990s preprint servers could be considered the catalyst for the evolution of the IR today. In short, the IR began as a movement to facilitate scientific (and public) access to digitized journal preprint research that could be remotely accessed electronically. The informal servers run by academic departments (much as is done today in some basic science departments) were referred to at the time as the "archives" or "repository" of the physical scientists' preprint research. The rest is history. Campus-wide servers took off with the Internet and the availability of easy browser software (e.g., Netscape, Mosaic) around the mid-1990s, and most academic health science libraries had a web page operational within a year or two. During the next decade, there has been an expansion (by several orders of magnitude) of IRs being used for other fields of research.

There are many overlapping spheres of influence affecting the IR, and some include the open access movement, alternative scholarly publishing models, economics of scientific and research information, availability and accessibility of institutional intellectual output, technical advances, copyright, and the need to deliver digitized information to the desktop in a cost-effective manner.

The IR can undoubtedly benefit academic institutions by providing a platform for sharing information (e.g., research, health, clinical, education) and facilitating scholarship, research, institutional visibility, and even improving patient care. What role can the modern health sciences library play in the development of an IR? For example, should populating an IR be done by faculty self-archiving their research datasets and journal

articles? What works depends on a number of factors that are specific to an individual institution. Following are some of the issues and questions that should be considered.

Model Frameworks

There appear to be few IR model frameworks that can be appropriately adapted to all institutions. The development of IRs is still in an early stage. A number of large and prestigious universities are currently developing massive IRs, sometimes in concert with other institutions. The models used by large academic institutions may not be suitable for smaller institutions with fewer resources.

There are marked differences between academic health science/medical libraries and the main academic library of a flagship university. Many of the large-scale IR efforts are often (but not always) from large universities.

IRs in the science field have been generally located within large research universities (e.g., California, Harvard, Cornell, MIT, Stanford,) because they have significant financial resources. Some of these IR projects have received funding from the National Science Foundation under the Digital Libraries Initiative or the National Science Digital Library program.

The development of an IR could be considered a fashionable or trendy approach to institutional data gathering, and it might not be appropriate for all institutions. Not every health science center will need or want to implement an IR, but such institutions may wish to offer some institutional repository service to its academic community.

Institutions should be cautious in developing large, centralized IR services. However, currently, most academic health science centers have some kind of departmental or individual faculty repositories that include published articles or research. Indeed, many

basic science departments have their own servers providing access to individual faculty publications or papers. Moving these to a central institutional location makes sense. The role of the medical library in developing an IR is related to its role of being the health science information resource center for the campus, but participating (or leading) the effort to develop an IR could be especially challenging during this era of often inadequate and dwindling institutional support for libraries. Further, the role of information technology (IT) offices in providing the infrastructure for a large IR effort is critical and must be considered.

Seeding and growing an IR takes considerable time, energy, and planning and involves many stakeholders. Establishing a goal and strategic plan is ideal, but many institutions are proceeding on a piece-meal basis. Simply making software available to a campus community to have faculty, staff, and students self-archive their materials (e.g., journal articles) will not consistently work in seeding an IR, as evidenced by the experience of the University of Glasgow (Mackie, 2004).

The open access movement, scholarly communications, and IRs could be considered overlapping issues, but how are they related? The issues are complex and evolving, and of foremost concern to many academic administrators is the cost model and who pays for IRs. Phelps (2004) presents an excellent overview of these issues, strategies, and various pay models (e.g., reader pays, sender pays, patron pays, institution pays, combination strategies) taking into consideration the perspective of each stakeholder.

Perhaps the single best resource that provides the broadest overview of IRs for academic institutions and libraries is Susan Gibbons (2004) excellent *Library Technology Reports* on establishing an IR. As Ms. Gibbons points out, the 2003 edition of ACRL (Association of College of Research Libraries) identified IRs as a critical emerging issue that might affect both the future of academic libraries, as well as higher education. The

report (Appendix B, pp. 63-68) presents examples of IRs located in academic institutions throughout the world.

Software

A variety of software is available for mounting an IR. The selection of IR software depends on a number of factors that need to be addressed according to the goals related to establishing an IR.

The Open Society Institute (OSI) published *A Guide to Institutional Repository Software* (Crow, 2004) that discussed available software systems that must meet certain criteria:

- Be available via an open source license, that is, they are available for free and can be modified
- Comply with the Open Archives Initiative (OAI) metadata harvesting protocols
- Are released and publicly available

The software systems presented in the OSI guide include Archimedes, ARNO, CDSware, DSpace, Eprints, Fedora, I-Tor, MyCoRe, and OPUS, as they meet the above criteria. The OSI guide provides system descriptions, an overview of the available software, and links for each system.

Following are descriptions of perhaps the two most widely used OSI software for developing IRs: DSpace and Eprint.

It appears that the DSpace software has the most installations in North America, while Eprints appears to have the largest installed base in institutions worldwide.

DSpace (http://www.dspace.org/)

DSpace is a digital library system that captures, stores, indexes, preserves, and redistributes the intellectual output of a university's research faculty in digital formats. It was developed jointly by MIT Libraries and Hewlett-Packard (HP) and is freely available to research institutions worldwide as an open source system that can be customized and extended. The DSpace Federation includes all the research institutions, libraries, and other institutions that are using the DSpace digital repository system. DSpace is so popular that is has been downloaded over 15,000 times since it was first released in late 2002. The release of DSpace triggered a world-wide increase in the development of IRs, particularly within North America.

DSpace is usually cited as the prime example of the most robust software backbone for IRs in North America, and the Massachusetts Institute of Technology (MIT), one of the most prestigious higher education science institutions in the country, early embraced DSpace in forming its IR. Therefore, it's important to examine what MIT has done.

The Massachusetts Institute of Technology (MIT) Digital Repository Project
https://hpds1.mit.edu/index.jsp

The MIT DSpace project includes research in digital form, including preprints, technical reports, working papers, conference papers, and images, but not all of it is MIT's research. DSpace is limited to digital research products and for items in print, and people who access the MIT website are directed to "Barton," the MIT Libraries' catalog.

Perhaps the best article (http://www.dlib.org/dlib/january03/smith/01smith.html) on the MIT IR effort is "DSpace: An Open Source Dynamic Digital Repository," which includes an excellent overview of MIT DSpace's early development, implementation, growth, and maintenance:

> In March 2000, Hewlett-Packard Company (HP) awarded $1.8 million to the MIT Libraries for an 18-month collaboration to build DSpace™, a dynamic repository for the intellectual output in digital formats of multi-disciplinary research organizations. HP Labs and MIT Libraries released the system worldwide on November 4, 2002, under the terms of the BSD open source license, one month after its introduction as a new service of the MIT Libraries. As an open source system, DSpace is now freely available to other institutions to run as-is, or to modify and extend as they require to meet local needs. From the outset, HP and MIT designed the system to be run by institutions other than MIT, and to support federation among its adopters, in both the technical and the social sense. (Smith et al., 2003)

The role of the library was important in the development of the MIT DSpace effort.

> Running such an institutionally-based, multidisciplinary repository is increasingly seen as a natural role for the libraries and archives of research and teaching organizations. As their constituents produce increasing amounts of original material in digital formats—much of which is never published by traditional means—the repository becomes vital to protect the significant assets of the institution and its faculty. (Smith et al., 2003)

Thus participating in the development of an IR is considered as a natural role of the library.

Smith describes the DSpace system, including its functionality and design and its approach to various problems in digital library and archives design, as well as the implementation of DSpace at MIT, plans for federating the system, and issues of sustainability.

Eprint (http://eprint.org/)

Eprint is dedicated to opening access to the refereed research literature online through author/institution self-archiving, and it allows a library to mount software and have the faculty self-archive their articles onto a library server. The software is free and open source. Eprint can convert any file to over 150+ document, raster, or vector file formats and easily converts to PDF, PPT, EXL, DOC, HTML, TXT, TIFF, JPG, GIF, PNG, etc., from any program.

The many terms used for IR and self-archiving can be confusing. Accessible via the Eprint home page is an excellent glossary of terms with definitions (see http://www.eprints.org/glossary/).

The Eprint software was developed in the United Kingdom and has the largest installed base of IR software worldwide, because it allows self-archiving and offers an easy-to-use system for setting up preprints.

An overview of some of the practical issues involved in developing an OAI-compliant e-print archive is addressed in the article, "Setting up an institutional e-print archive":

> E-prints are electronic copies of academic research papers. They may take the form of 'pre-prints' (papers before they have been refereed) or 'post-prints' (after they have been refereed). They may be journal articles, conference papers, book chapters or any other form of research output. An 'e-print archive' is simply an online repository of these materials. Typically, an e-print archive is normally made freely available on the web with the aim of ensuring the widest possible dissemination of their contents. (Pinfield et al., 2002)

Pinfield discusses experiences at the universities of Edinburgh and Nottingham, which have both developed pilot e-print digital servers, and presents one model for approaching the development of an IR and outlines considerations: document types and formats, encouraging user participation, setting up the server, digital preservation, submission procedures, metadata standards and quality, costs, advocacy issues, concerns of the key players (e.g., intellectual property issues, copyright, quality control, workload, and publishing issues).

There is a large IR development effort in Europe (e.g., ARNO, DARE, FAIR, National University of Ireland, Maynooth) mostly using the Eprint self-archiving software (http://www.sparceurope.org/Repositories/).

Hofstra University (http://hofprints.hofstra.edu/)

HofPrints is an electronic archive for papers produced by members of Hofstra University. This archive includes papers written by Hofstra faculty and administrators, papers delivered at Hofstra-sponsored conferences and invited lectures. HofPrints is a service to two main groups (http://hofprints.hofstra.edu/information.html):

> •For AUTHORS, it provides a way to make their pre-refereeing preprints and their refereed, published reprints available to the world scholarly and scientific community on a scale that is impossible in paper.
> •For READERS, it provides free worldwide access to the primary scholarly and scientific research literature on a scale that is likewise impossible in paper.

Other institutions are invited (and encouraged) to set up their own archives using the free Eprints software for author self-archiving.

CalTech CODA (http://library.caltech.edu/digital/)

The Caltech Library System operates the California Institute of Technology's IR, which uses the Open Archives Initiative - Protocol for MetaData Harvesting (http://www.openarchives.org/). CalTech CODA is for faculty-approved research results and other content supporting the mission of the Institute. This repository was launched in 2000 and has grown to include electronic theses, technical reports, books, conference papers, and oral histories from the Caltech archives. The IR is populated (and organized) by the entity responsible for the content—which may include a department, individual faculty member, or institutional unit. Their library is currently exploring technology for offering federated searching of all the content.

The DAEDALUS Project (http://www.lib.gla.ac.uk/daedalus/index.html)

DAEDALUS is a three-year project at the University of Glasgow that started developing a network of freely accessible digital collections that will include published and peer-reviewed academic papers, preprints and grey literature, theses, and working papers.

The article, "Filling Institutional Repositories: Practical Strategies from the DAEDALUS Project" (Mackie, 2004), provides an overview of some of the strategies that can be used to identify potential content for populating a repository, concentrating on published peer-reviewed journal articles. The author emphasizes how important it is to be able to demonstrate to stakeholders how the IR will work and that doing so is only possible with content in place. Addressing the need to establish a process whereby academics systematically self-archive or, at the very least, provide publication details on an ongoing basis, requires a different approach than having, say, a library do the archiving. An overview of follow-up strategies, staff web sites, publisher copyright issues, journal approach, open access as a source of content, and faculty and departmental publications

database issues is outlined. Of particular note is their experience of trying to populate their IR.

> Filling a repository for published and peer-reviewed papers is a slow process, and it is clear that it is a task that requires a significant amount of staff input from those charged with developing the repository. Although we have succeeded in adding a reasonable amount of content to the repository we have also been offered significant amounts of content that cannot be added because of restrictive publisher copyright agreements. In some cases academics have offered between ten and twenty articles and we have not been able to add any of them to the repository. This is a clear demonstration that major changes need to take place at a high level in order for repositories to be successful. Although some academics have taken the decision to try and avoid publishing in the journals of publishers with restrictive policies, this is still relatively rare. We can inform staff about the issues, but we cannot and should not dictate in which journals they publish. Change is only likely to happen if staff are required, either by the funding councils or by their institution, to make their publications available either by publishing in open access journals or in journals that permit deposit in a repository. Academics also need to be assured that their chances of scoring highly in the Research Assessment Exercise will not be adversely affected by publishing in open access journals. It is clear that while academics can see the benefits of institutional repositories, there has not yet been a sufficient cultural shift to persuade them to take action. It will be very interesting to see whether the policy adopted by the Queensland University of Technology requiring academics to deposit their research outputs in the University's Eprint repository is more widely adopted. (Mackie, 2004)

Mackie provides an interesting example of populating the IR with existing journal articles published by faculty, and a small case study is presented using articles from the journal *Nature* that is worth examining (Mackie 2004, p. 3).

Project Euclid (http://projecteuclid.org/Dienst/UI/1.0/Home)

According to their web site, Project Euclid is a user-centered initiative to create an environment for the effective and affordable distribution of serial literature in mathematics and statistics. Project Euclid is designed to address the unique needs of independent and society journals through a collaborative partnership with scholarly publishers, professional societies, and academic libraries.

A bit of history is in order. In 1999, the Andrew W. Mellon Foundation funded a proposal from MIT to support the design and implementation of a platform for the online distribution of serial literature in mathematics and statistics. As a result, Project Euclid was funded in 2000 and launched as a multimodel publishing service in early 2003. Euclid currently hosts and provides open access delivery, including around 40 subscription journals, to individuals and libraries. Euclid's technology support is based on the modular digital library architecture and protocol previously developed at Cornell in the early 1990s and is now known as DPubS (Digital Publishing System). DPubS helps to develop and deliver both open access and subscription controlled scholarly publications. As Ehling (2004) stated,

> In spring 2004 Cornell University Library in partnership with the Pennsylvania State University Libraries and the Pennsylvania State University Press were awarded a $670,000 grant from the Mellon Foundation to generalize and enhance the DPubS system and release the resulting improved version of the software under an open source license. The development goals for this project include:
> 1. Creation of a general purpose publishing platform.

2. Provide on-line editorial management services to support "peer review" activities.
3. Enhance the administrative functionality and interface.
4. Provide interoperability with institutional repository systems. (Ehling, 2004)

The development of the open source publishing system at Cornell and Penn State Universities provided a unique infrastructure model for the developing, organizing, and accessing IR applications (Ehling, 2004).
http://www.arl.org/newsltr/237/opensource.html

EDUCAUSE (http://www.educause.edu/home/720)

EDUCAUSE is a nonprofit professional association whose mission is to advance higher education by promoting the intelligent use of information technology. Membership is open to institutions of higher education, corporations serving the higher education information technology market, and other related associations and organizations.

A number of EDUCAUSE papers and presentations, primarily from its Evolving Technologies Committee, include useful IR information. Articles, reports, presentations, papers, speeches, and conferences that address IR issues, policies, and experiences can be accessed via their IR web page:
http://www.educause.edu/content.asp?page_id=645&PARENT_ID=671&bhcp=1.

SPARC (**http://web3.arl.org/sparc/**)

SPARC (Scholarly Publishing and Academic Resources Coalition) is an alliance of universities, research libraries, and organizations built as a constructive response to market dysfunctions in the scholarly communication system. SPARC believes that these dysfunctions have reduced dissemination of scholarship and crippled libraries.

SPARC serves as a catalyst for action, helping to create systems that expand information dissemination and use in a networked digital environment.

An excellent SPARC international workshop was held in November 2004, and included a series of distinguished presenters (see Bibliography); the series of IR papers were clustered into such topics as

- How to populate your IR: marketing strategies
- Authors agreements, copyrights, and other legal issues
- Formulating IR policies
- IR business models
- Choosing an IR platform
- Shared goals, different approaches
- Open access legislation

http://www.arl.org/sparc/meetings/ir04/ir04speak.html

SPARC announced in January 2005 that

> The E-print Network, a free service of the U.S. Department of Energy (DOE) Office of Scientific and Technical Information, has been chosen as a SPARC "Scientific Communities" partner (http://www.osti.gov/). The selection recognizes the contribution of the E-print Network to expanded availability and use of open-access scientific and technical research on the Internet. (SPARC, 2005) http://www.arl.org/sparc/announce/011005.html

BioMed Central: Open Repository Service (http://www.openrepository.com)

In late 2004, BioMed Central began offering a new service called "Open Repository" for institutions and research organizations. This service offers professional help to institutions to build, launch, maintain, and populate their own repositories, and they offer three different standard levels, each having a different fee: standard, silver, and gold service (http://www.openrepository.com/products.html).

Their Open Repository services include a basic set-up using the DSpace open source technology platform, with customization and access control, ongoing maintenance and customer support, document upload and formatting, file format conversion into PDF and XML, and populating the repository (e.g., automatic data-feeds of open access articles into the repository and search functionalities).

The "Zwolle Principles"
(http://www.surf.nl/copyright/keyissues/scholarlycommunication/principles.php)

A series of meetings by copyright stakeholders was held in Zwolle, Netherlands, in June 2001. A number of professionals (e.g., authors, publishers, librarians, university administrators) met to discuss copyright management for universities to consider with regard to organizing and making available electronic academic scholarly information. A significant outcome of the meetings was a set of principles that has come to be known as the "Zwolle Principles." Blixrud (2004) states that the purpose and objectives of the Zwolle Principles are

> To assist stakeholders—including authors, publishers, librarians, universities and the public—to achieve maximum access to scholarship without compromising quality or academic freedom and without denying aspects of costs and rewards involved.

1. Achievement of this objective requires the optimal management of copyright in

scholarly works to secure the clear allocation of rights that balance the interests of all stakeholders.

2. Optimal management may be achieved through thoughtful development and implementation of policies, contracts, and other tools, as well as processes and educational programs, (collectively "Copyright Management") that articulate the allocation of rights and responsibilities with respect to scholarly works.

3. Appropriate Copyright Management and the interests of various stakeholders will vary according to numerous factors, including the nature of the work; for example, computer programs, journal articles, databases and multimedia instructional works may require different treatment.

4. In the development of Copyright Management, the primary focus should be on the allocation to the various stakeholders of specific rights.

5. Copyright Management should strive to respect the interests of all stakeholders involved in the use and management of scholarly works; those interests may at times diverge, but will in many cases coincide.

6. All stakeholders in the management of the copyright in scholarly works have an interest in attaining the highest standards of quality, maximizing current and future access, and ensuring preservation; stakeholders should work together on an international basis to best achieve these common goals and to develop a mutually supportive community of interest.

7. All stakeholders should actively promote an understanding of the important implications of copyright management of scholarly work and encourage engagement with the development and implementation of Copyright Management

> tools to achieve the overarching objective. (Blixrud, 2004) (http://www.arl.org/newsltr/237/copyright.html)

IR Faculty Content Recruitment

Foster and Gibbons (2005) published an excellent article that presents the results of their research study and highlights some of the keys issues surrounding improving faculty content recruitment for IRs. Their study focused on how faculty members do their research and writing, and specifically how they used digital tools to organize their work. They state that for an IR to be successful it must be filled with scholarly work of enduring value that is searched and cited, and crucial to this effort is improving faculty content recruitment of scholarly information.

> The phrase "if you build it, they will come" does not yet apply to IRs. While their benefits seem to be very persuasive to institutions, IRs fail to appear compelling and useful to the authors and owners of the content. And, without the content, IRs will not succeed, because institutions will sustain IRs for only so long without greater evidence of success. (Foster and Gibbons, 2005)

The basic premise in their paper is that while there may be "numerous measures for the success of an IR, quantity of content is an obvious and uncomplicated metric." The findings from their study suggests that a centralized, faculty-based approach to the design and marketing of repositories is extremely important in populating them with faculty content in order to make the IR a useful tool. They found that one effective means to recruit faculty content for an IR is to work with a small early-adopter faculty group and networking from them to their colleagues. They successfully tried a new structure based on "library liaisons" as subject matter experts who work with library collection development by reaching out to the faculty campus community (http://www.dlib.org/dlib/january05/foster/01foster.html).

KU ScholarWorks--University of Kansas (https://kuscholarworks.ku.edu/dspace/)

KU ScholarWorks is a digital repository (using DSpace) for scholarly work created by the faculty and staff of the University of Kansas. KU ScholarWorks makes research available to a wider audience and helps assure its long-term preservation.

Association of Academic Health Sciences Libraries (AAHSL) http://www.aahsl.org/

The Association of Academic Health Sciences Libraries (AAHSL) is composed of the libraries serving the accredited U.S. and Canadian medical schools belonging to or affiliated with the Association of American Medical Colleges. It also includes other related libraries and organizations that lead in resolving information and knowledge management problems in the health care environment. AAHSL recently developed a pilot IR for its materials, and it is presently located at the University of Kansas on their DSpace server, where this white paper currently resides (https://kuscholarworks.ku.edu/dspace/handle/1808/216).

Professional associations may become quite active in developing organizational repositories of their information, and linking may occur between associations in the same kinds of fields.

Information and Issues

The Case for Institutional Repositories: A SPARC Position Paper (Crow 2002) offers an excellent overview and rationale as to why the IR is important to academic institutions. Crow states that IRs

> Provide a critical component in reforming the system of scholarly communication--a component that expands access to research, reasserts control over scholarship by the academy, increases competition and reduces the monopoly power of journals, and brings economic relief and heightened relevance to the institutions and libraries that support them; and have the potential to serve as tangible indicators of a university's quality and to demonstrate the scientific, societal, and economic relevance of its research activities, thus increasing the institution's visibility, status, and public value.
>
> Institutional repositories can provide an immediate and valuable complement to the existing scholarly publishing model, while stimulating innovation in a new disaggregated publishing structure that will evolve and improve over time. Further, they build on a growing grassroots faculty practice of self-posting research online. While institutional repositories necessitate that libraries--as their logical administrative proponents--facilitate development of university intellectual property policies, encourage faculty authors to retain the right to self-archive, and broaden both faculty and administration perspectives on these issues, they can be implemented without radically altering the status quo. Moreover, they can be introduced by reallocating existing resources, usually without extensive technical development.
>
> In sum, institutional repositories offer a strategic response to systemic problems in the existing scholarly journal system--and the response can be applied immediately, reaping both short-term and ongoing benefits for universities and their faculty and advancing the positive transformation of scholarly communication over the long term. (Crow 2002, see Executive Summary).

Kobulnicky (2004) compares the purchase of scholarly publications for universities to that of buying pork bellies on the commodities market and explains that university

presses and institutional repositories, along with the advent of content-management software, are helping universities turn the scholarly communications market to their advantage.

Obviously institutions have become dependent on a mix of web-based systems to manage their daily business of research, education, service, and patient care.

Duncan (2004) states that some institutions are looking to convergence—the seamless integration of various e-content and e-delivery systems, and "libraries, digital repositories, (IRs) and web content systems is an umbrella heading under which all systems and services can be listed" (p. 3). He discusses the trends toward convergence and the immediate issues to be addressed (e.g., stakeholders, working together with other organizations, environmental concerns, vendors, marketing), and he suggests a closer working relationship between IT and libraries, all of which requires ongoing education.

Duncan emphasizes that the potential of IRs to help create change in academic institutions is significant, but there are many implementation challenges, including a short administrative attention span, as well as a long-term central administrative commitment, to ensure preservation and maintenance of the IR over time. IT infrastructure and authentication and access systems need to be improved to support development of a wide IR.

McCord (2003) discusses the value of IRs for enhancing teaching, learning, and research and ways institutions are deploying increasingly complex education storage and delivery systems but do not provide seamless integration. The development of an IR can address this problem and offer a searchable, institution-wide database. However, Duncan (2004) offers a compelling argument on how the IR, if properly planned, can offer seamless integration and why this is very important for higher education. He cites the importance

of a library role in this development (as well as related issues). Thus, development of the IR is important for institutions because

> •Student and faculty intellectual output require massive storage needs
> •Long-term digital storage is needed
> •Great disparity between our ability to create digital assets and to control their inventories
> •Most of the collections managed by our libraries are created outside the walls of our institutions
> •Many newer e-journal collections are inadequately integrated with the master library catalog
> •Institutions have not done an adequate job of providing tools to create, manage, and inventory their rich media assets
> •A considerable amount of internally generated intellectual property may not migrate to scholarly journals
> •Losing value by not adequately managing intellectual output

The concept of searching across library collections and the development of interoperable digital library collections are related to IRs. The rapid development of the digital library and using IRs as Creative Commons is discussed in an article by Besser (2002), where he states that

> Online collections do not yet function like conventional libraries. Many digital collections are experimental and lack service components, and few have preservation components. The function of searching across collections is a dream frequently discussed but seldom realized at a robust level. This paper places a conceptual framework upon digital library development, and discusses how we might move from isolated digital collections to interoperable digital libraries. It first examines how early efforts to construct digital collections were conceived as

> experiments rather than operational libraries….the author points to functions (such as infrastructure, robust metadata, and preservation components) that can be deployed to move us from isolated digital collections to interoperable digital libraries.

Clifford Lynch, who has written several cogent articles about IRs and their development, believes that one of the most important potential outputs of an IR is "opening up entire new forms of scholarly communications that will need to be legitimized and nurtured with guarantees of both short- and long-term accessibility" (Lynch, 2002).

In the future, Lynch (2003) states that we will probably see various forms of consortia or cluster IRs developing between institutions. I think we will see an increasing number of professional associations mounting IRs, and AAHSL could be on the forefront of this development.

Open Access, IRs, and Libraries

There have been a considerable number of articles written and papers presented about the open access (OA) movement in scholarly communications. The open access movement has been a response to the high cost and accessibility of scholarly information. Goodman has written an excellent article on the criteria for open access, and, as he points out, the development of open access "depends on the very low incremental cost for additional users of electronic materials delivered over the Internet, whereas printed materials must have an incremental cost for each copy printed." (2004, p. 258). The preservation problem for open access dovetails with the development of the IR, and the library plays a key role in this development.

> With electronic publication, the publishers have generally been responsible, with backup from consortia and national libraries. With OA, national libraries would

> have the primary responsibility, which is totally in keeping with their overall mandate. (Goodman 2004, p. 263)

The crucial issue is, of course, financing. Goodman discusses the library budget, and the plan for conventional library subscriptions related to IRs that include self-archiving.

> The library budget has sometimes been mentioned as a potential source of funds. Libraries are naturally anxious to minimize this portion because there is obvious equity in transferring funds needed in the past for purchasing material to support the publication of the material instead. Although the library expenses for scientific journals will be reduced under all of the plans except the "Green OA" combination, the libraries naturally want at least some of the released funds to be used for other needs than science journals. (Goodman 2004, p. 264)

Geyde acknowledges that open access will be a solution to the rising cost of scientific journals and a way to ease the library budget and thus the money that an institution pays to support its library collection, while providing a way for disseminating and accessing research information. He believes that librarians can play a significant role in the open access movement. As always, it seems to come down to money and administration.

> Not surprisingly, many librarians, along with authors and some publishers, have seized upon the author pays model of Open Access publishing as the most logical and hopeful solution to ease the burden on library budgets, as well as the best way to unshackle research findings, which is, of course, its primary goal.
> (Geyde, 2004, p. 271)

Geyde mentions several roles that librarians can play related to the scholarly publishing and the open access movement, as well as how IRs could support the open access of scholarly communications. He mentions the possibility of a shift in library services on

the order of a sea change, and he raises a number of cogent questions about librarian skill sets and the changes necessary to design, develop, manage, and maintain a successful repository.

Publishers

There is a revolution going on in the publishing industry. Digital online journals are now ubiquitous. Elsevier (http://www.elsevier.com/wps/find/homepage.cws_home), a major journal publisher of scientific research, now permits authors to self-archive their journal articles.

> "An author may post his version of the final paper on his personal Web site and on his institution's Web site (including its institutional repository). Each posting should include the article's citation and a link to the journal's home page (or the article's DOI)," stated Karen Hunter, Elsevier vice president for strategy. "The author does not need our permission to do this, but any other posting (e.g., to a repository elsewhere) would require our permission. By 'his version' we are referring to his Word or Tex file, not a PDF or HTML downloaded from ScienceDirect—but the author can update his version to reflect changes made during the refereeing and editing process."
>
> "We are not only announcing the extension or further liberalization of our policy, we are also reaffirming prior policy, to ensure that our authors' needs are being met." said Arie Jongejan, CEO, Elsevier Science and Technology." (Peek, 2004)

NATURE (www.nature.com/nature)

In 2002, the Nature Publishing Group (NPG) was one of the first publishers to allow authors to post their contributions on their personal web site by requesting an exclusive

license-to-publish rather than requiring authors to transfer copyright. Nature took a liberal stand on self-archiving of journal articles, and the IR at the University of Glasgow now allows for archiving of *Nature* publications by their faculty (Mackie, 2004). The *Nature* self-archiving policy has allowed faculty articles to be placed in their IR beginning several years ago. For the full collection of specially commissioned insights and analysis from leading scientists, librarians, publishers, and other stakeholders on open access issues related to IRs, see the articles published in *Nature* at this link: http://www.nature.com/nature/focus/accessdebate/archive.html.

For an examination of publisher copyright policies and self-archiving of journal articles, see http://www.sherpa.ac.uk/romeo.php.

In early 2005, NPG announced a change to its self-archiving policy. Authors of original research papers published by the NPG are encouraged to submit the author's version of the accepted, peer-reviewed manuscript to their relevant funding body's archive for release six months after publication. Additionally, authors are also encouraged to archive their manuscript version in their institution's repository (and also their personal web site) also six months after the original publication.
This policy has been developed in response to the open access movement, and specifically "to extend the reach of scientific communications, and to meet the needs of authors and the evolving policies of funding agencies that may wish to archive the research they fund. It is also designed to protect the integrity and authenticity of the scientific record, with the published version clearly identified as the definitive version of the article" (www.nature.com/news).

NPG has been a progressive and vocal participant in debates about access to the literature. An ongoing debate on access to the literature can be found at the NPG site: http://www.nature.com/nature/focus/accessdebate/ .

NPG actively supports the self-archiving process and intends to continue to work with its authors, readers, subscribers, and site license holders to develop Nature policies, publications, and services in line with their needs.

Further changes in the publishing world will continue due to the open access movement and are likely to influence the further development of IRs.

National Institutes of Health (NIH) --Public Access Policy
(http://www.nih.gov/about/publicaccess/index.htm)

During 2004, NIH considered policy for free access to publications in journals six months after publication in which NIH-funded research findings appeared. The first NIH proposed and widely disseminated policy was released on September 3, 2004, in the NIH Guide for Grants and Contracts and September 17, 2004, in the Federal Register. As a result, more than 6,000 public comments were received through November 16, 2004. Many stakeholders were quite vocal in speaking either for or against the policy, and two major stakeholder groups (e.g., publishers and those supporting open access) were polarized in their viewpoints. The most significant change in the NIH policy from that originally proposed was to provide more flexibility for authors to specify the timing of the posting of their final manuscripts for public access through PubMed Central (PMC). The original proposed policy had indicated a six-month delay for posting through PMC. The final NIH policy requested and strongly encouraged that authors specify posting of their final manuscripts for public access as soon as possible (but within 12 months of the publisher's official date of final publication). The policy also clarified that the publication date is the publisher's official date of final publication.

Here is the official NIH policy

The National Institutes of Health (NIH) announced its policy on enhancing public access to archived publications resulting from NIH-funded research. Beginning May 2, 2005, NIH-funded investigators are requested to submit to the NIH National Library of Medicine's (NLM) PubMed Central (PMC) an electronic version of the author's final manuscript upon acceptance for publication, resulting from research supported, in whole or in part, with direct costs from NIH. The author's final manuscript is defined as the final version accepted for journal publication, and includes all modifications from the publishing peer review process.

This policy applies to all research grant and career development award mechanisms, cooperative agreements, contracts, Institutional and Individual Ruth L. Kirschstein National Research Service Awards, as well as NIH intramural research studies. The policy is intended to: 1) create a stable archive of peer-reviewed research publications resulting from NIH-funded research to ensure the permanent preservation of these vital published research findings; 2) secure a searchable compendium of these peer-reviewed research publications that NIH and its awardees can use to manage more efficiently and to understand better their research portfolios, monitor scientific productivity, and ultimately, help set research priorities; and 3) make published results of NIH-funded research more readily accessible to the public, health care providers, educators, and scientists (http://www.nih.gov/about/publicaccess/index.htm).

Copyright

The issue of copyright is critical to the development of IRs, especially with regard to journal articles and materials for which others may own the copyright. Greig (2004) provides a useful overview of how to populate an institutional IR and stay within the legal limits (http://www.arl.org/sparc/meetings/ir04/presentations/greig.html).

Due to technology and easy access to digital materials, there has been a significant increase over the last decade in the illegal downloading or hosting of commercial copyrighted materials (e.g., music and movies).

Copyright issues are critical to consider in populating an IR. Issues surrounding copyright and digital works are of concern both within and beyond the IR. Some institutions have been quite proactive in addressing the issues of copyright in the digital age. One such institution is the University of California System, which seeks to promote responsible management and use of digital resources across the University system (http://www.ucop.edu/irc/policy/copyuw.html).

In developing an IR, it is important to develop a centralized policy on digital copyright protection. The above example from the University of California is provided as one example of a comprehensive policy. However, with open access repositories, digital rights protection for journals may not be needed for access control.

Creative Commons License (http://creativecommons.org/about/licenses/)

The Creative Commons license web site offers a means for people to retain copyright to their materials while offering some rights to other people on certain conditions so as to encourage the widest use of their materials in user-friendly ways. They suggest eleven different creative licenses from which to choose, allowing a person to mix and match certain conditions. There probably is a Creative Commons license that could be utilized for most applications, and this is a useful means for licensing materials, particularly for "grey" materials that have not been previously published.

Critical Elements, Issues, and Questions to Consider

Following are some of the issues and questions related to developing of an IR in an academic health science center that might be considered.

Elements and Issues

Defining the IR for the institution

General purpose

Goals

Core mission

Strategic plan

Support resources

Institutional framework

Political climate

Governance

Stewardship

Funding

Policy

Existing digital content or transfer of print materials

Types of content

Metadata creation

Sharing

Ideal situation/plan and fly-by-the-seat-of-the-pants

Basic approach

Archiving

IT infrastructure support and system administration

Documentation and management

Data migration

Availability and accessibility of information

Security and confidentiality

Faculty promotion and tenure policy and nontraditional scholarship

Content integration and accessibility (e.g., integrated with campus library and course management systems, with other institutions, to the general public)

Copyright (e.g., publisher, faculty)

Intellectual property issues

Faculty support teams: Self-archiving or faculty-supported archiving?

Open access journals as a source of content

Creating silos of information

Updating and maintenance

Questions

Is the medical library, or health science center, part of a larger academic campus located in proximity, or is it autonomous? What software is the main campus using? What software is the best for the academic health science center?

What is the position of central campus administration with regard to the development of an institutional repository for the institution? Will policies be developed?

Should the academic health science library take a proactive position in the absence of any clear institutional initiative for a repository, or should it be reactive?

What is the advantage to the institution of developing an IR? What is the advantage to the faculty in doing so?

What would be the fiscal (and personnel) cost to your institution in establishing an IR?

What IR software should be used?

What might be included in the IR (e.g., published journal articles, research data collections and reports, grants, academic information, institutional file storage systems, institutional archives, web content management systems, all intellectual output from the institution)?

What should an IR not contain? Consider copyright, licensing, and other restrictions.

What are the resources that can be brought to bear on the effort to develop the IR, both within the medical library as well as the institution?

Who should manage the IR (e.g., library professionals, stand-alone, both, or other), and to what extent should self-archiving be facilitated, or even allowed?

Summary

This AAHSL white paper has provided an overview of IRs, salient issues, and strategies to consider for the academic health science library. There appear to be an increasing number of IRs being developed both in North America and abroad. No one model presents a best approach, for institutions vary in size, scope, and primary mission. The two dominant forms of IR software appear to be DSpace and Eprint.

Not every health science center will need or want to implement an IR, but almost every such institution may wish to offer some institutional repository service to its academic community. The models used by large academic institutions may not be the best for smaller institutions with fewer resources.

The development of an IR can appear to be trendy and fashionable. However, there are clear benefits to an institution implementing some kind of IR service for its campus community. The role of the library is a natural fit for the development of an IR.

Critical issues to consider in developing an IR are content (how to populate it), legal issues (including author agreements and copyright), personnel support, funding, policies and procedures, technical considerations, and institutional commitment.

There is no one best approach to developing an IR for an institution, and it would be most useful to consider the experiences of other institutions and ask a number of salient questions before embarking on an effort to develop an IR, so as to make an informed decision involving key stakeholders. A number of articles, papers, websites, and other resources have been provided to aid in this effort.

Bibliography/Resources

Besser, Howard. "The next stage: Moving from isolated digital collections to interoperable digital libraries," *First Monday*, 7(6): June 2002. Accessed November 16, 2004, at http://firstmonday.org/issues/issue7_6/besser/index.html.

Blixrud, Julia. Balancing stakeholder interests in scholarship-friendly copyright practices. ARL Bimonthly Report 237. December 2004. Accessed March 2, 2005, at http://www.arl.org/newsltr/237/copyright.html.

Crawford, Susan, Julie M. Hurd, and Ann C. Weller. From print to electronic: The transformation of scientific communication. ASIS Monograph Series. Medford, N.J.: Information Today, Inc., 1996.

Crow, Raym. The case for institutional repositories: A SPARC position paper. August 2002. Accessed November 16, 2004, at http://www.arl.org/sparc/IR/ir.html.

Crow, Raym. A guide to institutional repository software v.3.0. New York, N.Y.: Open Society Institute, August 2004. Accessed November 16, 2004, at http://www.soros.org/openaccess/software/.

Duncan, Jim. Convergence of libraries, digital repositories, & management of web content. October 11, 2004. EDUCAUSE Evolving Technologies Committee. Accessed November 16, 2004, at http://www.educause.edu/LibraryDetailPage/666&ID=DEC0401.

Ehling, Terry. ARL Bimonthly Report 237. The development of an open source publishing system at Cornell and Penn State Universities. December 2004. Accessed March 2, 2005, at http://www.arl.org/newsltr/237/opensource.html.

Foster, Nancy F., and Susan Gibbons. Understanding faculty to improve content recruitment for institutional repositories. D-Lib Magazine. 11(1). January 2005. Accessed March 1, 2005, at http://www.dlib.org/dlib/january05/foster/01foster.html.

Gadd, Elizabeth, Charles Oppenheim, and Steve Probets. The intellectual property rights issues facing self-archiving. Key findings of the RoMEO Project. E-Lib Magazine. 2003 September; 9(9). Accessed November 30, 2004, http://www.dlib.org/dlib/september03/gadd/09gadd.html.

Gedye, Richard. Open access is only part of the story. Serials Review. 2004; 30(4): 271-274.

Gibbons, Susan. Establishing an institutional repository. Library Technology Reports. 2004 July/August; 40(4):1-68.

Goodman, David. The criteria for open access. Serials Review. 2004; 30(4): 258-270.

Greig, Morag. The copyright conundrum: How to populate your repository and stay legal. SPARC workshop. November 18-19, 2004. PowerPoint. Accessed November 29, 2004, http://www.arl.org/sparc/meetings/ir04/presentations/greig.html.

Harnad, Stevan. The self-archiving initiative: Freeing the refereed research literature online. Nature. 26 April 2001; 410: 1024-1025.

Harnad, Stevan. For whom the gate tolls? How and why to free the refereed research literature online through author/institution self-archiving, now. 2003. Accessed November 11, 2004, http://cogprints.ecs.soton.ac.uk/archive/00001639/01/resolution.htm.

Harnad, Stevan, and Tim Brody. Comparing the impact of open access (OA) vs. non-OA articles in the same journals. June 2004; 10(6) Accessed November 11, 2004, http://www.dlib.org/dlib/june04/harnad/06harnad.html.

Info653 Paper 3, Digital Repositories in Science. (no author listed) April 22, 2003. Accessed November 19, 2004, http://www.keepinsite.net/~denise/paper3.htm.

Johnson, Richard K. Institutional repositories: partnering with faculty to enhance scholarly communication; D-Lib Magazine. 8(11). November 2002. Accessed March 2, 2005, http://www.dlib.org/dlib/november02/johnson/11johnson.html

Kobulnicky, Paul. Pork bellies and silk purses. 2004. EDUCAUSE Evolving Technologies Committee. Accessed November 16, 2004, http://www.educause.edu/LibraryDetailPage/666&ID=ERM0436.

Luce, Richard E. The open archives initiative: Interoperable, interdisciplinary author self-archiving comes of age. Serials Review and NASIG Conference Proceedings, San Diego, June 22-25, 2000. Accessed November 11, 2004, http://lib-www.lanl.gov/lww/articles/oai_nasig2000.htm.

Lynch, Clifford. "Institutional repositories: Essential infrastructure for scholarship in the digital age." August 2002. Libraries and the Academy, 3(2) 200: 327-336. Baltimore: Johns Hopkins Press.

Lynch, Clifford A. Institutional repositories: Essential infrastructure for scholarship in the digital age. ARL Bimonthly Report. February 2003. Report 226. Accessed November 16, 2004, http://www.arl.org/newsltr/226/ir.html.

Mackie, Morag. Filling institutional repositories: Practical strategies from the DAEDALUS Project. *Ariadne*. 39, April 2004. Accessed November 16, 2004, http://www.ariadne.ac.uk/issue39/mackie/.

McCord, Alan. Enhancing teaching, learning, and research. EDUCAUSE Evolving Technologies Committee. October 16, 2003. Accessed November 16, 2004, http://www.educause.edu/LibraryDetailPage/666&ID=DEC0303.

McDonald, Robert, Anthony Smith, Charles Thomas, and Tyler Walters. The new frontier of institutional repositories: Three libraries, three plans, one goal. (2004). EDUCAUSE web site. Accessed November 16, 2004, http://www.educause.edu/content.asp?page_id=645&PARENT_ID=671&bhcp=1.

McKiernan, Gerry. Open content and access for digital scholarship. July 27, 2004. Accessed November 11, 2004, http://www.public.iastate.edu/~gerrymck/OpenContent.ppt.

Nature. Press releases and website information. www.nature.com/news (March 2005).

Nature. For the current collection of specially commissioned insights and analysis from leading scientists, librarians, publishers, and other stakeholders in a number of articles related to open access and IRs, see the *Nature Forum* at the following URL. Accessed November 17, 2004, http://www.nature.com/nature/focus/accessdebate/archive.html.

Nature Pubishing Group/ Author License FAQ. Accessed November 18, 2004, http://npg.nature.com/npg/servlet/Content?data=xml/05_faq.xml&style=xml/05_faq.xsl.

Okerson, Ann Shumelda, and James J. O'Donnell (eds). Scholarly Journals at the Crossroads: A Subversive Proposal for Electronic Publishing. An Internet Discussion about Scientific and Scholarly Journals and Their Future. April 9, 1998. Accessed November 11, 2004, http://www.arl.org/scomm/subversive/toc.html.

Peek, Robin. Elsevier allows open access self-archiving. *Information Today*. 2004. Accessed November 17, 2004, http://www.infotoday.com/newsbreaks/nb040607-2.shtml.

Phelps, Charles E. Scholarly communication, open access, and cost saving: Are they related? October 5, 2004. SPARC workshop. Accessed November 29, 2004, http://www.arl.org/sparc/meetings/ir04/presentations/phelps.html.

Pinfield, Stephen, John Macoll, and Mike Gardner. Setting up an institutional e-print archive. *Ariadne*. Issue 31. April 11, 2002. Accessed November 16, 2004, http://www.ariadne.ac.uk/issue31/eprint-archives/intro.html.

Rusbridge, Chris, and William J. Nixon (2001) Setting up an institutional ePrints archive--what is involved? Unpublished paper, UKOLN Meeting (July 11, 2001). Accessed November 11, 2004, http://www.lib.gla.ac.uk/eprintsglasgow.html.

Smith, MacKenzie, Mary Barton, Mick Bass, Margret Branschofsky, Greg McClellan, Dave Stuve, Robert Tansley, and Julie Harford Walker. DApace: An open source dynamic digital repository" *D-Lib Magazine*. 9(1). January 2003. Accessed November 16, 2004, http://www.dlib.org/dlib/january03/smith/01smith.html.

SPARC. Institutional repositories: The next stage. A SPARC workshop with multiple presenters. Accessed November 29, 2004, at http://www.arl.org/sparc/meetings/ir04/ir04speak.html

SPARC. Press Announcement. "DOE/OSTI's E-Print Network Selected as SPARC Partner. Provides Research Communications and Full-Text Searching of Science Websites and Databases." January 10, 2005. Accessed March 3, 2005 at www.arl.org/sparc/announce/011005.html.

SPARC Europe. Homepage accessed November 17, 2004, http://www.sparceurope.org/Repositories/.

Suber, Peter. Open access overview. September 17, 2004. Accessed November 11, 2004, http://www.earlham.edu/~peters/fos/overview.htm.

Various presenters. Thinking Beyond Digital Libraries--Designing the Information Strategy for the Next Decade. February 2004. Proceedings from the 7th International Bielefeld Conference. The sessions included information on institutional repositories, in addition to access and use of scholarly information and strategic planning for academic libraries. Accessed November 16, 2004,

http://conference.ub.uni-bielefeld.de/proceedings/.

Young, Jeffrey R. Google teams up with 17 colleges to test searches of scholarly materials. Accessed November 11, 2004, http://chronicle.com/free/2004/04/2004040901n.htm.

Website Resource Examples

AAHSL	http://www.aahsl.org/
IR White paper	https://kuscholarworks.ku.edu/dspace/handle/1808/216
BioMed Central	http://www.openrepository.com/
Open Respository Service (http://www.openrepository.com)	
Budapest Open Access Initiative	http://www.soros.org/openaccess/software/
California Digital Library	http://www.cdlib.org/
CalTech CODA	http://library.caltech.edu/digital/
Creative Commons License	http://creativecommons.org/about/licenses/
Daedalus project	http://www.lib.gla.ac.uk/daedalus/index.html
UTHSC Demo	http://eserver2.lib.utmem.edu/
DSpace home page:	http://www.dspace.org/
PowerPoint Slides	https://dspace.lib.ohio-state.edu/index.jsp

EDUCAUSE http://www.educause.edu/home/720

Eprint http://eprint.org/

ETDs http://scholar.lib.vt.edu/theses/

Euclid http://projecteuclid.org/Dienst/UI/1.0/Home

First Repository http://arxiv.org/

Hofstra University http://hofprints.hofstra.edu/

KU Scholar https://kuscholarworks.ku.edu/dspace/

MIT https://hpds1.mit.edu/index.jsp

NIH Open Access Policy http://www.nih.gov/about/publicaccess/index.htm

OAI Harvester http://oaister.umdl.umich.edu/o/oaister/

Open Archives Initiative Protocol for Metadata Harvesting
(OAI-PMH) http://www.openarchives.org/OAI/openarchivesprotocol.htm

SHERPA http://www.sherpa.ac.uk/romeo.php

SPARC http://www.arl.org/sparc/index.html?page=m1
http://www.arl.org/sparc/meetings/ir04/ir04speak.html

University of Rochester Digital Repository https://dspace.lib.rochester.edu/index.jsp

Video http://www.open-video.org/

Zwolle Principles

http://www.surf.nl/copyright/keyissues/scholarlycommunication/principles.php

(http://www.arl.org/newsltr/237/copyright.html)

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The AAHSL Charting the Future Committee commissioned the development of this white paper. The white paper currently resides on KU Scholar site, which houses the University of Kansas IR. https://kuscholarworks.ku.edu/dspace/handle/1808/216

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