Countering Enclosure: Reclaiming the Knowledge Commons
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ABSTRACT
Numerous forces are enclosing the knowledge commons and threatening the sustainability of scholarly communication. This chapter describes strategies deployed to counter enclosure, many of which are undertaken through the collective action of librarians and scholars working together worldwide. It then considers alternative models for delivering research resources that expand access and participation, as well as the role of research libraries in these efforts. It also discusses the challenges to achieving these new operational modes. The author then proposes some designs for governance structures, financial models, and advocacy efforts that will help transform the academy into a 21st century institution that organizes, safeguards, preserves and promotes the
knowledge assets of the scholarly community. Finally, the author suggests research that is needed to advance theory and practice related to the development of sustainable knowledge commons in the digital age.

**Introduction**

For centuries, scholars, students, and the general public have relied on libraries to serve as their knowledge commons—a commons where they could share ideas and “promote the Progress of Science and useful Arts.” For scholarship to flourish, researchers have always needed free and open access to ideas. In today’s digital age, this means access to knowledge and information online. In the early days of the Internet, new technologies promised exactly that – abundant open access to an infinite array of resources available anywhere, anytime. By the dawn of the 21st century, new technologies transformed the way students learn, faculty members teach, scholars inquire, and librarians deliver research resources. But the same technologies that enable unfettered access also enclose these commonly shared resources, thereby restricting information choices and the free flow of ideas. As a result, many of the scholarly resources formerly available through libraries are now enclosed, unavailable from the commons where they were openly shared in the past.

Librarians, scholars, civil libertarians, and others favoring open access to information and ideas have struggled against enclosure. Despite impressive efforts, they have faced an uphill battle to influence outcomes in Congress, the courts, and beyond. Now, however, they are coming together around the emerging notion of the knowledge
commons, which offers a new model for stimulating innovation, fostering creativity, and building a movement that envisions information as a shared resource. Knowledge commons offer a way not only of responding to the challenge posed by enclosure, but also of building a fundamental institution for 21st century democracy.

In this chapter, I examine the numerous forces enclosing the knowledge commons and threatening the sustainability of scholarly communication. I describe strategies deployed to counter enclosure, many of which are undertaken through the collective action of librarians and scholars working together worldwide. I then consider alternative models for delivering research resources that expand access and participation, as well as the role of research libraries in these efforts. I also discuss the challenges to achieving these new operational modes. In addition, I propose some designs for governance structures, financial models, and advocacy efforts that will help transform the academy into a 21st century institution that organizes, safeguards, preserves and promotes the knowledge assets of the scholarly community. Finally, I suggest research that is needed to advance theory and practice related to the development of sustainable knowledge commons in the digital age.

Enclosing the Scholarly Commons

During the last quarter of the 20th century, traditional means for acquiring and distributing information began to transform. With increased availability of digital content and high speed telecommunications, industries raced to dominate the burgeoning information marketplace. While news about media monopolies, telecommunications deregulation, and the dot.com boom played in prime time, a less visible transformation
was changing dissemination modes for scholarly information. Government information was privatized and classified, journal publishers merged, and copyright laws modified in response to shifts in policy discourse, the rise of a global economy, adoption of new technologies and the ease of copying computer files. As a result, many people now have less access or ability to use new information and communication technologies. Others find their access limited because they cannot afford the high prices or comply with the ever-changing rules set by information proprietors who are eager to protect their investments in digital commodities. In effect, this “walled garden” or “enclosure” online creates an inequitable and often inaccessible information marketplace.

Instead of fulfilling the promises of the information age, large portions of online content have come under government-imposed restrictions or corporate controls like technological protection measures, licensing, and other digital rights management techniques, all of which impede access to information and limit its use. As a result, much online content is now restricted, wrapped, and packaged -- treated as secret or private rather than public or common property. Like medieval times when enclosure of agricultural pasture lands occurred both piecemeal and by general legislative action, no single decision or act is causing today’s enclosure of the commons of the mind. Some of the enclosures of the knowledge commons have been rapid, others gradual; many brought on by digitization and electronic distribution; others brought on by economic exigencies. No matter what the reason, a cumulative series of public- and private-sector policies have resulted in less access to the knowledge essential to “promote the Progress of Science and useful Arts.”
The story of enclosure of the knowledge commons began unfolding after World War II. In the mid-20th century, the government contracted with the defense industry to use computers to develop databases that could manage information efficiently and effectively. One of these companies, Lockheed, launched the “Dialog” system, which indexed educational and medical information along with defense-related data. But after a decade of federal start-up support, the information industry that emerged in the 1960s began urging the government to curtail or eliminate its publication programs, and warned of the dangers of a government monopoly over information. As Paul Zurkowski, the director of the newly formed Information Industry Association (the “IIA”), put it: “Just as surely as the Berlin Wall stands today, in the absence of a concerted industry-wide effort, user choice in information one day soon will be replaced by ‘free information’ from one source.”

Over the next decade, the Reagan Administration eliminated scores of government-produced publications, contracting out federal library and information programs (which resulted in the closing of many important federal research libraries), and placing “maximum feasible reliance” on the private sector to disseminate government information. The privatization platform advocated by the IIA and fostered by the Reagan Administration was the backdrop for many of the battles to come over ownership and control of information. With the subsequent development of networks, the World Wide Web, and digitized content, government publications in electronic format became big business. But many of those still produced by the government are no longer included in standard catalogs, distributed through the depository library program, or archived or preserved for permanent public access.
In the 1980s, at the same time that government publications were becoming privatized, many scholarly societies inadvertently facilitated enclosure of the commons when they turned over their journal publishing to private firms as a way to contain membership fees and generate income. Prices of scholarly journals soon soared, and publishing conglomerates restricted or enclosed access through expensive licenses that often require bundled or aggregated purchase of titles. Unfortunately, once journal prices outpaced library budgets, the short-term financial gains for the societies were quickly offset by serious losses in terms of access to research results. Initially, price increases were offset by resource sharing networks that facilitated rapid delivery through interlibrary loan. Later, though, these counterbalancing arrangements were undermined by restrictive licensing agreements.

By the early 1990’s, mergers of academic journal publishers left only a few international conglomerates in control, straining already tight higher education budgets by charging as much as $20,000 for subscriptions to journals like *Nuclear Physics*, *Brain Research*, and *Tetrahedron Letters*, while returning profits as high as 40%. According to a study by Bergstrom and Bergstrom, these commercial press charges differed remarkably from the prices charged by non-profits, typically differing by six times the average per-page price for journals published in the same field. Dependence on the private sector for scholarly journals essentially compels universities to finance research, give it away to for-profit publishers for free, and then buy it back at astronomical prices. Because of the extraordinary increases in journal costs -- 220% since 1986 (as compared to an increase in the consumer price index of 64%), research libraries have had no recourse but to cut many of their journal subscriptions. At the same time, the stress on
budgets has resulted in far fewer purchases of books, particularly titles of marginal interest or those published overseas, and has strained the revenues of university presses that traditionally relied heavily on libraries for sales.\(^\text{10}\)

In addition to steep price increases for some publications, publishers and information aggregators began requiring consumers and libraries to sign restrictive licensing agreements if they were to acquire or use digital materials – both copyrighted and public domain – that are compiled into databases such as *LEXIS/NEXIS* and *Science Direct*. Some licenses are simply imposed on consumers when they open shrink-wrapped packages or download software from the Internet. Others signed by libraries require complex negotiations prior to electronic purchases, and often force libraries to buy bundled suites of items -- many of low interest -- if they are to receive titles in greater demand. In addition, these contracts centralize control over the flow of information and eliminate many user protections guaranteed under copyright laws, such as fair-use rights to view, reproduce, and quote limited amounts of copyrighted materials.\(^\text{11}\) In addition, licensing contracts limit libraries from loaning materials to outsiders or archiving and preserving them for posterity. Moreover, because these licensed databases are leased rather than owned, the library has nothing to offer users if it discontinues its subscription, even after it has paid annual fees for many years.\(^\text{12}\) When budget cuts come, says Siva Vaidhyanthan, “The library has no trace of what it bought: no record, no archive. It’s lost entirely.”\(^\text{13}\)

At the same time that libraries and scholars are pressed to sustain the production and preservation of knowledge, they are facing the imposition of new “technological protection measures” such as “digital rights management” techniques that prevent
individuals from lawful lending and sharing of creative works, or making “fair use” of them through commentary, parody, scholarship, or news reports. Congress has exacerbated this problem by passing such laws as the 1998 Digital Millennium Copyright Act (the “DMCA”) which imposes criminal penalties for circumventing encryption and other technological protection measures, or even distributing circumvention tools,\footnote{14} and the Sonny Bono Copyright Term Extension Act (the “CTEA”), which extends the already lengthy duration of copyright for 20 years, thereby freezing the public domain where works are freely available to distribute, copy, and share.\footnote{15} Another DRM tool is the “broadcast flag,” a digital mark that signals conditions allowing or disallowing TV programs to be copied. In November 2003, the FCC mandated that all digital television (DTV) equipment recognize and obey a broadcast flag, an approach struck down by the D.C. Circuit Court in May 2005, but revived for consideration by Congress.\footnote{16}

Recently, the courts have reinforced these Congressional actions that further enclose the public domain and limit the public’s rights to use information. In Eldred v. Ashcroft in 2003, the Supreme Court rejected a constitutional challenge to the Sonny Bono law, in a decision that seems to give Congress the power to extend the copyright term at will into the future.\footnote{17} In 2000, the lower courts shut down the music file-sharing service Napster. Less centralized systems like Grokster and KaZaA took Napster’s place, but they too have been sued for “contributory” copyright infringement. In 2003, the recording industry began filing lawsuits against hundreds of people accused of downloading copyright-protected music, even though many were practicing lawful file sharing. The continuing efforts of the companies that make up the “copyright industry” to shut down file-sharing services, prosecute individuals for alleged copyright violations,
and otherwise lock up or enclose information have resulted in a highly-contested policy terrain for information and culture, and chilled lawful exchange of information.\(^ {18} \)

Perhaps the most hotly contested technological measure used to control information access is the Internet filter. Initially designed for home use, filters are now required for use in schools and public libraries if they are to receive federal grant support under the Children’s Internet Protection Act, upheld by the Supreme Court in June 2003. Unfortunately, filters do more harm than good, blocking the use of thousands of legal and useful resources for adults while many banned images remain available. Although Congress mandated filters in order to limit the exposure of minors to obscene, harmful to minors, or child pornography images on the Internet, it requires that public libraries install this restrictive software on all computers, including those used by adults and staff. Even though colleges and universities are not directly affected by this law, many of the affected public libraries, such as those in New York and Boston, serve scholars as well as the general public.\(^ {19} \)

Another type of enclosure was resurrected following the terrorist attacks on September 11, 2001, when the government put in place a series of measures to secure the nation by locking down “sensitive” information. These measures, similar to many imposed during the cold war,\(^ {20} \) greatly expand government secrecy at almost every level, restricting access to critical health and safety information and removing sensitive but unclassified information from Web sites and scientific journals. Most visible of these measures is the USA PATRIOT Act, passed with a variety of controversial surveillance measures just 45 days after the attacks. Among the most contested provisions are the sections that open up confidential library and book store records to law enforcement
review, chilling free expression and eroding the civil liberties of innocent Americans.\textsuperscript{21} Even before this law passed, Attorney General John Ashcroft tried to restrict open access to government information when he sent a memo to government agencies urging them to refuse Freedom of Information Act requests whenever possible, reversing previous policy that denied the release of information only if it would result in foreseeable harm.\textsuperscript{22} The government is also withholding more information through the classification process. The U.S. Information Security Oversight Office reported a record 15.6 documents classified in 2004, an increase of 10\% over 2003 and 50\% since 2001. Furthermore, the pace of declassification has slowed to a crawl, from a high of 204 million pages in 1997 to just 28 million pages in 2004.\textsuperscript{23} Not only are agencies withholding more information because of perceived national security risk, they are also labeling public data as “sensitive but unclassified,” further restricting access. In March 2002, White House Chief of Staff Andrew Card ordered a reexamination of public documents posted on the Internet, resulting in the removal of thousands of items that might aide terrorists.\textsuperscript{24} But the terror-related categories used by the government to “take down” sensitive sites are considered so vague by the American Library Association and others that virtually any type of information conceivably related to terrorism can now be withheld from public scrutiny.\textsuperscript{25} About the same time but apparently unrelated to national security, President Bush issued Executive Order 13233 preventing public access to presidential records, formerly ordered for release (under the Presidential Records Act of 1987) twelve years after a president leaves office.\textsuperscript{26} 

Beyond government-produced documents, the Bush administration has reached into the private research arena to restrict public access to sensitive information. In 2003,
officials struck a pact with the editors of peer-reviewed scientific journals that relies on the voluntary withdrawal of articles and rejection of future submissions that could compromise national security. Since then, targeted articles have vanished from electronic versions of scientific journals. All of these post 9/11 limitations on public access have prompted policy makers from across the political spectrum, including the Chair of the 9/11 Commission, to raise alarms that the government is placing unnecessary restrictions on everyday information essential to ensuring public health and safety.

While restrictions are necessary to protect against real threats, scholars, civil libertarians, and librarians caution that a presumption of secrecy rather than disclosure chills the openness necessary to accelerate the progress of technical knowledge and enhance the nation's understanding of potential threats. Such overzealous restrictions on public access to information result in unnecessary enclosure of public data -- enclosure that thwarts innovation and creativity by scholars and researchers eager to solve global problems.

Finally, a discussion about the enclosure of information must not overlook differential access to the Internet and other communications tools that exclude many from the benefits of the digital age. No matter whose data is used to describe the “digital divide” between rich and poor, between black and white, between urban and rural, between English and Spanish-speaking, between old and young, between immigrants and Native Americans, this gap between those with high levels of access and those without persists not only within American communities, but also among colleges and universities. As Larry Irving, former Administrator of the National Telecommunications and Information Administration (NTIA), points out, a big issue for colleges is differential
levels of technology infrastructure and information resources. He contends that students who attend elite well-equipped schools often come with greater exposure to and experience with sophisticated information tools, giving them a big head start. In contrast, those at historically black colleges and universities, Hispanic-serving institutions, or the tribal schools are likely to experience older technology, worse infrastructures, and fewer electronic subscriptions than others, paralleling their limited pre-college experiences that put them further behind in preparation for the workforce. Even those not falling behind in their ownership or access to computers and telecommunications networks often lack the skills necessary to utilize these resources effectively. Far too many students, faculty and other citizens are unable to identify, evaluate, and apply information and communicate it efficiently, effectively, and responsibly--essential skills if they are to learn, advance knowledge, and flourish in the workplace as well as carry out the day-to-day activities of citizens in a developed, democratic society.

In the face of these enclosures, librarians along with their colleagues in the scholarly community have struggled to protect access to critical research resources, balance the rights of users and creators, preserve the public domain, and protect public access for all in the digital age. Although they have fought hard to stop enclosure, they face an uphill battle to influence outcomes in a society that emphasizes individual ownership over sharing of resources. In effect, those striving to promote open access remain trapped in political limbo between two opposing solutions—either privatization or government intervention—in order to solve the problem of Hardin’s “tragedy of the commons.” As Ostrom and Hess point out in their introduction to this volume, one of Hardin’s mistakes is that he failed to recognize other possibilities such as management by
groups under suitable conditions. Rather than getting caught between these battling camps, the scholarly community can change the terms of the discourse about who owns its knowledge by adopting a different paradigm for creating, managing, and preserving knowledge in the digital age.

Reclaiming the Knowledge Commons

Digital age information-sharing initiatives, or knowledge commons, allow scholars to reclaim their intellectual assets and fulfill critical roles—the advancement of knowledge, innovation, and creativity through democratic participation in the free and open creation and exchange of ideas. Knowledge commons offer a way not only of countering the challenges of access posed by enclosure, but of building a fundamental institution for 21st century democracy. Such an institution facilitates not only expression “as diverse as human thought,” but also “peer production”—that is, decentralized production and distribution of information that bypasses the centralized control of more traditional publishing. As the legal scholar Yochai Benkler writes, peer production is “a process by which many individuals, whose actions are coordinated neither by managers nor by price signals in the market, contribute to a joint effort that effectively produces a unit of information or culture.” The result is commons-based production of knowledge that, while not challenging individual authorship, fundamentally alters the current system in which commercial producers and passive consumers are the primary players. In effect, peer production allows everyone to be a creator, thereby privileging “more idiosyncratic, unpredictable, and democratic genres of expression.”
The notion of knowledge commons also provides expanded opportunities to present a new narrative needed to persuade policymakers and the public of the promises and opportunities of an approach that is neither private nor government—one that employs collective action to ensure equitable access, free expression, and fair use in the digital age. The metaphor of the commons provides a language to explain how the extraordinary public assets invested in the nation’s information infrastructure can deliver democratic opportunities for the participation of all citizens. As Bollier explains in this volume and elsewhere, focusing on the commons helps people recognize that public participation and freedom of expression are at stake in the battle to control the flow of information and ideas. The commons elevates individuals to a role above mere consumers in the marketplace, shifting the focus to their rights, needs, and responsibilities as citizens.39

**Countering Enclosure of the Knowledge Commons**

No longer able to cope with enclosure of the knowledge commons, scholars, librarians, academic leaders, computer and information scientists, nonprofit publishers, and professional societies have joined forces to reclaim control of their research and scholarship. By creating more competition in, and alternative modes of, publishing, the scholarly community has launched well-managed, self-governed knowledge commons that allow the creators of this content to take back their information assets while promising sustainability and an alternative to the private market or government.40 The emergence of knowledge commons offers a new model for sharing information,
stimulating innovation, fostering creativity, and building a unified movement that
envisions the sharing of information with each member of a community.

Working together, librarians and scholars are undertaking novel collaborative
efforts among communities with common interests. These new paradigms for creating
and disseminating scholarly communication embody many of the characteristics of
common property resources or commons. They take advantage of the networked
environment to build real and virtual information communities, and they benefit from
network externalities, meaning the greater the participation, the more valuable the
resource. Cost to these communities is often free or low, ensuring equitable, democratic
participation and encouraging interactive discourse and exchange among members.
Participants contribute new creations after they gain and benefit from access. Such
reciprocity enhances both the human and social capital of these sustainable common
goods. Their governance is shared, with rules and norms defined and accepted by
constituents. While not every example fully embodies all aspects of commons, they all
represent exciting new approaches to populating the marketplace of ideas.

New scholarly communication paradigms, or knowledge commons, have the
potential to transform the roles of scholars as well as librarians as they advance teaching,
learning and research in the digital age. As scholars reclaim control over their intellectual
assets, their role changes, in the words of Hess and Ostrom, “from passive appropriator
of information to active provider of information by contributing directly into the common
pool.” Hess and Ostrom also point out that scholars worldwide are capable of “not only
sustaining the resource (the intellectual public domain) but also building equity of"
information access and provision, and creating more efficient methods of dissemination through informal, shared protocols, standards, and rules.\(^ {41}\)

According to Peter Levine, what is appealing about such efforts is that they are not controlled by bureaucrats, experts, or profit-seeking companies and they encourage more diverse uses and participation. At the same time, however, they are vulnerable if they fail to adopt appropriate governance structures, rules, and management techniques in order to defend themselves against rival alternatives, influence democratic discourse, and avoid the anarchy that can result in the tragedy of the commons as described by Hardin.\(^ {42}\) That is one of the many reasons why the sponsorship and collaboration of institutions like libraries and universities remain so vital to protecting, promoting, sustaining and preserving newly emerging knowledge commons.

*Open Access to Scholarly Journals:* Today, scholarly communities are actively creating new and exciting approaches to managing and disseminating their collective knowledge resources. Foremost among them is the Scholarly Publishing and Academic Resources Coalition (SPARC), founded in 1998 as an alliance of research libraries, universities, and organizations. SPARC, with 300 member institutions in North America, Europe, Asia, and Australia, was formed as a constructive response to market dysfunctions in the scholarly communication system. SPARC helps incubate alternatives to high-priced journals and digital aggregated databases, publicize key issues and initiatives, and raise awareness among the scholarly community about new publishing possibilities.\(^ {43}\) Beyond projects undertaken by SPARC, a number of professional societies in the U.S. are adopting their own new paradigms for sharing research results. A good example is the American Anthropological Association’s (AAA) AnthroSource and
AnthroCommons portal, which offers members online access to a vast array of resources in anthropology. In 1999, a group of research librarians urged the Association to develop a portal as a way to control journal costs as well as retain ownership and control of content based on the values and working habits of its members. By 2005, the AAA was making content available through its scholars’ portal, designed by and for anthropologists in collaboration with the University of California Press with a grant of $756,000 from the Andrew W. Mellon Foundation. A Steering Committee is assessing the work habits of members and articulating how to distinguish AnthroSource as a “tool of immense value” for anthropologists.44

Another approach to solving enclosure problems with scholarly publishing is open access (OA), which promises to make scholars’ ideas more readily available, reduce costs, and slow the commercialization of online scholarly literature. In this volume and elsewhere, Peter Suber, publisher of Open Access SPARC’s Open Access Newsletter, illustrates how adopting new standards and structures will not only reduce costs, but also overcome barriers to access such as restrictive copyright laws, licenses, and DRM.45 To encourage open access, the Soros Foundation’s Open Society Institute created the Budapest Open Access Initiative, which provides leadership, software, technical standards, and funding.46 For scholars, free availability of open access publications over the Internet has dramatically increased their frequency of citation, ensuring greater impact and faster scientific progress, particularly beyond the borders of North America and Europe.47

Among the nearly 2000 open-access journals now distributed are titles as diverse as Cell Biology Education, Journal of Arabic and Islamic Studies, and The New England
Many of these online open access journals began publication with funds from foundations, learned societies, and other nonprofits, and with assistance from SPARC and the Open Society Institute. Because the crisis in scholarly publishing hit science early and hard, the scientific community has led the way in designing new modes to exchange research and data. In 1999, BioMed Central became the first scientific publisher to institute an alternative model that offers open access online journals that are fully peer-reviewed. It recovers costs through author charges, some advertising, and institutional support from universities and foundations. Three years after the introduction of BioMed Central, the Public Library of Science (PLoS), conceived by Nobel Laureate Harold Varmus with his colleagues Michael Eisen and Pat Brown, and funded by a $9 million grant from the Gordon and Betty Moore Foundation, was founded as a nonprofit scientific publishing initiative. Its first open access journal, *PLoS BIOLOGY*, launched in October 2003, was so popular that it received more than 500,000 hits in a matter of hours, bringing the server down temporarily. Another scientific open access initiative, BioOne, offers an innovative partnership between scientific societies, academe, and the commercial sector with financial support from close to 900 libraries. In recognition of the value of open access to advance science, expand and speed public access, and preserve research findings, the National Institute of Health (NIH) now supports a full-text archive of grantees’ manuscripts accepted for publication based on research supported with NIH funding, available through the National Library of Medicine’s PubMed Central.

*Digital Repositories:* In October 1999, the library community helped launch the Open Archives Initiative (OAI) in order to provide low-barrier, free access to publicly
accessible articles in electronic journals through digital repositories. OAI utilizes new technologies, along with standardized descriptive cataloging (or metadata) to facilitate the efficient dissemination of these scholarly papers. Using the OAI tool, a number of universities, disciplines, and individuals now share scholarship, take a more active, collaborative role in modernizing scholarly publishing, and provide an unprecedented alternative to the limited access dictated by ever-more restrictive copyright legislation, licensing agreements, and technological protection measures utilized by many scholarly journals.

Best known of the new institutional digital repositories is MIT Library’s DSpace, launched in November 2002 with a $1.8 million grant from Hewlett Packard, as an open source software platform that enables the capture and description of digital articles, distribution over the Web through a search and retrieval system, and long term preservation. Aimed at making MIT faculty members’ scholarship more widely available, this project has encouraged the development of a federation of similar systems at many of the world’s leading research institutions, like Érudit at the University of Montreal, eScholarship, sponsored by the University of California’s Digital Library, and the Institutional Repository of Utrecht University (DISPUTE). According to Clifford Lynch, executive director of the Coalition for Networked Information, institutional repositories emerged “as a new strategy that allows universities to apply serious, systematic leverage to accelerate changes taking place in scholarship and scholarly communication.” It moves universities “beyond their historic relatively passive role of supporting established publishers,” and enables them to explore “more transformative new uses of the digital medium.”
Like universities, academic disciplines have also created a rich array of digital repositories. The first, the Los Alamos ArXiv.org, begun in 1991 by physicist Paul Ginsparg, provides low-cost access to scientific research papers in physics and related fields before peer-review and subsequent publication in journals. This open access, electronic archive and distribution server, now maintained by the Cornell University Libraries, receives as many as 300,000 queries per day, and includes more than 350,000 papers.\textsuperscript{58} By 2003, papers located on the ArXiv.org e-print service were cited about twice as often as astrophysics papers that were not, according to a report presented at the American Astronomical Society (AAS) Publications Board in November 2003.\textsuperscript{59}

Following the success of ArXiv.org, numerous other disciplines have created repositories such as EconWPA, the Oxford Text Archive, the PhilSci Archive; the Networked Digital Library of Theses and Dissertations, the Conservation Commons and the Digital Library of the Commons.\textsuperscript{60}

Individual authors are also distributing their own scholarly papers through personal Web sites or independent repositories. By retaining rights to archival copies of their publications, scholars become part of an international information community that increases access and benefits for everyone. According to Stevan Harnad and other researchers at the RoMEO project at the University of Loughborough in England, 55% of journals now officially authorize self-archiving, and most others will permit it upon request, demonstrating the dedication of many scholarly publications to promoting rather than blocking research impact. The more that research is read, used, cited, and applied, the greater the impact. As with many forms of information, rewards are reaped from increased reading and use, not from sales.\textsuperscript{61}
Digital Libraries: Over the past two decades, librarians have transcended the boundaries of their traditional buildings by delivering their collections of research materials remotely. To assist scholars and transform the academy into a 21st century digital enterprise, they have developed digital libraries by converting works to machine-readable form from their own collections, purchasing and linking to electronic resources, establishing standards and best practices for describing and preserving electronic materials, and teaching the skills users need to utilize these new tools. Today, faculty and students can use their library’s research materials anytime and anyplace, and they can receive expert assistance with the click of a mouse.

Daniel Greenstein and Suzanne Thorin describe the decade-long evolution of digital libraries, explaining that much of the early work was grant-funded and experimental, focusing on the development of best practices and standards, as well as on demonstrations that showcase particular collections and services online. Towards the end of the 1990’s, these efforts began focusing on users and their preferences and needs. Today, individual institutions have sought partnerships to participate in more collaborative development of digital collections, to create closer ties to the communities most interested in these collections, and to integrate these programs into mainstream library services. Authors and publishers have challenged some of these collaborative partnerships, like Google Print, on the basis of copyright infringement. Amazon, Random House and Microsoft intend to get around copyright challenges by offering full text access on a “pay-per-view” basis. A different model under development by the Open Content Alliance (OCA), which was established by the Internet Archive with a long list of international library, cultural, technology and business partners, is structured to
provide universal electronic access (through Yahoo) to public domain or otherwise open access collections from multiple research institutions for use by scholars, teachers, students, and the public.\textsuperscript{65}

Another collaborative digital library effort, the Distributed Open Digital Library (DODL), was begun solely by research libraries in order to provide universal electronic access to public domain humanities and social science collections from multiple research institutions for use by scholars, teachers, students, and the public.\textsuperscript{66} A similar effort in the United Kingdom will extend beyond universities to include some 20 public sector and other organizations that will form a Common Information Environment Group to serve the information needs of a wider audience of learners.\textsuperscript{67} For science, the National Science Foundation (NSF) has worked across the private and non-profit sectors to develop a collaborative national science digital library (NSDL) of high quality content and services needed by major communities of learners.\textsuperscript{68} One other noteworthy collaborative effort is the Digital Promise Project, proposed to create the Digital Opportunity Investment Trust ("DO IT") with proceeds from the auction of the public spectrum, which would fund public and private sector partnerships to digitize high-quality content from the archives of our nation's universities, libraries and museums.\textsuperscript{69} All of these private and non-profit initiatives aim to open up research collections to a broader audience of users.

\textit{Community-Based Preservation Efforts:} Traditionally, libraries preserved the materials they purchased from publishers in accord with their condition and the needs of users. While they altered each other about various conservation efforts, they undertook most of their work locally. With licensed online electronic materials, however, they have no local copy to preserve. Their licensed (leased) subscriptions reside with publishers,
presenting unusual challenges for permanent public access. In this volume, Donald
Waters explores key roles and responsibilities that “community-based” stakeholders
might assume when preserving digital common pool resources. He describes two
fledgling projects, both funded by the Mellon Foundation, that create trusted third-party
agents to store and archive publishers’ content. One, called Portico, sets up a new
organization to preserve publishers electronic source files. The other, developed at
Stanford University and called LOCKSS for Lots Of Copies Keeps Stuff Safe, relies on
the collective action of libraries (80 so far) working with publishers (more than 50) to
share responsibility for copying and storing journal content, using a common
infrastructure for systematic capturing of files. LOCKSS has spawned a variety of related
projects, ranging from government documents preservation to archiving of 9/11 Web site,
that depend on member libraries to take responsibility for preserving copies of titles—with
the publisher’s permission—and then agreeing to preserve the titles chosen by other
libraries as well, thereby ensuring a sufficient number of copies for safety and spreading
the work load among participants. These prototype systems provide opportunities for
the library community to work collectively to archive and preserve valuable resources.
But to sustain the effort, libraries will need to manage and coordinate their participation
carefully as well as develop a viable long term sustainable financial plan.

Learning and Information Communities: On campuses around the country,
integrated digital learning centers are creating an environment where traditional
boundaries blur and many constituent activities flow across old unit divisions. Libraries
have established these centers in conjunction with academic colleagues who run
information technology services and teaching and learning facilities. Some of these
spaces are called information commons, where disparate information resources are brought together by librarians and information technology staff. Others are referred to as learning commons, where students come together around shared learning tasks. What distinguishes these centers from the more traditional computer labs located in many university libraries and academic computer facilities is that they aim not to encourage the mastery of information, but to facilitate collaborative learning using all forms of media.\textsuperscript{72} The challenge, according to Scott Bennett, is to ensure that these learning commons are “conceptually ‘owned’ by learners, rather than by librarians or teachers.”\textsuperscript{73}

Noteworthy are such commons located at the University of Arizona where the library, the University Teaching Center, and the Center for Computing and Information Technology developed a dramatic shared facility in partnership with other units on campus.\textsuperscript{74} A similar collaboration between the Indiana University Libraries and University Information Technology Services offers a "technology and information center" with more than 250 individual and group workstations, reference services and resources, technology consultants, and a multimedia production laboratory. Since opening in September 2003, the library’s commons has become a major hub of campus life, raising overall use of the library by 20%; the overwhelming success of the facility prompted the adding of 250 more workstations in early 2005.\textsuperscript{75} Another example of a learning commons is one designed for first-year students at Indiana University-Purdue University at Indianapolis (IUPUI), who are enrolling in special seminars or learning communities, led by a collaborative of librarians, faculty, staff, and administrators, who teach critical thinking skills that will enhance their learning experiences.\textsuperscript{76} While all of
these commons are popular, evaluators are yet to assess their impact and how they will be sustained, governed and financed over the long term.

Opposing Enclosure: As far back as the 1920’s, librarians opposed federal attempts to prohibit importation of materials deemed subversive or obscene. Ever since, the American Library Association (ALA) has provided librarians opportunities to voice their collective concerns about the future of library and information policy in the United States. That voice is heard through federal and state legislative action, promotion of intellectual freedom, and advocacy. Sometimes, ALA speaks out to protest actions by the federal government to stifle free expression, such as the USA PATRIOT Act’s chilling effects on library users and communities. Other times, ALA takes legal action, such as suing to overturn the Communication Decency Act (CDA), the Children’s Internet Protection Act, and the FCC’s attempt to mandate the Broadcast Flag. While the librarians do not always prevail, members’ communications have influenced outcomes like the modification of the so-called library records provision of the USA PATRIOT Act and the unanimous decisions striking down portions of the CDA and the broadcast flag.

ALA is among several library associations that maintain Washington offices; Association staff and members work tirelessly to protect free expression and promote the free flow of ideas in the digital age. Almost always, these lobbying efforts are collective, involving coalitions and alliances across a broad spectrum of educational, public interest, and other organizations. One such group, the Information Access Alliance, made up of six library groups including ALA and the Association of Research Libraries (ARL), was formed to promote a new standard for antitrust review of mergers among scholarly and legal publishers. These six library groups have also formed coalitions with others like...
education, scientific, and civil liberties organizations to influence issues such as access to government information, copyright and fair use, funding, filtering, and anti-terrorism legislation. Much of this work to shape policy relies on influencing the court of public opinion as well as educating stakeholders about what is at stake in the battles to protect public access. The recently launched public relations effort called “Create Change,” sponsored by ALA’s Association of College and Research Libraries (ACRL), the Association of Research Libraries (ARL), and SPARC goes a long way toward telling the story about the crisis in scholarly communication to a wider audience. Also helpful are toolkits like the one ACRL produced on scholarly communication to educate, inform, and support advocacy efforts that work toward changing the scholarly communication system.

*Licensing Information Sharing:* In order to encourage open exchange of ideas, authors and artists can take advantage of a set of flexible copyright licenses offered by the Creative Commons. These licenses help creators dedicate their works to the public domain or license them as free for public use, with some rights reserved. Established in 2001 by Lawrence Lessig, James Boyle (a contributor to this volume), and other cyberlaw and computer experts. With support from the Center for the Public Domain, the Creative Commons is now used by millions around the world, increasing the sum of raw source material online, cheaply and easily.

*The Role of Research Libraries*

New methods for creating and disseminating scholarly information provide extraordinary opportunities to transform research libraries into 21st century institutions
for collective action and to provide the type of sponsorship and collaboration needed to build and sustain knowledge commons that will thrive in a complex and competitive information marketplace. Actually, this transition began as far back as the mid 20th century. Clifford Lynch has cogently summarized the four stages of this transition, beginning in the 1950s with the automation of day-to-day library operations, followed by reference use of computerized databases in the late 1970s, then direct patron access to the Internet in the 1990’s, and finally purchase of commercial databases and conversion of collections to digital formats. By automating and then networking their operations, librarians built bridges that connected collections and reference services directly to faculty and students needing context, connectivity, content, and capability to navigate the bewildering sea of information flooding their desktops.

Today, rather than simply supporting the teaching and research of members of the academy, librarians are serving as partners in a common enterprise that relies on their expertise and guidance. 21st century librarians are working together with information/learning communities to enhance the production, availability, and preservation of knowledge; collaborating beyond their facilities to create active, resource-based learning models that encourage critical thinking; and fostering the creation of information communities, both within and outside the library. Along with colleagues throughout the university, librarians foster not just access, but also the creation, exchange, and preservation of ideas among diffuse communities of scholars. Through this transition, libraries are evolving into “institutions of collective action,” or commons, in order to ensure the long-term, productive use of scholarly assets.

In this volume and in her report, Diffuse Libraries, Wendy Pratt Lougee analyzes the changing role of research libraries in the digital age. As digital efforts have evolved
from projects to programs, Lougee contends that research libraries are becoming less hierarchical, relinquishing control to more democratic modes of governance and participation. This changing relationship between libraries, content creators, publishers, and consumers as information becomes more distributed and access more open, has resulted in “a shift from publication as product to publication as process.”

As information distribution becomes more diffused, libraries become more involved in the process of scholarly communication and in building information communities. This transformation into more engaged, collaborative institutions will transform libraries as creators and not just sustainers of knowledge commons.

No longer are research libraries confined to a specific place or schedule; their resources and staff are now diffused throughout the campus and beyond. In these new roles, libraries must be flatter, more agile organizations that can respond to the changing needs of their institutions. They must organize services around content rather than function-based activities and build teams that combine various types of specialties like subject, cataloguing, instruction, and reference expertise that can work directly with user communities. But to succeed with this transition, libraries must reconsider not only their structures, but also the scope and boundaries of their responsibilities.

To engage in the process of scholarly communication, research libraries are embarking on collaborative ventures, their new territories that need flexible rules and boundaries, carefully negotiated among a variety of stakeholders, some seeking guidance from the library, and others competing with the library for control. New activities like learning commons and digital repositories raise questions of jurisdiction and priorities. What role will faculty and other academic colleagues play? How will rules be negotiated?
Who will determine the scope and effectiveness of their activities? What kinds of reciprocity will be required for sustaining these activities? How will they build the trust of their new colleagues? And what kinds of communication channels will they need to establish and maintain? Ultimately, how will libraries synthesize these disparate collaborative projects into a more integrated, coherent information creation and delivery system?

*Transforming Research Libraries into 21st Century Knowledge Commons*

Over the centuries, libraries and librarians have played an important role as caretakers of the cultural record and custodians of knowledge commons by applying their extensive experience in managing and disseminating information as well as their principled positions of intellectual freedom, equitable access, diversity, and democratic participation to forge policies and practices that serve the common good. To reclaim and expand that role in an era of enclosure, librarians must conceptualize and articulate the role of libraries as commons -- as collective action institutions that not only protect ideas, but also facilitate their creation, sharing, preservation and sustainability. Their challenge is to educate scholars, the public and policymakers about the benefits of open access while they continue to fight against enclosure. And they must engage the larger community of information users and providers in their quest to constitute, develop and sustain structures designed as alternatives to the prevailing digital marketplace. As James Boyle has suggested in this volume, librarians will need to rethink their systems and services as open rather than closed, designed with and for a broad array of potential users, not just those in their immediate communities. Moreover, librarians will need to
determine if they will serve as leaders or followers in the chaotic digital world.

What can librarians do to reclaim their pivotal role in building and sustaining knowledge commons? First, librarians must act collectively to solve the multitude of problems facing scholarly communication. They cannot work alone or in a vacuum. They need to extend their networks beyond libraries, including the full spectrum of information creators and users of information resources. Second, they must explore new ways of sharing information by participating in initiatives like open access, digital repositories, and community-based preservation, and by involving stakeholders in the design, creation, and management of these tools. Third, they must shape legislation and participate in policy discourse, promoting the value and benefits of open access and conveying the perils of enclosure. And fourth, they must create their own learning communities to stay abreast of new developments and communicate their implications to the public. To facilitate dialogue and participation, they can utilize innovative collaboration tools like web logs (blogs) and RSS feeds to share ideas and customize information dissemination to colleagues and users.

**Governing the Knowledge Commons**

As control over the creation, dissemination, and preservation of scholarship becomes more democratic and shared, what governance structures are necessary? Following the framework outlined by Hess and Ostrom in this volume and elsewhere, self-governance of these newly emerging commons will require definition of boundaries (which tend to be “fuzzy”), design and enforcement of rules, extension of reciprocity, building of trust and social capital, and delineation of communication channels.85 With
research resources diffused throughout the campus and beyond, their broad scope requires stewardship well beyond the boundaries of the edifices or structures that defined them in the past. The ideas and artifacts resulting from collaborative creation and dissemination of knowledge will need rules that are carefully negotiated by a variety of stakeholders, some relying on facilities like libraries, archives and scholarly societies for guidance, while others carve out new structures for control.

Collective action organizations like open access publishers, digital repositories, and digital libraries must develop democratic governance structures if they are to avoid the tragedy of the commons. This means that they must raise difficult questions like: What is our jurisdiction and what are our priorities? What role will faculty and other academic colleagues play? How will our rules be negotiated? Who will determine the scope and effectiveness of our activities? What kinds of reciprocity will be required for sustaining our activities? How will we build the trust of our new colleagues? And what kinds of channels will we need to establish and maintain communication and facilitate action?

Never before has collaboration been so essential to the successful introduction, development, and widespread utilization of scholarly resources. In the past, librarians and scholars cooperated on many levels. But collaboration means something far more demanding than the cooperative endeavors relied upon in the past. It means the development of a common new mission and goals, new organizational structures, more comprehensive planning, additional levels of communication, new kinds of authority structures with dispersed leadership, and shared and mutual control. In order to transform into more open collaborative organizations, knowledge commons will need new
organizational frameworks, with serious commitments by administrators and their parent organizations. In addition, they must broker new relationships, entrepreneurial activities and communication structures. While these new relationships sound promising, they often face pitfalls, such as conflicting institutional priorities and competition for scarce funding. Furthermore, some universities may not be prepared to retool so as to contribute efficiently and effectively to the development of knowledge commons. Indeed, without a strong commitment to these new paradigms, universities are unlikely to preserve their existing libraries as commons, let alone advance new knowledge commons in order to enhance teaching and learning.

**Financing the Knowledge Commons**

Developing, sustaining, and governing knowledge commons will also require significant investment in infrastructure and content to pay for start up and ongoing costs. While scholars may gain more free or low cost access under these new arrangements, someone must pay to sustain these resources. Moving from an unsustainable subscription-based structure will shift long-standing financial and social relationships. As highlighted throughout this paper, many emerging knowledge commons are supported by foundations and other grant-making agencies; benefactors like the Mellon Foundation and the Open Society Institute are unlikely to sustain commons indefinitely. At some point, these efforts will need to generate revenues that replace the subscriptions and grants that either previously or now cover costs.

In the case of open access publishing, for example, the burden of production expenses is shifting from purchasers to creators. Such transitions require capital for
starters, and then new streams of revenue for sustainability. Rather than charge subscriptions, open access publishers collect author and/or membership fees. One such publisher, BioMed Central (BMC), began by offering journals to libraries on a flat fee basis. Now BMC is asking institutions to pay membership renewals based on the estimated number of articles that faculty are likely to generate. Understandably, participating institutions are outraged by this unannounced steep rise in fees. Yet the flat fee model paid previously removes authors from any sensitivity to the costs of sustaining publications. Given resistance to rising costs, new financial models may fail to solve all the problems they were designed to fix.

Indeed, these new publishing paradigms carry risks and costs for libraries, authors, and publishers alike, along with concerns that they might overlook the importance of peer review and drive commercial publishers out of business. Such institutions as Stanford, MIT, Harvard, Cornell, University of Connecticut, and North Carolina State University are balking at renewing multi-year Reed Elsevier licensing contracts and some are even discouraging faculty from submitting articles to their journals. Commercial publishers like Reed Elsevier are beginning to feel the effects of these actions. Not only do they lose revenues from discontinued library subscriptions, but they also lose credibility with creditors. In the fall of 2003, a securities firm, BNP Paribas, judged the company to “underperform” because its subscription-based access was weak “compared to the newer and more successful article-fee based open access system.”

Beyond coping with rising subscription costs for both open access and commercial publications, institutions worry about finding additional funds to finance the
transition from subscription to a production business model. Low cost journals and digital archives may be welcome, but they are becoming available at a moment when research libraries face serious budget constraints that limit their ability to pay for long-standing commitments, let alone new ventures. At the same time, universities need to redirect resources if they are to become publishers as well as consumers of their faculty’s scholarship, authors need incentives and rewards if they are to migrate toward new publishing ventures that may demand high publication fees, and professional societies and other publishers need new revenue streams that compensate for the loss of commercial revenues. In short, new publishing ventures on or among campuses that involve libraries, academic presses, technology centers, and scholars will need sound business plans and not just grant funds to succeed. And this probably means, as the Committee on Institutional Cooperation (CIC) has recommended, that many of these new efforts to improve scholarly communication must build upon inter-institutional relationships already underway.  

*Advocating for Knowledge Commons*

Libraries, universities, professional societies and scholarly publishers can no longer rely on the old adage: “Build it and they will come.” Instead, they must devote scarce resources to projects chosen through careful consideration of user needs. To assess these needs, they must rely on focus groups, surveys, and other evaluation techniques to provide feedback for strategic planning. In addition, they must apply sophisticated packaging, advertising, and promotion techniques to encourage greater awareness of the valuable resources they are working hard to create and sustain on behalf of scholars.
After all, competing with Google will remain a big challenge even with the most appealing initiatives.

More importantly, they must tell a compelling story about the value of a new scheme for managing their intellectual assets. Rather than rely solely on an uphill battle to counter enclosure, they must also offer a fresh approach to constructing a fundamental institution for the digital age. This means that they must use language that explains how the extraordinary assets invested in advancing knowledge can reap more benefits for scholarship and society. Legal scholar Carol Rose believes that property arrangements are basically what “people have quite consciously talked themselves into.” She stresses that “narratives, stories, and rhetorical devices may be essential in persuading people of that common good.”91 For scholarly communication, a new narrative is needed to persuade librarians, academics, policymakers and the public of the promises and opportunities of more open access in the digital age. The proponents of new paradigms must capture people’s imagination and demonstrate how knowledge commons will transform educational institutions so they can meet the needs of 21st-century democracy.

To meet the challenge of access to information in the digital age, proponents of knowledge commons need to band together to amplify their voices and extend their reach. Their individual efforts are impressive, but now they must mobilize to create a movement comparable to environmentalism established in the last two decades of the 20th century. Boyle considers information as an “ecosystem.” As such, he recommends creating coalitions of people currently engaged in individual struggles that have little or no sense of the larger context.92 He is joined by a growing list of practitioners including librarians, scholars, and self-publishers who recognize the need to identify and mobilize
a broad array of individuals, information communities, and organizations concerned with the production and distribution of knowledge and ideas – people often inexperienced at working in concert to promote common concerns and collective action. The people whose voices need amplification range from authors, journalists, artists, musicians, scientists, and scholars to independent and academic publishers, lawyers, librarians, public interest groups, readers, listeners, viewers, and other users of information.

Building powerful coalitions and partnerships will require extensive organizing and fundraising. In order to stop enclosure of the knowledge commons as well as promote public access, those committed to sharing information must first find each other and then look far beyond the normal sources for allies. They must find common threads to tie various constituents together and to recognize that allies on some issues may become enemies on others--for example, publishers and librarians, who coalesce in support of First Amendment causes but approach copyright and fair use very differently. Before carving out new territory for producing and sharing intellectual assets, they must engage many within the academy who still remain unaware of the crisis and their role in solving it.

Champions of collective action must also articulate the positive economic value of the commons. Good examples and best practices abound, demonstrating that commons are a viable, effective alternative to creating and delivering information resources. Unless these models are documented and shared widely, however, stories will not resonate with policymakers, the media, and the general public.

If knowledge commons are to defend themselves against rival alternatives as suggested by Levine, the scholarly community will need to continue to navigate through
the highly-contested information policy arena of copyright, distance education, next-generation Internet, and intellectual freedom issues. On campus, librarians and others must educate administrators, faculty and students about their rights and responsibilities, and they must advise legal staff about the dangers of enclosure presented by restrictive license agreements, challenges to fair use, and other policies that affect both creators and users of resources. All must work together to articulate what is at stake and shape policy on campus, at the federal level, and beyond.

**Research Opportunities**

New models for creating and distributing information are proliferating. What is needed now is a survey documenting the impact and diffusion of these efforts so we can get an overview of the success and extent of adoption nationally. The scholarly community also needs a better sense of how these efforts are making a difference and why they are important to the future of the academic enterprise. As knowledge commons evolve, we need to learn how to avoid the tragedy of the commons by studying viable governance, managements, and financial structures. We need to conduct case studies of mature projects like arXiv.org so we can learn best practices, apply them to other projects, and inform the discourse about commons. Likewise, we need to monitor and evaluate the impact of such endeavors as open access publishing and digital repositories. Do these efforts improve access and lower costs? Will scholars participate in them? Will tenure committees consider such publications worthy? We need to gain insight into the characteristics of both successful and failing efforts, and determine how good projects can survive and thrive over the long term. Moreover, we need to explore whether open
public access actually contributes to the progress of Science and useful Arts. Finally, we need to construct narratives that tell stories that we have learned about open access to information and the negative effects of enclosure.

**Conclusion**

New technologies offer unprecedented possibilities for human creativity, global communication, and access to information. Yet digital technology also invites new forms of information enclosure. In the last decade, information providers have deployed new methods of control that undermine the public’s traditional rights to use, share, and reproduce information and ideas. These technologies, combined with dramatic consolidation in the media industry and new laws that increase control over intellectual products, threaten to undermine the political discourse, scientific inquiry, free speech, and creativity needed for a healthy democracy.

At stake in today’s debates about the future of information access is not only the availability and affordability of information, but also the very basis on which citizens’ and scholars’ information needs are met. The new information infrastructure must preserve traditional commons institutions like schools and universities, libraries, nonprofits, and governmental organizations, as well as buoy the development of more contemporary information communities committed to promoting and fulfilling the future resource sharing needs of scholars, creators, students, and citizens. To counter enclosure of the commons, librarians, scholars, and other public interest advocates have sought alternative ways to expand access to the wealth of resources over the Internet, and have begun to build online communities, or “knowledge commons,” for producing and sharing scholarship, information, creative works, and democratic discussion.
If everyone is to be ensured free and open access to information, proponents of commons must change the terms of the debate by focusing on what is needed, not just on what is unacceptable. They must articulate why knowledge commons advance scholarship, civil society and democratic participation. They must inform themselves about a broad array of complex issues and the various perspectives held by players on all sides. Moreover, they must undertake research that demonstrates the contributions of open public access to the advancement of knowledge, map public opinion, and compile narratives about the positive effects of open access to information and the negative impact of enclosure.

Finally, it is important to recognize that building information commons does not mean a total rejection of the for-profit media industry. As Frederick Emrich, the editor of the info-commons.org Web site, points out: “Commercial uses of information serve a vital role in ensuring that new ideas are produced. So long as commercial uses of information are balanced with effective public access to information, there is good reason to see the information commons and information commerce as mutually beneficial aspects of one system of managing ideas.” In the 21st century, no single model for creating and distributing information is likely to emerge. But knowledge commons will provide useful alternatives that ensure a meaningful role for users and creators alike.

Designers of knowledge commons are making significant strides in demonstrating and promoting new paradigms for information access. Having proven the concept, they must bring these disparate projects together to construct a fundamental new research institution for the digital age. Collaborative partnerships are broadening the reach of these efforts while showcasing the value of each endeavor. Although the challenges are great,
the potential for success keeps growing. With so many new projects unfolding, the scholarly community is well-positioned to reclaim their intellectual assets by nurturing and sustaining technologically sophisticated knowledge commons. Otherwise, many scholars, students, and others will be left behind in the information age.

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ENDNOTES (all URLs accessed 11-07-05)

1 U.S. Copyright Clause, U.S. Constitution, Article 1, Section 8 Clause A.


14 Digital Millennium Copyright Act, 12 U.S. Code §1201.

15 Sonny Bono Copyright Term Extension Act, 17 U.S. Code §301-304. The public domain consists of works whose copyrights have expired as well as works that, like government resources, were never covered by copyright.


18 A&M Records v. Napster, 239 F.3d 1004 (9th Cir. 2001); Metro-Goldwyn-Mayer Studios v. Grokster, 259 F. Supp.2d 1029 (C.D. Cal. 2003), appeal pending. For an overview of these cases and attempts to stop file-sharing, see Heins, “The Progress of Science and Useful Arts,” pps. 35-41.


43 For more information, see SPARC, http://www.arl.org/sparc/core/index.asp?page=a0


46 For more information including a Guide to Business Planning, see Budapest Open Access Initiative, http://www.soros.org/openaccess/


For more information about BioMedCentral, see http://www.biomedcentral.com.


For more information about BioOne, see SPARC, BioOne, http://www.arl.org/sparc/core/index.asp?page=d3


For more information, see, Open Archives Initiative, web site, http://www.openarchives.org/

This effort was boosted by articulation of the characteristics and responsibilities for large-scale, heterogeneous collections, which helped digital repositories provide the reliable, long-term access to resources. See, Research Libraries Group and OCLC, “Trusted Digital Repositories: Attributes and Responsibilities,” Mountain View, CA: Research Libraries Group, May 2002, http://www.rlg.org/longterm/repositories.pdf; see also Hess and Ostrom, Winter/Spring 2003, pps. 139-141.

DSpace Federation, http://www.dspace.org


http://www.ala.org/al_onlineTemplate.cfm?Section=American_Libraries&template=/ContentManagement/ContentDisplay.cfm&ContentID=108705

http://www.earlham.edu/~peters/fos/newsletter/11-02-05.htm


Donald Waters, “Preserving the Knowledge Commons,” in Hess and Ostrom, 2006.

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