KNOWLEDGE AS A COMMONS: SCHOLARLY COMMUNICATION, RESOURCE SHARING, AND THE POTENTIAL OF DIGITAL LIBRARIES

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Abstract

This paper reports on new research by Charlotte Hess and Elinor Ostrom funded by the Andrew W. Mellon Foundation. This research is aimed at advancing the study and practice of knowledge and information as a "commons." Commons are natural or human-made resources shared by local, regional, national, or international communities. Effective management and sustainability of commons requires the resource communities to communicate, collaborate, and agree upon appropriate rules and strategies.

Rapid hyper change in scholarly communication is touching every corner of how the scholarly record is managed and governed, including how it is generated, stored, and preserved. Like natural resource commons, knowledge today requires new ways of collaborative management, greater individual responsibilities, reciprocity, and cooperation. While ICTs enable the global dissemination of information, they also allow the unprecedented capture, privatization, and enclosure of traditionally open knowledge. Reconceptualizing scholarly communication as a commons may also help educate the academic community about the crucial role that each member plays.

The first part of this paper presents theoretical issues of the knowledge commons. The second part discusses a test bed case of building a knowledge commons in practice. A digital library based at Makerere could enhance information sharing, communication, archiving, and preservation of the research process for members of a collaborating research network with forest researchers in Uganda, Kenya, and Indiana University. The paper concludes with an examination of the benefits, challenges, and incentives for such an initiative.

Keywords*: commons; scholarly communication; collaboration; digital libraries*

1. Introduction

The rapidly expanding world of distributed digital information can be viewed as a global public good. Yet, this potentially valuable resource carries with it many negative externalities In previous papers, Hess and Ostrom [1] discuss the paradoxical nature of digital technologies. While ICTs have the capacity to *increase* access to and provision of information, they are also increasing the knowledge gap between the digital *haves* and *have nots*; between the North and the South; the rich and the poor; and the literate and illiterate. The westernization and the preponderance of English of online information serve to further widen the digital divide. Digital information is fragile. It can more easily be privatized, distorted, corrupted, and lost. While more and more people are becoming wired, able to both self-publish and access unprecedented amounts of information, the numerous threats to the quality, access, and preservation of the scholarly record increase at proportional rates. Information of value on the Web is not only less robust than hardcopy publications in traditional libraries; it is in danger of extinction unless better mechanisms for preservation and sustainability are put into place.

A growing number of scholars and information specialists around the world are finding the concept of the "commons" an extremely useful term [2] in relation to knowledge and information. Borrowing the term from the domain of natural resource management such as with forests, fisheries, or

grazing pastures, [3] commons are shared resources that require communities to communicate and make rules, in order to effectively manage and sustain them. Resources that are "commons" are also subject to free riding, pollution, and degradation. Conceptualizing knowledge as a commons elucidates the new parameters of scholarly communication and the need for new kinds of collaborative initiatives in the digital environment.

In the last ten years, scholarly information is gravitating beyond the proprietary hands of publishers and librarians. It is moving rapidly away from the neat confines of private publishing, decentralized libraries, and institutional organization. The focus has changed from information product to information *process*. Ultimately, the availability of scholarly communication lies primarily in the hands of the authors who have the ability to make their work openly accessible or not [4]. As a recent study shows, however, most authors are not aware of the issues involved with open access (OA), copyright, self-archiving, and open source [5]. Therefore, an important new focus of librarians and information specialists needs to be the education of the university community about the complexities of the distributed information environment, helping them navigate through the sticky fields of intellectual property rights, and to collaborate with them in building digital libraries, institutional repositories, and electronic archives. This collaboration to collect, organize, disseminate, and preserve the scholarly record is the knowledge commons in practice.

2. Defining Scholarly Communication and the Commons

The term *scholarly communication (SC)* comprises the whole "ecosystem" of scholarly information. It is the "system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals, and informal channels, such as electronic listservs." [6] Because of the rapid generation and exchange of digital information, valuable information lies throughout the SC spectrum. The assignment is to keep this information from getting lost. The goal, rather, is to collect, archive, and share it with other communities.

In the SC ecosystem, there are multiple types of commons. The collaborative network engaged in information dissemination and preservation is a commons. The knowledge shared by scholars is a commons. The resource facility, such as a digital library, is also a commons. The commons connotes the *jointness* of the shared resource in focus, the need to manage it in order to protect it and preserve it. The commons requires collaboration, cooperation, compliance, and reciprocity. Understanding information as a commons draws attention to the need for *collective action, self-governance,* and *evolving rules* that are required for the successful management and sustainability of all shared resources. And, it moves beyond the public-private dichotomy of ownership.

Within the scholarly communication commons, librarians and information specialists need to be advisors and leaders, as well as subject bibliographers, cataloguers, and reference specialists. All of us ICT professionals need to keep ourselves informed on a daily basis with the complex issues in the distributed digital environment. We need to (1) facilitate the design and implementation of digital libraries, archives, and repositories; (2) advise authors on writing fair and equitable copyright contracts so that authors retain the right to self-publish; (3) help with the application of metadata and archiving standards; (4) educate the university community about open source and open archive initiatives; and (5) remain vigilant to the externalities caused by the use of this commons, from spamming, and deception to piracy and cyber terrorism.

Whether in rich countries or poor, the academic library has traditionally been heralded as the citadel of civilization and the storehouse of knowledge. The digital revolution, where the contents of whole libraries can be stored on a desktop computer, redefines the role of the library in society.

[7] Libraries, however, can continue their role as repositories of the scholarly and cultural record if they utilize the social and intellectual capital of librarians and computer specialists, and work collaboratively with the faculty, students, and administration. By building new knowledge networks, the ICT professionals can provide the necessary expertise to craft a well-formed university-knowledge commons.

3. Building the Commons in Practice

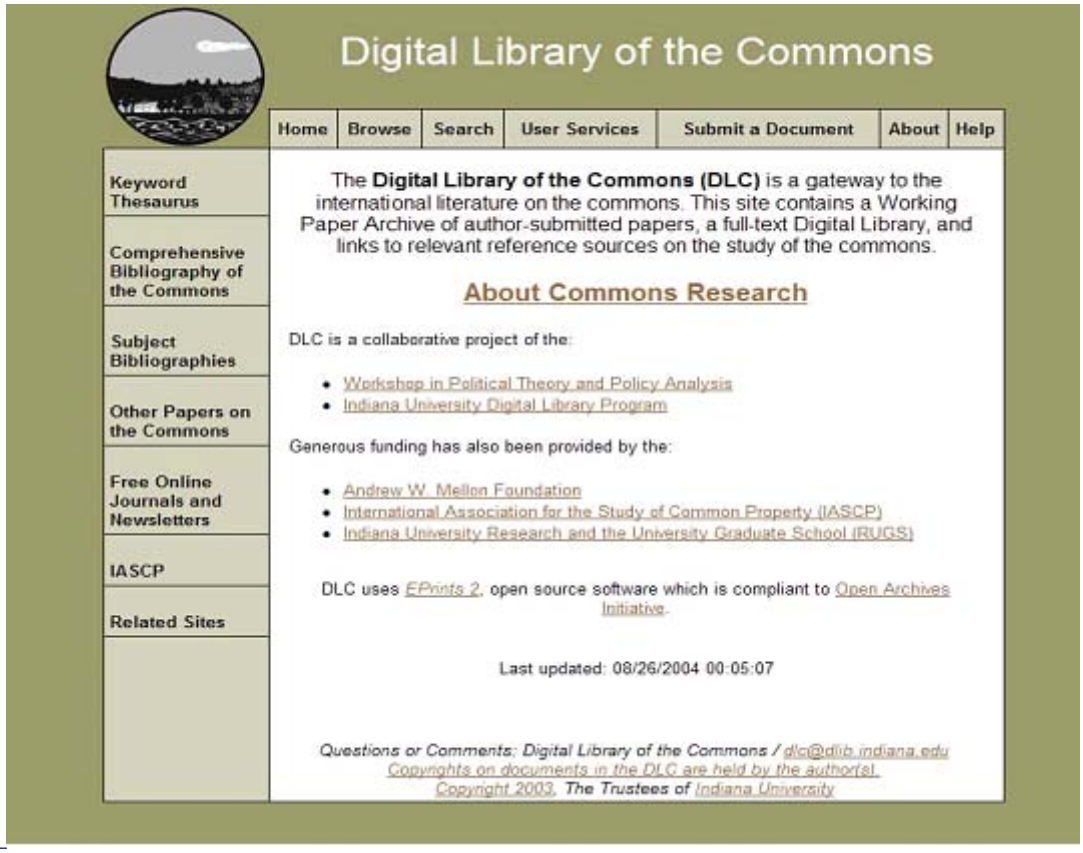
In our study of the knowledge commons, we are using as a test bed case a project that is close to our hearts: the ten-year collaborative research program called the International Forestry Resources and Institutions (IFRI). While centred at Indiana University, IFRI consists of 13 Collaborating Research Centres (CRCs) around the world [8]. The longest-running and most successful CRC is the Uganda Forestry Resources and Institutions Centre (UFRIC) in the Department of Forestry at Makerere. The collaborative process has already been well-practiced. Many of the Ugandan researchers have spent time at Indiana, and in 1997, Hess helped establish the library in the new building of the Faculty of Forestry and Nature Conservation at Makerere University [9]. Fittingly, a major focus of IFRI research is the commons, particularly with community forests.

The UFRIC team has produced a wealth of case studies, reports, papers, articles, and books. There is already a great deal of social capital in place and multiple areas of expertise. The goal now is to get these archives assembled, catalogued, digitized, preserved, and disseminated in order to share methods, findings, and lessons learned with other IFRI researchers. The establishment of an IFRI digital library based at Makerere would be the most efficient, economical, and a beneficial path. Is it feasible? There are many challenges, but the incentives are high and the benefits are enormous.

3.1 A Digital Library Model

In order to speed up implementation, we propose using the successful Digital Library of the Commons as a template. The purpose would be to share usability design, metadata schema, standards set by the Open Archives Initiative and Dublin Core, and open-source software. (Although DLC uses Eprints 2, UNESCO's software, Greenstone, appears to be more versatile. It is "open-source, multilingual software, issued under the terms of the GNU General Public License.") [10] The actual physical design and content of the UFRIC DL would be determined by the local team.

Figure 1. Homepage of the Digital Library of the Commons http://dlc.dlib.indiana.edu



The content stored in a local, forestry digital library is of crucial importance both to the global knowledge pool and to local communities. It is the university scholarly record, an international research program archive, and contains the cultural memory of East Africa. It combines, in the Hayekian tradition, general scientific knowledge with time and place analysis [11]. This information is timely and timeless. The types of information are wide-ranging from searchable databases, thesauri and glossaries, to preprints and post prints, reports, field notes, and images.

4. Challenges

4.1 Sustainability

While seed funding will be necessary to start such an initiative, considerations need to be given to the long-range sustainability of the DL at the outset. The very fragility of digital information lies in its centralized storage – one URL – as apposed to hundreds of libraries for hard copies of books. It has been estimated that the average lifespan of a URL is 44 days [12]. A universal hazard for digital libraries is that so many are founded and managed on soft money without long-term sustainability built in. Tragic examples are the African Technology Forum and Africa.com [13]. But even a world-class model digital library, Oxford's Forced Migration Online (FMO), is looking for funding to sustain its operation [14]. Some experts promote the use of business models to sustain DLs [15]. One business model calls for subscription-based access for some users. Another, applied by several online journals charge author fees, instead of user fees, in order to publish in the journal. The optimal scenario is to allow for as much free, OA information as possible.

What happens to the information once the research program has ended? Arrangements must be

made now for that eventuality. The home university, in this case, Makerere, needs to protect these scholarly and cultural archives and commit to them for the long-term, as they do for their traditional archives. In the case of collaborative initiative, multiple universities might agree on a sustainable solution.

4.2 Institutional change

Institutional change means changing rules and behaviours. Researchers see themselves as scientists, scholars, and, perhaps, authors. They rarely see themselves as archivists. But as Suber has already reminded us [3] the information of value is in their hands. A massive education campaign is about to get underway. Most faculty and students are unaware of the issues of open access, self-archiving, and copyright contracts. Self-archiving guru Steven Harnad instructs authors that:

> *Self-archiving the preprint is the critical first step. Before it has even been submitted to a journal, your intellectual property is your own, and not bound by any future copyright transfer agreement. So archive the preprints (as physicists have done for 10 years now, with over 150,000 papers, and cognitive scientists have done for 3 years now, with over 1000 papers). This is a good way to establish priority, elicit informal feedback, and keep a public record of the embryology of knowledge. [16]*

Only after researchers have understood the multiple arrays of issues, can they begin to see themselves as part of the solution.

The DL team will need an information specialist or librarian to implement the software and design. There will also need to be a team leader to coordinate standards and submissions of documents. The leader will need to be a champion for the cause, because, as we have learned from the Digital Library of the Commons, compliance may be difficult at first. The forestry researchers are not in the habit of actively sharing their work.

5. Incentives

Establishing an open access research-driven digital library will require time, planning, compliance, learning, support, and long-term commitment. Why do it?

5.1 Visibility

There are large incentives, for the UFRIC team as well as for Makerere University. Having e-prints freely available on the Web will give global visibility to the research. Several studies have noted the increased visibility of online papers. Computer scientist Steve Lawrence calculates the increase in citation rates for online articles to be 286% [17]. Increased citation rates further the professional reputation and careers of the authors. This visibility also benefits the public and the worldwide community of forest researchers [18].

5.2 Open Science

Open access to quality online research follows the time-honoured tradition of open science, the rigorous exchange of knowledge, data, and findings between scholars. IFRI researchers in other countries have long wanted better communication between the CRCs. If the digital library is established at UFRIC it will serve as an impetus and a model for the other centres.

5.3 Demonstration of accomplishment

A dynamic digital library that serves as a research archive can demonstrate a

project's accomplishments to funders better than any report or proposal. Potential funders can also see the inevitable growth of such a website. Examples are two websites directed by the author. The number of user of the DLC doubled in 2004. The IASCP website usage has skyrocketed [19]. It has had 144,000 visitors since 1997, with 45,000 in 2004! By continuing to archive the centre's research notes, studies, and papers on their own digital library, UFRIC will provide a dynamic site that serves as a timely library of relevant research as well as a historical record of their research process.

6. Benefits

6.1 Local Design

A UFRIC digital library would conform to IFRI research, Open Archives Initiative (OAI) [20], and Open Source standards. A great deal of the material would be in English, the language of the scientific collaborative network. Nevertheless, the greater the local design and uniqueness, the greater the value to the global knowledge pool. "Local design" means more than graphics. For the Ugandan forestry researchers, it could mean descriptions of local forest sites, a glossary of indigenous botanical names, and summaries in the languages of the communities. No one else in the world holds the keys to their unique collection of information and knowledge.

6.2 Voice

Knowledge plus voice produces power. By self-publishing their scientific research, the UFRIC team position themselves to the possibility of influencing public policy. Local, authoritative, scientific information about Ugandan forests and communities, freely available on the DL website, are likely to become valuable resources for government officials and policymakers. The information can also influence the global environmental knowledge commons.

6.3 Equity

The western centrism of the Web is caused by the extreme imbalance of US and European information that has already been built up on the Internet. In 2004, roughly 72% of the language on the Web was either English (35.8%) or a European language (37.9%) [21]. The web language statistics are rapidly changing, however, as more non-western websites are put up. Chinese, for example, now comprises 14% and Japanese 9.6%. The surest way to even out the digital divide is to provide online local, African, and indigenous knowledge.

6.4 A University that is "Engaged"

An "engaged university" is one that is relevant to society; one that informs local citizens, and one that pays back to its communities [22]. A locally-based digital forestry library would represent the university at its best. This engagement recognizes free access to information as the cornerstone of a democratic society. Highly visible, locally relevant, globally significant digital libraries can inform policymakers, educate communities, and, at the same time, enhance the university's mission. ICT professionals need to work with university administrators as well as faculty and staff, to establish informed partnerships and communities of understanding.

7. Conclusion

This paper gives a brief overview of the concept of the knowledge commons within the university environment. It discusses an investigation of the possibility of putting the knowledge commons into practice by building an OA digital library that would serve both local and international collaborating researchers. It presents some of the challenges, incentives, and benefits associated with such a long-term facility. Since this work is in its initial stages, the paper may raise more questions than it answers. The author invites comments and suggestions during this ongoing investigation.

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