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Optimizing the Transformation of Knowledge Dissemination: Towards a Canadian Research Strategy: Preliminary Results

Abstract: Academic researchers are the major actors in the scholarly communication system and, as such, it is extremely important that any research being conducted in this area be guided by their needs. This study assembles a diverse panel of Canadian academic researchers in order to define a research strategy for the dissemination of scholarly knowledge in Canada that is defined by relevant to the research community. The major research question addressed here is the nature of a research agenda for the dissemination of scholarly research in Canada. These results so far reflect a substantially different approach to defining a research agenda for the dissemination of scholarly research than those outlined in the past.

I. Introduction

Scholarly research makes a profound contribution to the social, cultural and economic wealth of a country. The results of this research, scholarly knowledge, is created, organized, preserved and disseminated within the scholarly communication system. The Canadian scholarly communication system is just one part of a larger international system that is undergoing profound changes. While other countries are undertaking national research strategies aimed at understanding and navigating these changes, Canada is not. In order to optimize the dissemination of scholarly knowledge, it is critical that Canada has a comprehensive research strategy to examine the future of scholarly communication in this country. Following from its earlier work (AUCC 1996, Shearer 2001, Shearer and Birdsall 2002), the Canadian Association of Research Libraries (CARL) is taking the lead role in laying the foundation for the development of a strategy on scholarly communication through this research proposal.

The scholarly communication system has undergone many changes in recent years, in effect blurring the traditional roles of its actors. And, many believe that there are even more profound changes in store, the implications of which are far from understood (Cummings, 1992). These changes are the result of external forces or drivers, which range from economic, to political, to demographic, and in particular to technological and are described in more detail below:

Technology

New technology is a major driver transforming the scholarly communications system. Information technologies offer easy access to richer, multimedia formats, allowing the integration of text, sound, graphics, and video, and high levels of interactivity. It permits immediate worldwide delivery of publications and data to the researcher's desktop and has profoundly affected scholars' abilities to report, review, and distribute research results, challenging traditional models of publishing, storing, and preserving research.

Globalization

Research has always been an international undertaking and the continuing globalization of economies and research has a major influence on how knowledge is managed within the scholarly communication system. Canada is a "net importer" of information, and thus has a considerably greater need for the research results of other countries with larger populations and economic resources. On the other hand, the collections in the research libraries of Canada represent a large part of the accumulated documentary knowledge wealth of the country (Hill, 1995). Canada does have unique strengths and resources, and it is upon these, which we must capitalize, so that we can rightfully maintain our place in the global arena of scholarly research.

Economics

Economics is another very significant driver influencing the traditional scholarly communication system. This is particularly so in Canada, as the exchange rate with the United States, a major exporter of information to Canada, has increased significantly. In addition publishers have been increasing their prices each year by considerably more than inflation. As a result, even though Canadian libraries have increased expenditures over the last five years, their average purchasing power has dropped by between 21.6% and 32.7% depending on the region (Delamothe, 1999).

Changing Patterns of Research

Canadian research patterns are continually evolving. New fields of research, as well as inter-disciplinary and multi-disciplinary collaborative research have unique information needs and place new requirements of the scholarly communication system.

Increasing Quantity of Scholarly Publications

There has been a phenomenal increase in the amount of published literature in the past two decades (AUCC, 1996). This is true in particular in the hard sciences, where it has been estimated that the number of published papers doubles every 10 to 15 years. For example, scholars in the field of mathematics have published about one million scientific papers to date -- half in the past decade alone (AUCC, 1996). This poses a real challenge for the scholarly communication system, which seeks to provide access to all the resources required by scholars in order to remain up-to-date in their field.

Public Policy

Public policy issues have a huge influence on the nature of the scholarly communication system. Government policy and funding of towards academic research in Canada has a tremendous effect on the nature of research being pursued in Canadian universities. The commercialization of research generates issues relating to research priorities, applied versus pure research, intellectual property and publication rights, and so forth. Similarly, evolving legal regimes such as copyright and licensing change the shape of the scholarly communication profoundly.

II. Research Problem

These highly interrelated forces are challenging many elements of the scholarly communication system. The effects of these drivers on the Canadian scholarly communication system are far from understood, however it is clear that they raise issues critical to the continued vitality of Canadian scholarship in all disciplines. The aim of this study is examine how knowledge dissemination within the scholarly communication system in Canada is being transformed by these drivers, with the goal of optimizing the Canadian response to the impact of these drivers. In order to optimize the transformation of knowledge dissemination in Canada, a number of core research questions will be addressed:

- What is the current state of scholarly communication in Canada?
- How are external drivers transforming knowledge dissemination within the current system of scholarly communication?
- Is there a need for a specific Canadian research strategy to facilitate the adaptation of the scholarly communication system to this new dynamic environment?
- If so, what should that strategy be?

III. Methodology-The Consensus Conference

A major objective of the SSHRC Research Development Initiative (RDI) program is "to support research that identifies and defines new conceptual and methodological perspectives, directions, challenges and priorities in conducting research, dissemination, and researcher training." In short, a RDI funded study should lead research in new intellectual directions employing innovative methodologies. The study directly contributes to the RDI objective of providing a "means for researchers to collaborate on exploring innovative ways to develop and disseminate knowledge".

In the past, studies on the dissemination of scholarly knowledge in Canada were undertaken one of two ways: By individual consultants, often someone from outside of Canada, or; using some type of advisory body consisting of practitioners from the area under study, such as a group of librarians, who provided their input based on their collective experience and wisdom. These studies also for the most part focused on only one aspect of the scholarly communication chain such as the adequacy of library collections or the funding of scholarly journals. The studies neither examined the system as a whole nor involved those central to the system: academic researchers. And finally, the studies focused on finding solutions to specific problems such as funding, preservation, and so forth.

This study seeks to conduct a more inclusive examination of the issues throughout the scholarly communication process through a consensus conference process involving a panel of academic researchers. Rather than focusing on fixing a specific problem in the dissemination system the study will focus directed on whether there is the need for a Canadian national research strategy addressing the many challenges facing scholarly communication.

Therefore, we wanted to employ a methodology that:

- included the input of the major players in scholarly communication in Canada; Canadian researchers.

- allowed the research team to examine the scholarly communication system as a whole, including all the actors and activities involved in the dissemination of scholarly research;

- and, that not only stood on its own merits as a research study but also could make a contribution to current national public policy priorities relating to innovation, research and development, and economic growth.

In light of these considerations, the research team adopted a consensus conference methodology to achieve these aims. The concept of the consensus conference was developed in the United States in the 1970s to assess the feasibility of adopting new medical techniques. The process originally involved the creation of a panel of health experts who were provided with the testimony of other medical experts. The panel would then arrive at those recommendations it could achieve through consensus. However, since the issues being addressed increasingly involved complex legal, public policy, and ethical issues impacting on large segments of society, consensus conferences began to incorporate laypersons on their panels. The medical consensus process soon spread from the US to Europe and elsewhere in the 1980s (Joss and Durant, 1995).

In 1987, the Danish Board of Technology adapted the use of the consensus conference process to bridge the gap between technical experts, politicians, and the public. The process is used to ensure that the general lay public has input into important public policy formulations relating to complex science and technology issues. It was adapted so the panel membership would consist of individuals from the general public, rather than "experts" in the field. Variations of the process have been used in several countries for public policy purposes. In Canada there has been no substantive use of the consensus conference process regarding public policy. However, the Ontario government recently announced it would be using a variation of citizen panels in its budget consultation process.

While consensus conferences vary depending on the topic and context, they typically include:

- a consensus panel of lay persons,
- presentations to the panel by experts and stakeholders on the issue under investigation,
- the use of professional facilitators to assist the panel in the process to reach consensus,
- and, at a two day meeting at the end of the process, the preparation of a concise report of recommendations based on a consensus reached by the panel.

For this study, the process has been modified:

- to meet the needs of our specific research initiative;
- to remain within funding limitations;
- and to take advantage of the availability of web-based technology.

Consensus Panel

In this study it was decided that a panel of researchers would be more appropriate than a panel of laypersons, as they are the major stakeholders in the scholarly communication system and are both the creators and users of scholarly knowledge. Due to financial constraints, we were limited to a panel of ten members who were selected by the research team based on s set of criteria that aimed at getting individuals who were in various stages of the research career along with regional, gender, and disciplinary representation. An electronic invitation for volunteers to serve on the panel was sent to 175 Canadian scholarly associations with the request the invitation be circulated to their members. We do not know how many associations circulated the invitation to their members. We were able to determine that over 20 had put information about the study on their website or in their electronic new letters. In any case, there was a tremendous response to our invitation: over 70 individuals volunteered.

The Research Team selected ten panel members based on the criteria it had established. We were able to fulfill most of our criteria. With regard to geographical representation there were 2 members from the Atlantic region, 2 from Quebec, 2 from Ontario, 2 from the Prairies, 1 from British Columbia, and I from the Northern territories. Regarding disciplines, we had 3 social scientists, 2 health scientists, 2 natural scientists, 2 from the humanities, and 1 from technology. There were 6 males and 4 females, which represented the proportions of those applying. We also had a good mix of people at various stages of the research career including a Ph. D. student, junior scholars, heavy publishers, research administrators, and what we called gatekeepers such as journal editors, directors of research networks, and so forth.

The consensus conference methodology was conducted in four phases: an environmental scan; initial prioritization of research issues; expert presentations; and the final consensus conference. Each of these methodologies is described briefly below:

Phase 1: Environmental Scan: An initial environmental scan of the current state of the scholarly communication system was undertaken and reported in the attached Shearer and Birdsall publication. This will be updated and expanded by research team. In addition, a thorough statistical analysis relating to each of the players within the scholarly communication system in Canada, and in relation to comparable nations, will be undertaken. This will provide, for the first time, a quantitative picture of the entire scholarly communication system in Canada. The research team will then prepare a background document on the current state of scholarly communication and the drivers transforming it.

Phase 2: Prioritization of Issues

Once the consensus panel was formed, they were brought together for an initial one-day meeting. At this meeting, the panel was tasked with identifying four to six transformational issues that require further research in the Canadian context. To achieve this panel members were taken through a three-step process: identification; grouping; and prioritization. To begin with individual panel members identified a number of critical issues for the dissemination of scholarly research. 22 issues were put forward in total and the panel discussed these issues. The issues were then grouped together with other similar issues forming seven clusters. The final process in this meeting was to prioritize the clusters according to set of criteria. The criteria defined prior to the panel meeting by the research team, and re-evaluated by panel members. Once agreed upon, the panel was asked to weight each cluster according to the criteria.

Phase 3: Expert Presentations
Based on the clusters identified by the panel, a series of presentations are to be conducted via conference call facilities and also broadcast over the web. The research team chose experts presenters from a pool of potential experts, practitioners, and/or private sector stakeholders, compiled by the research team, based on the consensus panel's research clusters. Each presenter will address the set of questions provided by the panel, after which, panel members will carry on a discussion with the presenter to clarify the scope and definition of each cluster. The presentations will be broadcast on the Internet, via the project web site allowing wider stakeholder input. The questions of the panel members and the responses provided by the experts will be recorded and archived, along with comments received from the virtual audience.

Phase 4: Final Consensus conference panel meeting
Upon completion of the presentations, the panel will be assembled for a final two-day consensus conference. Using input from the expert presenters and the virtual audience, the panel will formulate a research strategy for scholarly communication in Canada. This process will emphasize re-evaluating and refining the previously defined clusters and result in a final report from the panel members. The consensus will also consist of concrete recommendations for achieving that strategy including identifying research needs and establishing research priorities.

IV. Results to Date

Phase 1: Environmental Scan
In Summer/Fall 2003, the Research Team conducted a thorough environmental scan of the current state of the scholarly communication system. The environmental scan consisted of a search of the scholarly communication literature from 1998 to 2003. In addition, a statistical analysis relating to the actors within the scholarly communication system in Canada and internationally (researchers, publishers, and libraries) was undertaken. Based on this scan, the research team prepared a set of 21 background documents outlining the current state of scholarly communication and the drivers transforming it. These documents fall into three categories: The current state of scholarly communication; the knowledge dissemination issues arising from changes to the scholarly communication system; and descriptions of some of the research programs for scholarly communication in Canada and internationally (UK, US, the Netherlands, etc.). The research team identified 11 areas for potential research. Each of these is described briefly below:

User Needs- Canadian researchers depend on access to timely and comprehensive knowledge in their fields in order to create new knowledge. These complex and diverse knowledge requirements change over time as research disciplines evolve. Recent trends in Canadian research reflect to a large extent those occurring globally. Over the past two decades, changes have occurred with the composition of disciplines, the creation of new ones, and the emergence of new areas of research.

Alternative Publishing Models- Traditional modes of scholarly publishing are being challenged on a number of fronts. The rising numbers and costs of scholarly journals; time delays from submission to publication; and diminished access to publications as a result of subscription cancellations by research libraries are the impetus for the creation

of numerous alternative publishing models. As well, the ease and efficiency of electronic media has resulted in the development of numerous methods to facilitate both formal and informal scholarly communication.

Copyright and Intellectual Property- Intellectual property has become a battleground between researchers, university administrators, publishers, libraries, and users of research. The issues center around two debates: On the one hand, there has been an increasingly heated discussion about who should hold the copyright for research articles and monographs. On the other, the debate concerns the greater commodification of research output: Universities, governments and private industry increasingly seek to commercialize academic research, bypassing the publication process entirely, and transferring the ownership for intellectual property from the individual researcher to private industry.

Information Retrieval- A continuing increase in volumes and format of scholarly literature in the past two decades has exacerbated a long-standing problem of the information age--that of information overload. As well, as the traditional boundaries between institutions and disciplines begin to blur, researchers increasingly require access to information from a wider range of sources, both within and outside of their own subject area. As a result, one of the major challenges for the scholarly communication system will be to develop more sophisticated methods for retrieving distributed research material and establishing protocols and standards to facilitate the assembly of this material.

Knowledge Representation- Another crucial aspect of resource discovery is the development of methods for representing objects so they may be retrieved more efficiently. Knowledge representation can be defined as the "identification, in some language or communications medium, description, or picture that corresponds with an object being described" and encompasses a number of issues and research problems.

Costs of Publications- Rising cost of academic serials has been a cause for concern to many in the scholarly communication system for the last 15 years, in particular the research libraries. Between 1990 and 1999 the journal budgets of Canadian research libraries increased by a factor of 1.85 while the consumer price index increased by only a factor of 1.20. However the cost of journals in all disciplines rose by a factor of 3.21. Journal purchasing power therefore declined by 42% over this period in Canadian research libraries. (CARL, 2002)

Open Access- As a response to the rising costs of scholarly publications, a number of concerned stakeholders in the scholarly communication system launched the "open access movement". Open access calls for the free availability of scholarly literature and is being promoted on several fronts.

Journal Licensing- In response to the rapidly rising prices of academic journals, research libraries have turned to consortial site licensing as a means to increase their buying power and secure greater access to journals for their users. Basically, site licensing entails access to an aggregation of journals that publishers offer as one-price, one-size fits all packages. These licensing agreements, usually negotiated by libraries as a group, have greatly enhanced access to scholarly publications in the last several years and can be accomplished at a fraction of the cost compared to the licensing of databases or journals by individual libraries. This method of providing access to users is especially

cost-effective and beneficial for smaller colleges and universities, or for those libraries with limited budgets. It also creates access to new titles that were not previously available to users, and makes them more accessible by more users.

Commercialization- In Canada, the commercialization of university research has garnered increasing attention as a strategic means to enhance Canada's economic growth. Canada's Innovation Strategy aims to make the commercial exploitation of research by the private sector a fundamental mission of the university and granting councils and urges universities to provide more incentives for faculty, staff and students to engage in research that can be commercially exploited by private companies. This shift from knowledge as a public good to its commodification is changing the nature of how knowledge is generated, distributed, and used and is a growing concern to many in the scholarly communication system.

Preservation- The tradition of preservation is being challenged on several fronts, which include new technology, economics, and the increasing volume of knowledge resources. Developing priorities for preservation activities on the basis of the research value of a rapidly growing body of research knowledge has always been, and will continue to be extremely challenging, because of the unknown and unfixed values of artifacts. Nevertheless, researchers continue to depend on access to historical and original artifacts. Current preservation issues can be separated into three different categories: What to preserve; how to preserve; and, who will preserve.

Cyberinfrastructure- The real challenge is to build systems supporting scholarly communication that yield new capabilities and capacities so effectively and efficiently that they are intuitive and transparent in their operation. Digital libraries are currently an integral part of the cyberinfrastructure of the scholarly communication system. Early digital libraries began as digital replicas of print-based materials but have rapidly morphed into a new mode of communication among researchers, enabling rapid dissemination of new findings, discussion and debate around these findings leading to major reductions in time for fully-vetted results, and a new form of scholarly communication infrastructure that holds the promise of enabling fuller exploitation of knowledge.

Phase 2: Prioritization of Issues

On January 14, 2004, a multidisciplinary Consensus Panel of Canadian researchers was brought together for an initial one-day conference. The purpose of this meeting was for the panel to identify and prioritize the issues that require further research in the dissemination of scholarly research in Canada. The twenty-one backgrounders authored by the research were provided to the ten-member panel to provide them with a detailed picture of the scholarly communication system, as well as brief descriptions of the funded research in this area already being conducted in Canada and internationally. This information was to be used to assist the panel in identifying those issues that were of critical importance for the dissemination of scholarly research in Canada. To begin the process panel members individually identified a number of critical issues for the dissemination of scholarly research. In total, the panel members described 22 issues. The panel then discussed these issues and grouped the similar issues together to form seven clusters: Control, Creativity and Rewards; The Future of the Book; Intellectual Property and Copyright; Knowledge/Data Storage and Retrieval; Knowledge Production and the Social Contract; Knowledge Systems; Power and Infrastructure within the Academy.

The final process in this meeting was to prioritize the clusters according to set of criteria. The criteria were defined prior to the panel meeting by the research team, and re-evaluated by panel members. The research areas were assessed according to the following criteria:

1. What would be the potential impact of research in this area?
2. What type of investment would be required to conduct research in this area?
3. And, would research in this area have a uniquely Canadian dimension?

Based on these three criteria, the panel prioritized the seven research areas identified and chose six of them to be examined more closely:

1. **Knowledge Systems**
2. **Knowledge/Data Storage and Retrieval**
3. **Knowledge Production and the Social Contract**
4. **Control, Creativity and Rewards**
5. **Power and Infrastructure within the Academy**
6. **Intellectual Property and Copyright**

Phase 3: Expert Presentations
A series of expert presentations will conducted April 19th and 20th, 2004 shortly after the submission of this paper to better inform the panel about each of these issues.

Phase 4: Final Consensus Conference Meeting
The final consensus conference will be held after the expert presentations in Halifax in early May 2004.

V. Discussion

The final results of this study were not available at the time of submission for this paper and there will likely be some changes to the six research areas outlined by the panel as they are will be refined and re-examined through the next two phases of the research study. Nevertheless, the initial results from the first two phases of the study are very interesting—particularly the nature of the research areas as defined by the consensus panel. Both the scope of the research areas and their defining characteristics differed somewhat from those outlined by the research team. In the initial environmental scan conducted by the research team, eleven potential research issues for the dissemination of scholarly research in Canada were identified. Meanwhile, the research areas identified by the panel tended to be much broader in scope than the issues and more theoretical in nature. For example, “Knowledge Production and the Social Contract” encompasses several of the issues described in the research teams backgrounder: the commercialization of research, the accelerating costs of journals, as well as the accessibility and translation of research results for public consumption. The research area “Control, Creativity, and Rewards” addresses the impact of peer review and promotion and tenure in the academy on the current scholarly communication system. In this category, the panel addresses such issues as: “Although Canadian granting agencies are encouraging partnerships and relationships with non-academic communities, the current academic rewards system does not acknowledge this type of knowledge dissemination” and, “How can peer review be used more effectively?” The research area, “Power and Infrastructure within the

Academy" addresses the inequities that currently exist in Canada in terms of access to knowledge resources. And, in the area of "Knowledge Systems", the panel addresses concerns such as how disciplinary differences in translating and interpreting knowledge affect the dissemination of scholarly research; how the scholarly communication system better serve non-text cultures; the reliability and accuracy of the primary sources and current archive of knowledge used for research; and how and what knowledge will be chosen for long-term preservation. The research area entitled "Knowledge/Data Storage and Retrieval" addresses for the most part the issues outlined in 3 of the backgrounders "information retrieval", "knowledge representation" and "preservation" and is mainly concerned with accessibility of knowledge resources. And finally, the research area entitled "Copyright and Intellectual Property" mirrors the issues addressed in the backgrounder originally outlined by the research team of the same name.

Several of the research priorities stand in contrast with the highly operable issues put forward by the research team. The panel members also took a highly ethics-based approach in selecting their research priorities. Woven throughout the panel's discussions are the themes of fairness and equity in the current system of scholarly knowledge dissemination. In particular, the panel was concerned with issues such as the shrinking public domain in scholarly research; the emphasis on high impact citations in the current promotion and tenure system; the accuracy of primary sources within current knowledge systems; the long-term preservation of non-textual knowledge; the disparities in access to the current networked infrastructure and knowledge resources; and, the visibility of Canadian research. Meanwhile, the research team emphasis were issue that effected the efficiency of the knowledge dissemination, rather than the equity of the system.

Despite the small "sample" size used in this study (10 panel members), the research team made a strong effort to have a panel that was representative of the entire scholarly research community in Canada. In particular, there were representatives from all geographic regions of Canada and from the disciplines of humanities, social sciences, the arts, physical sciences and health sciences. The research team was also careful to ensure that panel members were at varying stages in their careers. The intimate setting did allow for ease of discussion during the initial panel meeting and probably facilitated a greater exchange of ideas amongst panel members

The preliminary results that emerged from the initial panel meeting, while pertinent and interesting, will need to be refined somewhat before they can be used in defining a actionable research program. In some cases, the research areas outlined by the consensus panel are quite loosely clustered and in others the panel also seems to slip into addressing some of the issues of "knowledge", rather than "knowledge dissemination". For example, it remains to be seen how apt the category of "Knowledge Systems" is to a research agenda for knowledge dissemination. However, it is expected that the research priorities outlined in the initial stages of the study will be re-examined and more cohesively defined in the next two-phases of the study.

VI. Conclusion

Academic researchers are the major actors in the scholarly communication system and, as such, it is extremely important that any research being conducted in this area be guided by their needs. In the past, these types of studies have been conducted with little input from the Canadian research community and have involved advisory bodies and experts in

knowledge dissemination rather than the researchers themselves. This study has assembled a diverse panel of Canadian academic researchers in order to define a research strategy for the dissemination of scholarly knowledge in Canada that is defined by relevant to the research community.

The results of the study so far show how priorities for research in this area as seen by the major actors in the scholarly communication system differ substantially from those as perceived by specialists and experts in this area (i.e. the research team). The guiding principles of a research agenda in knowledge dissemination as defined by researchers are the creation of a fair and equitable system for knowledge dissemination, while experts have been more preoccupied with the efficiency of the scholarly communication system. These results also, in effect, widen the scope of a potential research agenda for the dissemination of scholarly research in Canada. Although the research priorities presented here will be refined by the panel members in the next two phases of the study, they provide do provide significant insight into the concerns of Canadian researchers about the current state of knowledge dissemination within the scholarly communication system.

Bibiliography

Arms, William Y. 2001. *Digital Libraries.* Cambridge, MA: 2001.

Association of Universities and Colleges of Canada-Canadian Association of Research Libraries/ABRC. 1996. *The Changing World of Scholarly Communication, Challenges and Choices for Canada: Final Report of the AUCC-CARL/ABRC Task Force on Academic Libraries and Scholarly Communication.* Ottawa: AUCC.

Borgman, Christine. 2000. *From Gutenberg to the Global Information Infrastructure.* Cambridge, MA: The MIT Press.

Canadian Association of University Teachers. Reframing Scholarly Communications: A Discussion Paper. http://www.caut.ca/english/member/papers/reframing.asp

Phillips, Susan D., Michael Orsini. 2002. *Mapping the Links: Citizen Involvement in Policy Processes.* Ottawa: Canadian Policy Research Networks.

Cheney, Terry. 1982. *Solitudes and Communities: A Review of Prospects and Options for Social Sciences and Humanities Research Library Resources in the 1980s.* Ottawa: SSHRC.

Consultative Group on University Research Libraries. 1978 *University Research Libraries: Report of the Consultative Group on University Research Libraries.* Ottawa: The Canada Council.

Council of Prairie and Pacific University Libraries. n.d. *Western Canadian Digital Library: Project Summary Submitted to Canada Foundation for Innovation.*

Downs, Robert B. 1967. *Resources of Canadian Academic and Research Libraries.* Ottawa: Association of Universities and Colleges of Canada.

European Commission. 2002. *The DigiCULT Report: Technological Landscapes for Tomorrow's Cultural Economy.* EU: Luxembourg. http://salzburgresearch.at/fbi/digicult/start.htm

Godin, Benoit, Camille Limoges. 1995. *Les Revues Scientifiques Québécoises: une Evaluation du Programme de Soutien aux Revues du Fonds FCAR.*

Guedon, JC. *In Oldenburg's Long Shadow. Librarians, Research Scientist, Publishers, and the Control of Scientific Publishing* (Washington, D.C., A.R.L., 2001), 69 pp. http://www.arl.org/arl/proceedings/138/guedon.html, on en trouve une traduction française à l'URL : http://doc-iep.univ-lyon2.fr/edelec. Une traduction en japonais est en préparation.

Houghton, John. n.d. The Crisis in Scholarly Communication: an Economic Analysis. http://www.vala.org.au/vala2002pdf/16Houghton.pdf.

Industry Canada. 2002. *Investing in Excellence: 1996-2001.* http://innovation.gc.ca/s-tinfo.

Jefcoate, Graham. 1998. *Priorities for Digital Library Research: A View from the British Library Research and Innovation Centre.* http://www.ukoln.ac.uk/services/papers/bl/blri078/content/repor~16.htm

Joss, Simon, John Durant. 1995. *Public Participation in Science: The Role of Consensus Conferences in Europe.* London: Science Museum.

McLean, Neil. 1999. Strategic Directions for Australia's Research Information Infrastructure. Commonwealth Scientific and Industrial Research Organization.

National Science Foundation. 2002. *International Digital Libraries Collaborative Research and Application Testbeds. Program Solicitation. NSF-02-085.* http://www.nsf.gov/pubs/2002/nsf02085/nsf02085.html

Ontario Council of University Libraries. n.d. *An Information Infrastructure for an Ontario Digital Library.* www.ocul.on.ca/news/odl_submission.html

Owen, John M. 2000. Digital Libraries and Scholarly Communication: Transforming the Information Chain. http://www.hum.uva.nl/bai/home/jmackenzie/pubs/Thessaloniki-2000-JMO.htm.

Phillips, Susan D., Michael Orsini. 2002. *Mapping the Links: Citizen Involvement in Policy Processes.* CPRN Discussion Paper No. F21. Ottawa: Canadian Policy Research Network.

Schauble, Peter, Alan F. Smeaton. 1998. *An International Research Agenda for Digital Libraries. Summary Report of the Series of Joint NSF-EU Working Groups on Future Directions for Digital Libraries Research.* Brussels: NSF-EU. www.iei.pi.cnr.it/DELOS/NSF/Brussrep.htm

Shearer, Kathleen. 2002. *The Open Archives Initiative: Developing an Interoperability Framework for Scholarly Publishing.* CARL/ABRC Backgrounder Series #5. Ottawa: CARL/ABRC. http://www.carl-abrc.ca/frames_index.htm

Shearer, Kathleen, William F. Birdsall. 2002. *The Transition of Scholarly Communication in Canada*. CARL/ABRC Backgrounder. Ottawa: CARL/ABRC. www.carl-abrc.ca

Williams, Edwin E. 1962. *Resources of Canadian University Libraries for Research in the Humanities and Social Sciences.* Ottawa: National Conference of Canadian Universities and Colleges.