Online Scholarly Publishing in Canada: Technology and Systems for the Humanities and Social Sciences

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Abstract: This article analyzes online publishing models used by scholarly journal publishers across Canada. The sample described here is illustrative not only of most of the current and recent approaches to online scholarly publishing, but also of recent developments that may influence the next generation of innovators. It is argued that despite the perception that digitization often serves only to increase the torrent of information, some Canadian publishers have developed online processes and practices that use information technology not just to increase the quantity of information, but also its quality. Online scholarly publishing is in a period of dramatic change and these initiatives will set the standard for knowledge sharing.

Résumé : Cet article analyse des modèles d’édition en ligne utilisés partout au Canada par les éditeurs de revues savantes. L’échantillon décrit ici illustre non seulement la plupart des approches actuelles et récentes en édition savante en ligne mais aussi des développements récents qui pourraient influencer la prochaine génération d’innovateurs. L’article soutient que, malgré la perception que souvent la numérisation sert seulement à alimenter un torrent excessif d’informations, certains éditeurs canadiens ont développé des processus et des pratiques en ligne qui utilisent les technologies non seulement pour augmenter la quantité d’information mais aussi sa qualité. L’édition savante en ligne subit une période de changements dramatiques et ces initiatives établiront un modèle pour le partage des connaissances.

Keywords: Technology; Publishing; New media (Internet mediated); Internet/IP/WWW; Metadata

Introduction

Scholarly communication has been transformed through the use of computer technology in writing, editing, printing, indexing, and publishing, and in fact, a growing number of Canadian scholars, editors, and publishers are leaving the paper paradigm and moving to a fully digital, online publishing model. These
scholars are part of an international group of authors, editors, librarians, and programmers who have been experimenting with alternative modes of delivery for scholarly articles and pre-prints over the past decades (Peek & Newby, 1996). This article reports on an analysis of some of the objectives and approaches by Canadian journal publishers to the development of online publishing models. The objective of some scholarly publishers is to attempt to reduce the prices for journals and extend the access opportunities. Others find online production and distribution is a way to shift control of the process back to the scholars and shift ownership of the intellectual property back to the universities that employ the scholars. This article looks at a number of groups across Canada and profiles the systems and technology they have developed to bring scholarly journals online.

Before we look at the various models, however, we need to establish some boundaries. This article looks at the way that peer-reviewed articles by university-based researchers in the sciences, arts, and social sciences are published in online formats and made available to subscribers and the public through the Internet. We are not concerned here with the process by which academics self-publish their work on the Internet, although we will touch on it briefly at the end of our review in a section on institutional repositories. The current article contains descriptions of some of the journal-publishing initiatives from across Canada, including two from British Columbia, two from Alberta, three from Ontario, and one from New Brunswick. All of these have emerged in the last decade, and most have undergone significant revision in the past few years.

The managers of the online scholarly publishing websites were interviewed, their websites were analyzed, and we engaged the principals in telephone and e-mail discussions.¹ We have selected and grouped the initiatives in this article according to the online publishing model they use. The sample selected is intended to be illustrative of most of the current and recent approaches to online scholarly publishing. The first model presented in this article is the “do-it-yourself” model, the earliest attempt to bring scholarly publishing online. The second model is the “adopt-and-adapt” model, a method that employs software building blocks. The third model is the “self-service hosted” model, an evolved form of the do-it-yourself model. The fourth model is the “full-service systems and portals” model, where publishers go online by seeking service providers to get them online. The fifth model is the “toolbox” model, where specialists in specific areas of online publishing manage online publishing collectively. Finally, this article gives examples of international collaboration in online publishing and notes the importance of institutional repositories and libraries.

**Historical note: The Electronic Journal of Communication and Surfaces**

The first electronic journal launched in Canada was *The Electronic Journal of Communication*, which began publishing in 1990 in both English and French, under the direction of editors James Winter (University of Windsor) and Claude Martin (Université de Montréal). *The Electronic Journal of Communication* is currently hosted at the Communication Institute for Online Scholarship at http://
www.cios.org. Another early online initiative was *Surfaces*, launched in 1991 as a cultural journal, housed at the Université de Montréal, where it has remained.

**The “do-it-yourself” model**

The “do-it-yourself” (DIY) model of online scholarly publishing was probably the first to emerge. Starting as an in-house experiment, and using existing staff and curious graduate students, these models developed in a variety of locations as the publishers of scholarly journals watched what was happening on the Internet and experimented with what it could do for them in their work. The DIY journal publisher typically used programs created by their employees or modified versions of general-purpose programs available from Internet sources. Although the term did not have the widespread currency that it enjoys today, these were mainly “open source” projects, shared among colleagues and created without a market in mind, other than their own use. The era of the DIY online scholarly publisher began in the early 1990s and continues to this day, although increasingly it is falling out of favour because of the high cost of maintaining and enhancing a one-off solution. Like open-source projects, however, some DIY software projects for online scholarly publishing have matured into generic solutions made available to a larger group of journals (Raymond, 1999).

**The Canadian Journal of Communication (Simon Fraser University)**

The *Canadian Journal of Communication* (*CJC*) is a good example of the DIY journal publisher. The journal was first put online in 1993 as a simple set of HTML pages created by hand and revised and duplicated as needed when new issues and volumes were released. As many people involved in Web publishing have found, however, the enormous effort and the repetitive tasks involved in this type of approach to Web publishing become overwhelming, so a second generation website, with a “scripted” interface, was designed. This allowed for programmatic (automated) creation of components like tables of contents and navigation elements (back, forward, up, and so on).

While the scripted interface and integration with a database provide relief from some of the mundane aspects of online scholarly publishing, *CJC* remains a relatively complex system that requires the support of computer programmers when changes to the system are required or new features are sought. As a result, some e-publishing journals are looking at a possible transition from the “do-it-yourself” model to newer models such as “adopt-and-adapt,” “hosted solutions,” or even “full-service” models. The *Canadian Journal of Communication* is a case in point of this exploration of alternative models as well, as their software development team has been looking enviously at the features, simplicity, and community benefits of some of the alternative models.

**The “adopt-and-adapt” model**

Adopt-and-adapt systems typically use freely available software building blocks and assemble them, along with some custom code that is in some ways “generic” to the needs of an academic journal. These software packages are made available
for free on the Internet, and the prospective users are encouraged to download them, install them on their servers, and adapt them to the needs of their specific undertaking. The objective of the developers of these software packages is quite often clearly stated as a “political” one, in that their provision makes knowledge more freely available, encourages the development of new online journals, and enables existing journals to make the transition to online publishing. In contrast to the “do-it-yourself” model, the software development is more likely to be done by computer programmers than by graduate students related to any specific discipline or journal.

**Public Knowledge Project (University of British Columbia)**

An excellent illustration of the “adopt-and-adapt” model is the Public Knowledge Project (PKP), led by John Willinsky at the University of British Columbia. The software, known as “Open Journal System” (OJS), is available for download from the website and is in use by several journals around the world. The Open Journal System manages more than simply the posting of articles on a website. It also handles the entire submission, review, acceptance, revision, copy editing, archiving, and indexing process. Notably, the person installing and maintaining the system does not have to be a computer programmer; however, the author is expected to supply keywords and to fill in a short form that contains the so-called “meta” information about the article, including title, abstract, author names and affiliations, and so on. This not only saves the editors the time and trouble of doing this, but it reduces the chance for errors and omissions. Authors are also responsible for the conversion of their document to HTML or PDF format, although the system optionally can accept documents in MS Word format. Another significant feature of the Public Knowledge Project’s OJS is its ability to integrate with other online systems, including the open archiving initiative (Open Archives Initiative or OAI, http://www.openarchives.org) and various bibliographic and research tools.

**A self-service hosted solution**

At least one group in Canada has taken the “do-it-yourself” approach to a further level of evolution and created a hosted solution based on in-house code. The International Consortium for the Advancement of Academic Publishing (ICAAP) project, based at the University of Athabasca and led by Mike Sosteric, began as a custom set of software tools built to create an online journal of sociology. The project grew, and soon several other journals were using the same system. This system was not available for download, but journals that wished to publish online using this system could do so for very reasonable fees. Journal editors and publishers make use of the ICAAP facilities through a self-service model: all aspects of journal publishing are managed by the system, including peer review and indexing, and authors and the editorial staff need only initiative, motivation, their own labour, and a Web browser to set up an online journal. Another advantage to the system is the availability of centralized backup of all files, and the ability of the centralized site to invest in redundant servers, power supply, and Internet con-
nections. The ICAAP project is one of the longest operating online scholarly publishing projects in Canada. The ICAAP website also provides a portal to all of the affiliated and hosted journals, as well as a site for advocacy relating to online publishing. Although we have chosen to profile ICAAP as an enabler of self-service online publishing that got its start as a “do-it-yourself” operation, recently the operation has begun to grow beyond a self-service system and has taken on some of the additional features of a full-service operation (see the next section for another example of a “full service” online journal system). In its longevity and its evolution ICAAP illustrates the difficulty of putting a simple label on a project or group.

**Full-service systems and portals**

Sometimes journal publishers need a little more incentive to go online. It may be that they don’t know much about the process, or that they are busy with the print production aspects of their journal and don’t have time to manage the online aspects. One way to bring journals over to the online world is to do it for them. Here we provide a brief profile of two such systems.

**Projet Érudit**

Projet Érudit is one of the biggest and most ambitious projects in Canada for bringing social sciences and humanities scholarship online. Érudit was launched in 2002 and is funded by the Québec government to encourage greater participation in online publishing by Québec journals and to promote the broader dissemination of Québec scholarship, to the benefit of all Canadian scholars. The system is hosted on computers at the Université de Montréal and Université Laval, in Québec City. Because Érudit has full control over the conversion of documents to their system—they accept files in a wide variety of formats—it is able to undertake extensive markup and metatagging of the documents.

Projet Érudit does not provide services relating to the peer review and editorial aspects of publishing. In contrast to the models described above, this model assumes that the editorial and copy-editing decisions have already been made and the journal is ready to print. Projet Érudit is also notable for its significant efforts to place back issues online. With help from outside contractors, the project has scanned and converted to text format all of the back issues for many of its journals. The images of the scanned pages provide an authoritative version of the documents, while text produced by optical character recognition (OCR) allows for the indexing and searching of those documents.

**University of Calgary Press**

The University of Calgary Press (UCP) is a publisher of both books and periodicals, and they offer their journal customers, which are mainly in the humanities and social sciences, a full-service offering that includes manuscript management, portal development and support, indexing, promotion, and so on. UCP has a digitization and scanning group that allows them to get back issues from journals that pre-date computer-prepared text. Not all of their journals are available online, but UCP does provide website hosting and design for those journals that wish to have
those services. Another notable activity at the University of Calgary is the DSpace initiative, where they are exploring the concept of an institutional repository to support scholarly communication. They are also working on the use of templates to facilitate the publishing of electronic journals, including the process of peer review and access to pre-prints.

**National Research Council Press**
The National Research Council of Canada’s electronic-journal operation has long been a pioneer in online scholarly publishing in Canada. It is actively involved in the development of software for indexing and searching academic-journal articles, preserving and taking advantage of the information in the metatags that are embedded in modern styles of document formatting (e.g., XML). This type of search engine can be useful to all online publishers. The NRC press also has extensive experience and systems in place for subscription management, payment processing, and “pay per view” for articles. This type of infrastructure is expensive to maintain and complex to develop, however, some journals may be able to take advantage of this expertise. Finally, the NRC Press is developing, adapting, and purchasing software that will make it possible to link the references in an article directly to the article (and in some cases to the paragraph or page in question) that is being cited—a development that is of notable importance for cross-disciplinary research, breakthroughs in new fields, and keeping up with the fast pace of knowledge.

**The toolbox model**
Some of the publishers of online scholarly journals are specialists in the components of electronic publishing and have focused their efforts on parts of the value chain between author and reader. The Electronic Text Centre (ETC) at the University of New Brunswick is a good example of this approach. ETC personnel have, for example, developed tools for the rapid and accurate collection of images and accompanying metadata and the formatting of these for presentation on the Web. They have also worked extensively on metadata standards for e-learning, an area of considerable interest for scholars.

**Electronic Text Centre (University of New Brunswick)**
The ETC does not only develop tools. It is also the publisher of 15 electronic serials, ranging from local publications to international academic journals. Its approach to serial publication has been the do-it-yourself model described above, although it is able to leverage its experience and tools over several journals. The expertise at ETC is concentrated in the area of metadata and its implementation in XML systems. The group is an active participant in the various bodies associated with metadata standards development.

**International collaboration**
Not all online scholarly publishing initiatives in Canada are focused on Canadian journals. Some, as we have seen with ICAAP, are actively used by journals all over the world. Others, however, have an explicitly international character and in fact
take their motivation and inspiration from the challenge of bringing scholarship from other parts of the world to an international audience.

**Bioline International (University of Toronto)**

Bioline International (BI) is specifically designed to bring research from developing countries in Africa and South America to an international audience. The initiative’s servers are split between Canada and Brazil. The Bioline project receives funding from some major development agencies and is working hard to transform thinking about the support for scholarly publishing initiatives from a “subsidize until commercially viable” concept to one in which the support is seen as an ongoing contribution to the sustainability of science and society. In other words, rather than looking at building print journals that will most likely never have an audience outside their home country or region and probably never achieve a critical mass, using that same money instead to bring the journal to a global audience that may eventually see the value of indigenous knowledge and scholarship.

Bioline International is a not-for-profit electronic publishing service committed to providing access to quality research journals published in developing countries. BI’s goal of reducing the South-to-North knowledge gap is crucial to a global understanding of health (tropical medicine, infectious diseases, epidemiology, emerging new diseases), biodiversity, the environment, conservation, and international development. With peer-reviewed journals from Brazil, Cuba, India, Indonesia, Kenya, South Africa, Uganda, Zimbabwe, and more to come, BI provides a unique service by making bioscience information generated in these countries available to the research community worldwide. Bioline provides full-service document conversion, hosting, and promotion. The site also includes a special “species linking” and database-search tool developed at CRIA (Brazil). Bioline has a main portal, and it also considers the promotion of member journals to be part of its mandate. Bioline is a founding member of the Budapest Open Access Initiative (BOAI: http://www.soros.org/openaccess/index.shtml), and it runs a secondary e-prints server to archive PDF versions of articles, so that material is included in major BOAI databases. Unfortunately a very similar acronym, OAI, is used by the Open Archives Initiative, based at MIT. Both organizations have broadly similar aims, which can add to the confusion. The distinction, in brief, is that the Budapest Open Access Initiative is focused on the lobbying and policy-making that will help ensure that articles are available, especially in countries with less ability to pay. The Open Archive Initiative is focused on the technical details of exchanging metadata so that archived material can be easily found, ultimately from any search engine, without searching multiple search engines’ “silos” of information.

**Institutional repositories and the libraries**

Traditionally, libraries in Canada have not been publishers of scholarly information; they have been customers of the journal publishing companies. In the last decade, however, both the Canadian and American associations of research libraries—CARL and ARL—have struggled with what is termed the “crisis in serials pricing” as subscription costs have skyrocketed, especially for science and
medical journals. These increasing costs have been particularly galling to some academics, given that they are in some ways captive to the journals to publish their writing and research. The research results are, in many cases, publicly funded, and the resulting papers are provided to the journals at no cost in order to gain the academic standing that they require for career advancement and tenure. This situation has been exploited by commercial journal publishers, with the result that prices and profits in many media conglomerates with academic publishing arms rose swiftly in the 1980s (Odlyzko, 1995; Peek & Newby, 1996). On the other hand, serials publishers, especially in the sciences, have faced price rises of their own and have argued repeatedly that claims of “price gouging” are either unfair or should not be applied across the board (Holmes, 1997).

Either way, prices have been going up, especially in the sciences, and many solutions have been suggested, including group purchases by libraries, pressure on governments for national site licences, and other cost-saving measures.

One of the more interesting outcomes of the crisis is the move on the part of some libraries to set up “institutional repositories” for electronic documents that they hold or are willing to create by scanning. For the most part, these institutional repositories are not a substitute for journal scholarship. On the other hand, libraries are clearly tired of seeing scholarship go from the offices of the salaried professors on their campuses into the journal-publishing system (sometimes at enormous cost per page), from which the librarians then have to buy it back in the form of journal subscriptions.

The motivation to set up institutional repositories also stems in part from copyright concerns. A commercial publisher typically asks for authors to transfer copyright to their works to the journal or publisher. In this situation—more common in the sciences than the social sciences and humanities—the author and the author’s library may find themselves constrained in their ability to use their own scholarship. While most publishers are sympathetic to requests for local reuse, the concern about losing control of one’s own work still exists and can’t be dismissed as a factor in the drive to create institutional repositories.

Institutional repositories may not capture the full outflow of knowledge from a university, but they do provide a safe, searchable, and, in most cases, shareable system of storing and retrieving knowledge that might otherwise have been lost or given up. According to CARL, an institutional repository (IR) is a digital collection of a university’s intellectual output. Institutional repositories centralize, preserve, and make accessible the knowledge generated by academic institutions. They also form part of a larger global system of repositories, which are indexed in a standardized way and are searchable using one interface (this is the role of the Open Archiving Initiative from MIT), providing the foundation for a new model of scholarly publishing. Interestingly, the institutional repository also provides a potential gateway to the large amount of material that is currently published in informal collections by research groups, centres, and even individual faculty. By providing a standardized way to collect information about the documents (metadata) and situating that collection process a little bit closer to “home,” the institu-
tional repository stands a chance of bringing to light a large body of knowledge that might be impossible to locate otherwise. And with the resources of a campus-wide institution, such a repository may provide a bridge for these documents to enter more formal collections and be archived in a more sustainable fashion.

**T-Space (University of Toronto)**
The University of Toronto is one of the most active in the creation of an institutional repository. U of T has created a system called “T-Space” based on the principles laid out in the international DSpace initiative at Stanford University. The T-Space Web page at the University of Toronto is maintained by the U of T library and so far (as of fall 2003) contains a fairly small number of documents. The university’s plans, however, suggest that this will be the focal point for electronic collections originating at the university in coming years.

**DSpace (University of Calgary)**
The University of Calgary has also mounted a “DSpace” project, and it has quickly moved to populate it with documents from numerous communities within the university. The notion of self-governing communities is an essential part of the DSpace model, and documents in an institutional repository are always linked to some form of community. In the university context, this is typically a department, school, or faculty, but it could also be a research group or even an administrative unit, such as Research Policy or Human Resources.

**A note on DSpace**
Developed jointly by MIT Libraries and Hewlett-Packard (HP), DSpace is now freely available to research institutions worldwide as an open-source system that can be customized and extended. For more information, visit the DSpace website at http://dspace.org. These initiatives are still relatively new, and it is perhaps too early to say what their influence will be on scholarly communication. One of the most interesting elements is the renewal that this marks for libraries and their role in electronic scholarship.

**Conclusion**
It is clear that online publishing is a maturing enterprise, and as such, some of the early experiments are giving way to more sustainable and fully supported systems—some actively recruiting participants into a hosted solution, and some developing software that can be used by others.

For authors, the benefits of wider publication seem obvious, and few people would argue with the motivation to spread knowledge more widely. That said, electronic articles are not (yet) universally accepted by tenure committees, and authors understandably have some apprehension about the long-term impact. Will their articles be available in five years? Or 10? Or 50? With personal computers subject to virus attacks and hard-drive failures, the prospect of committing works purely to the digital realm can seem risky. It will take some time for these concerns to dissipate, most likely by growing familiarity with the technology and systems.

For most participants in this field, getting documents online is a necessary, but not sufficient, step toward a transformation of scholarship. The digitization of
knowledge has heretofore only served to increase the torrent of information that washes over the desks of scholars. Fortunately, protocols such as metadata (information about information) begin to provide the tools that will initiate the use of information technology not just for increasing the quantity of information, but also its quality.

Cross-referencing, which will allow reliable, inexpensive, and swift comparison of information across and within disciplines, seems to be the metadata application that will be the first “killer app” (category-creating software) of the online scholarly publishing system. A demonstration of the usefulness and power of automatic hyperlinked cross-referencing systems at a recent meeting in Ottawa hosted by NRC Press elicited universal praise from the audience.

Cross-referencing is an example of the kind of “value-added” approach being taken by commercial and non-commercial publishers to improve the quality of access to scholarly writing. One of the challenges that voluntary and non-commercial publishers face in this regard is keeping up with the recent spate of technical standards being set in this area. Some of these initiatives are extremely challenging technical hurdles, especially for a smaller organization, and it is not clear that an association publisher, for example, could afford to develop or purchase the software or hire the people required to keep a cross-referencing system working. In the NRC demonstration of cross-referencing, some of the cost figures being presented were as much as the entire budget of many small association publishers.

It remains to be seen to what extent these new features become a “must-have” in the minds of readers, and therefore something that causes some of these academic publishing models to lose the ability to satisfy the needs of their audiences. At this point it is too early to tell how this is going to work out, but given that readers are only just beginning to adjust to the availability of articles online, it may be a while before they grow dissatisfied with that basic service and demand more “quality” in searching, indexing, and cross-referencing.

It is noteworthy that most of the recent transformations of scholarly publishing seem to be motivated by the desire to enhance the quality of access, rather than to enhance the quantity of access. Some of the pioneers of that approach are here in Canada, and they believed that their efforts were about to get a dramatic boost in 2004, through the Synergies project.

Supporters of online publishing of scholarly materials in the social sciences and humanities in Canada were engaged in a significant research-funding initiative through much of 2003 and into 2004. The Synergies project (which, unfortunately, was turned down for funding by the Canadian Foundation for Innovation in the spring of 2004) aimed to bring these and other models under a single umbrella to enhance their collective viability and visibility and to encourage knowledge sharing. This, it was hoped, would make for stronger players and a better environment for all. Although the Synergies initiative has not been successful in acquiring funding, related and spin-off initiatives such as the Canadian National Site Licensing Project (now being reformulated as the Canadian Research Knowledge Network) and other efforts to build on the energy that united librarians and
journal publishers constructively are set to continue to push the frontiers forward in the coming year.

Even though Synergies has not been successful thus far, new initiatives are being crafted, and whatever happens in the coming years will not come “out of the blue.” Instead it will be strongly influenced by the heritage of scholarly publishing that exists in this country. That is why we have tried to provide an overview of some of the existing models here. While some of the individuals may change, and different models or systems may be adopted, we need to recognize that the range of motivations that inspired these pioneers will continue to influence the next generation of innovators. We shall all be the beneficiaries, and this account of some of the models may well serve to chronicle the collaborative work of a group of people on the edge of a great transformation.

Notes
1. The time and patience of a number of people should be noted: John Willinsky (UBC); Guylaine Beaudry and Jean-Noël Plourde (Université de Montréal); Alan Burk (UNB); Aldyth Holmes (NRC Press); Karen Turko and Leslie Chan (U of T); Mike Sosteric (Athabasca U); Mary Westell (University of Calgary); and Lynn Copeland, Mark Jordan, and Todd Holbrook (SFU). Thanks as well to the two anonymous reviewers—the changes to this paper based on their suggestions were significant and appreciated.
2. The Synergies project was a collaborative research-funding initiative involving researchers from Simon Fraser University, University of Calgary, University of Toronto, Université de Montréal, and the University of New Brunswick. The proposal went to the Canadian Foundation for Innovation for funding in the fall of 2003. It was turned down in April 2004. Alternative sources of funding are currently being sought.

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