

Clare Appavoo

Canadian Research Knowledge Network

Sabina Pagotto

Consultant

Introduction

Historically, researchers have relied on libraries solely for access to research literature. But in the digital age, libraries are taking on new roles within the academic environment. This article discusses the shifting relationship between academic libraries and scholarly communication as seen through the lens of the Canadian Research Knowledge Network (CRKN); from the traditional role of the academic library as a source of funding and access for scholarly communication to the emerging role of the academic library as an active participant in the content creation process, and even as the foundation for the construction of a new digital content infrastructure.

Prior to 2000, the academic library was cast in the traditional role as facilitator of access to scholarly communication largely through subscriptions to print journals and monographs. Between 2000 and 2006, libraries evolved into new roles as actors in the digital sphere, moving to offer expanded access to scholarly communication through the provision of digital content purchased in large packages – an arrangement known as the Big Deal. From 2006 to 2014, as libraries matured into their role as digital content providers, further evolution saw libraries actively participating in content creation. In 2014 and beyond, the role of university libraries in Canada has significant potential to expand as active participants in the evolution of a national digital content infrastructure that equals that of other research-intensive countries.

Clare Appavoo is Executive Director of the Canadian Research Knowledge Network. Email: cappavoo@crkn.ca .

Sabina Pagotto is a consultant working on behalf of the Canadian Research Knowledge Network. Email: sabina.pagotto@gmail.com .

CCSP Press

Scholarly and Research Communication

Volume 5, Issue 4, Article ID 0401197, 8 pages

Journal URL: www.src-online.ca

Received January 2, 2015, Accepted January 22, 2015, Published March 19, 2015

Appavoo, Clare, & Pagotto, Sabina. (2014). Libraries and Scholarly Communication in the Twenty-First Century. *Scholarly and Research Communication*, 5(4): 0401197, 8 pp.

© 2014 Clare Appavoo & Sabina Pagotto. This Open Access article is distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc-nd/2.5/ca>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

About CRKN

The Canadian Research Knowledge Network (CRKN) is a partnership of Canadian universities dedicated to expanding digital content for the university research enterprise in Canada. From its inception as a pilot project in 2000, CRKN has played a key role in building knowledge infrastructure in Canada, providing equitable and cost-effective access to scholarly content for universities nationwide.

CRKN emerged from the Canadian National Site Licensing Project (CNSLP), which originally secured \$20 million in seed funding from the Canada Foundation for Innovation (CFI) by demonstrating that systematic access to published research constitutes an essential component of Canada's research infrastructure. Participating universities and provincial governments built on the CFI funding by committing an additional \$30 million.

In the pilot phase of CRKN, the focus was on licensing full-text electronic journals and research databases in science, engineering, health, and environmental disciplines – where the needs and costs were most acute. This seed funding enabled a commitment to multiyear licenses with seven major scientific publishers, providing access to over 1,000 e-journals and key citation databases for researchers nationwide. CNSLP also established a “made-in Canada” model license agreement, which set superior terms of usage for the academic community.

On April 1, 2004, CNSLP was incorporated as a not-for-profit organization and renamed the Canadian Research Knowledge Network. Incorporation opened the doors to new participants in the consortium with ten universities joining to bring the total membership to 74 institutions. Most recently, MacEwan University joined CRKN, bringing membership to 75.

In 2010, CRKN conducted a study using focus groups of researchers to determine what impact access to digital research content has had on the research community in Canada. They found that research practices have become more productive as digital research content provides convenience of access, better selection, lower cost, and higher researcher satisfaction. The interdisciplinary nature of research has been augmented as more publications are monitored, gray literature is included, cross-disciplinary connections are made through keyword searches and links, related fields of research are accessible, and systematic reviews are more timely and of higher quality. Additionally, research collaboration has expanded networks of researchers in Canada and abroad. As cross-disciplinary networks and co-authorships develop and grow, Canada gains an international reputation for leadership through superior knowledge resources. Finally, teaching and learning practices are more effective and more efficient as they take advantage of expanded and timely learning resources.

Today CRKN continues to add high-impact collections of journals and backfiles to the content portfolio through 52 licences and provides access to over 2,600 journals and databases at an annual value of roughly \$90 million. This now includes significant humanities and social sciences content as well as scientific, technical, and medical (STM) content. CRKN is now fully funded by members. CRKN provides access to

thousands of journals that would have been outside the financial reach of many Canadian universities if not for the consortium arrangement.

Expanding access to digital content (2000–2006)

The period of the late 1990s and early 2000s saw the emergence of digital content licences for scholarly publishing and the emergence of organizations such as CRKN.

Since 2001, CRKN and its 75 member libraries have worked to:

- *Build research capacity*: increasing the quantity, breadth, and depth of scholarly content available to academic researchers throughout Canada, thereby building a rich and multidisciplinary milieu to underpin world-class research.
- *Transform the research environment*: speeding the transition from print-based to digital and value-added forms of scholarly content, thereby maximizing the use and utility of that content for researchers.
- *Influence the marketplace*: leveraging Canadian universities' buying power and influence in the international scholarly publishing marketplace, achieving advantageous terms and conditions for usage, as well as developing new business and service models.

During this time much of the scholarly content used by researchers in the STM fields became available digitally and was licensed through consortia like CRKN and regional library groups for use by Canadian researchers.

Participating in content creation (2006–2014)

Conscious of the growing need for digital content in the social sciences and humanities (SSH) disciplines, which were still primarily print based, CRKN began planning in 2005 for a three-phase content expansion project that would secure a portfolio of content in diverse formats and would culminate with another approach to CFI for grant funding.

In February 2007, CFI announced a \$19.1million award to the project under its National Platforms Fund. Additional funds totalling \$28.6million were provided by provincial governments and 67 universities. The Digital Content Infrastructure for the Human and Social Sciences (DCI) project was implemented.

Through the DCI project, funds were mainly used to purchase or license content for use in the SSH, however, along with content acquisition, an opportunity arose for libraries to further expand their role through funding or otherwise participating in the creation of content for students and researchers. A portion of the DCI funds was dedicated to digitizing unique content and making this content open access. For example, the University of Toronto digitized out-of-copyright monographs from the library's international collection of social sciences and humanities materials, and the University of Alberta was contracted to digitize monographs contained in Canadiana.org's legacy microfiche collection.

In 2013, CRKN members further delved into the role of content creator through a partnership with Canadiana.org on the development of the Heritage Collection. This

project uses seed funding from 47 CRKN member university libraries to digitize 60 million pages of archival material from the collections of Library and Archives Canada. The collection brings together large-scale digitization and linked open data, and Canadiana.org hopes it will act as a model for the sustainable funding of openly accessible collections.

The library's role as a catalyst for content creation extends beyond the digitization of heritage materials, and some exciting examples can be found at Canadian institutions. Islandora, originally developed by the University of Prince Edward Island's Robertson Library, is an open source software framework designed to help institutions, organizations, and their audiences collaboratively manage and discover digital assets using a best-practices framework. Another is Open Journal Systems (OJS), an open source software made freely available to journals worldwide for the purpose of making open access publishing a viable option for more journals, with the benefit that open access can increase a journal's readership as well as its contribution to the public good on a global scale. Developed within Simon Fraser University's Faculty of Education, the technical development and support of OJS is now undertaken by the Public Knowledge Project (PKP), overseen by the Simon Fraser University Library.

These forays into digital content creation and management have set the stage for libraries to take an active role in developing a digital content infrastructure. Thus, the role of the library going forward could be one of full collaboration with the actors in scholarly communication through an integrated digital scholarship ecosystem.

Creating a digital content infrastructure (2014–)

As scholarly communication continues to evolve, libraries stand ready to evolve their role in relation to it. The key objective of expanding the role of the library is to advance research capacity and innovation in Canada. Several projects that support this goal are being launched, including the Canadian Association of Research Libraries (CARL) Research Data Management Infrastructure project. CARL has launched this initiative to identify and develop tools to support data management, develop data management expertise through education, and co-ordinate service delivery across the data lifecycle. The focus of this project is on policy and resource coordination.

CRKN's 2013–2016 strategic plan includes the strategic objective to “collaborate to advance digital scholarship.” At the 2013 annual general meeting, CRKN members endorsed a proposal to develop an integrated digital scholarship ecosystem (IDSE) by coordinating and complementing a number of existing and emerging Canadian initiatives, and building on demonstrated success in leveraging investment in the Canadian academic community with an agile organizational structure and outside funding.

Toward an integrated digital scholarly ecosystem

This idea of an integrated digital scholarship ecosystem was first articulated during a CRKN Board of Directors strategic planning session by Richard Dumont of the Université de Montréal. The inspiration for this approach came from Apple's success in tightly integrating both software and hardware development, allowing for the creation of an unbeatable brand. Unfortunately, Canada's knowledge environment functions

more like the PC world, with many existing and emerging initiatives from coast to coast, but little coordination between those initiatives.

Preliminary investigations into the ecosystem revealed some of the components currently in place.

Figure 1: IDSE component diagram



COMMERCIAL E-ARTICLES AND E-BOOKS

Electronic research content is already supplied by CRKN and regional consortia, and there is a successful local hosting model in Ontario that could potentially be expanded nationally. Scholars Portal, a service of the Ontario Council of University Libraries (OCUL), provides a shared technology infrastructure and hosts shared collections for 21 university libraries in the province. It is designed to provide a single interface for accessing digital content from the world's leading scholarly presses and academic publishers. The platform hosts 35 million scholarly articles and 145,000 e-books licensed by OCUL member libraries.

OA PEER-REVIEWED E-ARTICLES AND E-BOOKS

The groundwork for open access publishing has already been laid by PKP and is already widely used by Canadian journals and others. Many libraries host the open source platform OJS to help scholars publish their works, and some may help pay Article Processing Charges (APCs) for open access (OA) journals. OA content is available through the institutional repositories of many university libraries, in both pre- and post-print format of commercially published articles and as digital versions of theses and dissertations.

RESEARCH DATA

Here is an identifiable gap: vast amounts of data are created and analyzed in the course of Canadian research, often without a formal data archiving plan. Individual researchers, faculties, or institutions often store research data on their own, providing little or no

access to the broader research community. Groups including CARL's Data Management Subcommittee (Project ARC) have begun to investigate options for the role of libraries in collecting, organizing, and providing access to researcher-generated data.

SPATIAL AND NUMERICAL DATA

Traditional data sets, including polling data and geospatial data, are available through several Canadian services. In Ontario, odesi and Scholars GeoPortal are part of the service provided by OCUL's Scholars Portal. In Quebec, Géoindex (a service of Université Laval) is already well developed.

CANADIAN DOCUMENTARY HERITAGE

A number of initiatives are already underway in this area, such as the Heritage Project. Supported by 47 Canadian university libraries, this project aims to digitize and make accessible some of Canada's most popular archival collections, encompassing roughly 60-million pages of primary source documents from the collections of Library and Archives Canada. There are also local initiatives at individual universities digitizing large swaths of Canadian heritage collections, including the Tyrrell photographs at the University of Toronto and the local history collection at the University of Alberta.

DIGITAL PRESERVATION

Again, this is an area of identifiable gap in Canada. HathiTrust Digital Library, developed in the U.S., is a partnership of academic and research institutions, offering a collection of millions of titles digitized from libraries around the world. Canadian librarians have discussed the development of a "HathiTrust North," which would ensure that the cultural record is preserved and accessible long into the future. HathiTrust ensures accessibility to material, but also preservation via compliance with required elements in the Trustworthy Repositories Audit & Certification: Criteria and Checklist (Dale & Ambacher, 2007). This type of initiative is within closer reach for us in Canada, with organizations seeking to earn Trusted Digital Repository (TDR) status. OCUL's Scholars Portal was successful in getting TDR status in 2013.

The Integrated Digital Scholarship Ecosystem project

The goal of the Integrated Digital Scholarship Ecosystem (IDSE) project is to coordinate the above-mentioned initiatives and, perhaps in some cases, to offer a single access point or at least provide seamless access to them. It also aims to offer text and data mining across this content, and to secure perpetual access for all the content that is created or purchased.

The information-gathering phase – assessing these initiatives and identifying trends and themes in digital scholarship – has been completed. An interim report on the findings so far, including progress to date, key themes and observations, next steps, and opportunities to engage, was prepared in March 2014. A final report on these trends and recommendations for future endeavours was released in the summer of 2014.

Possible actions toward achieving IDSE's goals include facilitating integration of various initiatives already underway through multiple library communities, and/or taking the lead in areas with identified gaps. Possible steps forward include:

- Developing a national infrastructure to host and provide seamless access to commercially licensed material, open access content, and research data (through potential partnership with Scholars Portal and/or others).
- Linking open access institutional repositories of Canadian Universities under one discovery layer.
- Supporting Canadian granting agencies as they develop guidelines for funding recipients to make research content available via open access (both by simplifying the process to share that content, and by providing a place to host it).
- Advancing a national strategy for perpetual access and preservation.
- Promoting open access to primary source materials for research (e.g., Canadiana.org Heritage Project).
- Supporting the Canadian scholarly publishing infrastructure (e.g., through the support of the Association of Canadian University Presses (ACUP), through transitioning to electronic monographs via eBOUND, or through a potential CARL/Canadian Association of Learned Journals (CALJ) open access pilot).
- Providing and sustaining support for the development of digital research tools.
- Advocating for methods to evaluate new forms of scholarly production, including altmetrics, and the incorporation of that evaluation into advancement criteria.
- Developing library research and development capacity.
- Continuing to negotiate for favourable licence terms, including the removal of digital rights management (DRM) restrictions to facilitate large-scale text- and data-mining across CRKN content.

Canada already has many of the pieces of this puzzle in place: Scholars Portal is a model that can be expanded; the groundwork for open access publishing laid by PKP is already widely used by Canadian journals and others; and institutional repositories and data repositories are in place. What is needed to convince our universities and our governments to invest in strong knowledge infrastructure in Canada is a fully integrated vision.

Conclusion

Academic libraries supported the transition of scholarly communication from print to digital and continue to support evolving forms of scholarly communication and production. A vision for the future of digital scholarship is increasingly being developed by the many organizations involved in the Leadership Council for Digital Infrastructure (LCDI) such as CRKN, CARL, Research Data Centre (RDC), Compute Canada, and CANARIE. Our piece of the puzzle in libraries is but one component of that larger initiative, but an integral component. With the knowledge and enthusiasm that librarians bring, we can play a vital role in developing this national ecosystem. Developing an integrated digital scholarship ecosystem will enable the next generation of academic library collaboration to further the goals of providing seamless access, diversity of content, and linked infrastructures.

Websites

Association of Canadian University Presses, <http://www.acup.ca/>

Canada Foundation for Innovation, <http://www.innovation.ca/>

Canadian Association of Learned Journals, <http://www.calj-acrs.ca/home.php>

Canadian Association of Research Libraries, <http://www.carl-abrc.ca/en.html?lng=1>
Canadian Community of Practice for Research Data Management in Libraries,
<http://data-carl-abrc.ca/project-arc/>
Canadian Research Knowledge Network (CKRN), <http://crkn.ca/>
Canadiana.org, <http://www.canadiana.ca/en/home>
CANARIE, <http://www.canarie.ca/>
Compute Canada, <https://computecanada.ca/en/>
eBound, <http://eboundcanada.org/>
Géoindex, <http://geoindex-plus.bibl.ulaval.ca/>
HathiTrust Digital Library, <http://www.hathitrust.org/>
Islandora, <http://islandora.ca/>
Leadership Council for Digital Infrastructure, <http://digitalleadership.ca/>
Odesi, <http://odesi2.scholarsportal.info/webview/>
Open Journal Systems, <https://pkp.sfu.ca/ojs/>
Public Knowledge Project, <https://pkp.sfu.ca/>
Scholars GeoPortal, <http://geo2.scholarsportal.info/>
Scholars Portal, <http://www.scholarsportal.info/>

Reference

Dale, Robin L., & Ambacher, Bruce. (2007). *Trustworthy repositories audit & certification: Criteria and checklist*. Chicago, IL: Centre for Research Libraries. URL: <http://www.crl.edu/archiving-preservation/digital-archives/metrics-assessing-and-certifying-0> [June 22, 2014].