Information Services for Business and Science Libraries

Pam Bjornson, Director General, National Research Council Knowledge Management
Richard Akerman, Innovation Officer, National Research Council Knowledge Management
Beverly Brown, Manager, Client Access and Partnership Services, National Research Council Knowledge Management

Introduction

For this paper, we compare some practices of special, academic and public libraries. We have used the IFLA definition of Special Library: “A library established, supported, and administered by a business firm, private corporation, association, government agency, etc., to meet the needs of its members or staff in pursuing the goals of the organisation.” In particular, we have focused on special libraries active in supporting STEM (scientific, technical, engineering and medical) organizations, including support to business needs within these organizations.

1. Context

Both in Canada and abroad, special, academic and public libraries are all adapting to meet the needs of their different patron communities. These needs are reflected through the design of the library space and the use of technology to deliver client-focused services.

Public libraries are extending their roles as community hubs to become key urban public spaces and access points for technology. University libraries are reducing on-site space for books in order to free up floor space for highly-used study and collaboration areas. In both cases the physical shared space is becoming an even more important part of the library service offering. In contrast, research and other special libraries, particularly in the private sector, are seeing heavy use of their online resources but much less demand on their physical space. Patron needs for service at their desktop and on their mobile devices are putting pressure on the capacity to deliver services entirely online.

Without exception, library physical space is being rearranged. In addition, major new libraries are being built in Canada and worldwide, incorporating the new perspectives on library priorities. In Canada this includes new public libraries in Halifax (2014), the Taylor Family Digital Library in Calgary (2011) - which is a physical space, despite its name - and a new university library at Mount Royal University. Recent surveys by public library systems in Ottawa, Vancouver and Halifax demonstrate that library users are seeking opportunities to use the library physical space for cultural and social exchange that may be solitary and closed (reading, studying), or collaborative...
and open (study groups, book clubs). A number of cities have refurbished or re-built their main libraries as a valued "place" and "destination" for citizens. New libraries continue to be constructed worldwide, including the Helsinki University Main Library (2012), a new central public library for Helsinki (2017), and the central public Library of Birmingham, UK (2013). All of these libraries draw heavily on the use of glass and uncluttered space to create well-lit, open areas. In reporting on the design of the recently-built Hunt Library (2013) at North Carolina State University, Library Journal states "From the first floor entrance of the Hunt Library there is not a single book in sight, and there’s not a staff member, desk, or chair, either." The Hunt Library is conceived as a space for collaboration, with a combination of the concept of the library as lab and the library as people space. The environmental scan for the 2nd Designing Libraries for the 21st Century conference (2013) brings out similar themes: visualisation labs and media creation spaces have been added to the usual solitary study and teamwork spaces. In a presentation from the same conference, Thomas Hickerson of the University of Calgary emphasizes the extent to which a modern university library project is a combination of a wide variety of types of spaces and very extensive technology infrastructure.

Public and university libraries are adapting to patron needs by becoming technology-enabled physical spaces. Public and university libraries are responding to a client needs by expanding and re-configuring their available space. One example is space used for "maker labs" equipped with 3D printers. Public library users are seeking new content types - ebooks, audiobooks, streamed music, DVDs, and databases allowing access to research texts and business subjects - as well as technology support for videoconferencing and Wifi for personal devices. Special libraries are responding to a flood of academic publications and research data by constructing and reconfiguring online spaces to better enable discovery and linking of the new information. The new online spaces include complex technology-enabled internet services. The human resources in special libraries are increasingly called upon to provide higher-level analysis, with basic research requests becoming routinely self-service using Internet discovery tools. The special library becomes a driver of business value, leveraging organisational knowledge and supporting organisational collaboration. In the Scandinavian Library Quarterly, Karl Kalseth writes "Special libraries are repositioning themselves as strategic instruments providing business benefits for their parent organisation. Knowledge sharing and knowledge exploitation are driving forces for improved business performance."

As well, libraries, particularly at the national level, are providing their information in more open and more highly linked ways. Libraries become not just gateways to data, but sources of data and connections themselves. This can be seen in services such as http://bnb.data.bl.uk/ where the British Library provides the British National Bibliography as linked open data.
The Grand Bibliothèque, (Bibliothèque et Archives nationales du Québec), opened in 2005 in the heart of the Latin Quarter in Montréal. Like many new public libraries, the building is bright, welcoming, technology-enabled, and offers open spaces for collaborative work. The Grand Bibliothèque has a broad library and archival mission and also seeks to: encourage reading, research and the enrichment of knowledge; to promote Québec publishing; to facilitate ongoing self-education; to foster the integration of persons new to Québec; and, to stimulate the interest of Quebecers in their collective heritage. With some 10,000 users per day and a record of 3,000,000 users in 2009—double the projected figure of 1.5 million. In 2011, it attracted 2.7 million visitors, and was the most frequented public library in both North America and the Francophonie.

La Grande Bibliothèque, Montréal, Québec

1 Guthrie, Jennifer. "La Grande Bibliothèque a 5 ans." Métro (Montréal), April 29, 2010, p. 10
2. **Drivers for Change**

As organizations active in scientific, technical, medical, and industrial research areas are adapting in response to drivers in the external environment, so libraries that serve these organizations must also transform in order to remain relevant.

**Organisational Changes**

If special libraries were ever considered as a separate and stand-alone service within an organization, this is no longer the case. Libraries are integrated into the organization and need to demonstrate value to the organizational goals. Library services may be integrated within corporate Information Management, one part of a central information service that also includes records management and archives. Special libraries may also be positioned within organizations to provide a key strategic and central business planning function. Expertise may be sought and developed within the library to contribute to corporate strategic planning, business intelligence, competitive and market intelligence, and program development and evaluation. Libraries and knowledge centres in for-profit organizations are a prime example, where “overhead” costs must be seen to improve the bottom line. In the federal government, NRC Knowledge Management (including the Canada Institute for Scientific and Technical Information) is an example of a library service converging with other central services to produce a more dynamic information flow and synthesis.

**Client Profiles**

Individual client research needs and behaviours are changing based on demographics. Older researchers tend to be more comfortable accessing familiar resources and requesting searches from librarians. Recent graduates are digital natives who are more adept at using information and communications technologies, although they may lack more in-depth search skills. Digital natives prefer independent self-discovery, as well as exploring social media and networking tools. While older researchers think of work as taking place at the workplace, younger researchers, armed with new technologies, think of work as occurring anywhere and anytime.

STEM and business libraries need to design services for all researchers, respecting those who want full literature searches to those who have completed a preliminary search and now want to identify resources that are “hard to find” (e.g. market research, patents and unpublished information).

In addition to supporting researchers with traditional reference services, there is a clear trend for knowledge centres to provide strategic decision support services to business units, program managers and senior management within an organization.
New and Endlessly Evolving Tools

Librarians in STEM libraries devote major resources to proving seamless access to electronic journals, e-publications, and databases. They make content easily findable on the web by applying metadata standards and taxonomies, link resolution technologies, and search applications. In order to ensure clients have a positive search and discovery experience, web technologies must search multiple content and locations seamlessly - licensed from publisher sites, stored locally, and stored on external servers (e.g. digital repositories). Web site librarians must understand and apply appropriate web accessibility standards, which may be rigorous. The role of the web site librarian/manager often incorporates user experience expertise to bring the client perspective in designing a logical and integrated library web presence.

Libraries will leverage Cloud-based IT solutions, in line with the adoption of the Cloud by parent organizations and researchers and individuals in the organization (e.g. mobile devices such as smart phones and tablets). Some special libraries have chosen Integrated Library Systems offered virtually rather than continue to support current solutions. More library and knowledge services will no doubt be offered from the Cloud in the coming years. There will need to be knowledge about how to manage and deploy Cloud-based services to clients.

“I haven’t been to the NRC library in 10 years, but I use it every day.”
NRC scientist

Supporting Research and Research Teams

There are a number of approaches librarians may need to take as they provide information to clients. One approach is to do deeper, broader or more complex searching of information for individual researchers. As noted, digital natives will do their own searches, but will ask for help when results have been unsatisfactory or where comprehensiveness is important (as with health regulatory work). In additional to traditional, published resources, librarians may need to integrate information obtained through streaming data, social data and business intelligence resources.

The research needed by the organization may include competitive and market intelligence, technology research or environmental scans in a particular commercial or business area. Findings will help determine gaps or promising areas for development of research programs.

Librarians may be members of project teams, managing information and data that result from the research. Librarians who support project teams directly may be called Library Liaisons, Information Specialists, Strategic Analysts, or Informationists, among others. This role generally requires an ability to collaborate and develop relationships to deliver services tailored to the team. It usually requires business or
scientific subject expertise to support teams in information searching, analysis and sharing. Another activity that librarians may play in projects is to ensure proper documentation throughout the project. The liaison role may also require familiarity with data formats in order to facilitate data mining and data archiving.

Open Access, Open Data, Open Science

The following brief “Open” definitions are designed to give some clarity around the terminology.

- **Open Access**: Scholarly literature that is digital, online, free of charge, and free of most copyright and licensing restrictions. Green OA is made available via institutional or subject repositories. Gold OA is made available in journal publications through payment of a one-time fee.

- **Open Data**: Data that is free to use, reuse, and redistribute. “Data” is non-textual material such as maps, genomes, chemical compounds, mathematical formulae, medical data and practice.

- **Open Science**: Umbrella term to make all aspects of scientific research, data and dissemination accessible.

OA addresses scientific endeavours and is of particular relevance for library services in universities, national research funding organizations, and some government organizations. To support OA mandates, librarians build and manage institutional repositories of publications, inform researchers about posting papers or data, assist with the publication process, and give direction or guidance on associated copyright issues.

Managing and Exploiting Data

There is much interest in the scholarly and popular press about big data. Making data accessible allows it to be reused by researchers and analysts, whether in business, government or the private sector; the result may be a faster pace of scientific discovery and innovation. Librarians in scientific research organizations are positioned to assist with the creation of data management policies and plans, preservation policies, metadata standards, and communicating Open Data developments. Librarians are also able to support scientists in implementing their data management plans and ensuring archiving of the data.

Data that is stored and appropriately tagged can then be searched in multiple ways to identify connections and new ideas for exploration.

Scientific data may be made available in repositories (publisher, institutional, discipline), and linked to the published output (paper or papers). Data may also be registered though DataCite Canada, a service that creates permanent DOIs (Digital Object Identifiers) for data sets, making them easier to locate and cite.
Need to Collaborate and Support Enterprise Collaboration

Collaboration is considered a key component for organizational success. STEM libraries can make important contributions to facilitating collaborative activities by promoting, supporting and training users on collaborative tools (e.g. wiki, SharePoint), by communicating and sharing within teams, by identifying potential external collaborators, and by working across the organization in finding and delivering key strategic insights and analysis to senior management.

University and government libraries are looking for cross-library/cross institution collaboration opportunities as ways to share costs and find efficiencies. In the university setting, Cornell and Columbia Universities have created a collaborative venture called “2CUL” to collaborate on technical services functions. This collaboration is described in more detail on the following page. Similarly, the largest science departments and agencies within the Canadian government are working to form a broad “federal science library” collaboration across several key services.

3. Services – Some Case Studies of Changing Services

Two examples of new library services are described below, drawn from the two very different environments, one a government agency and one a provincial consortium of university libraries. Each is defined and shaped, as one would expect, by the needs of the client community.

National Research Council (NRC) Knowledge Management
Competitive and Technical Intelligence (CTI)

In 2010, the National Research Council of Canada (NRC) began a transition to a Research and Technology Organization (RTO). A new business approach was adopted with a stronger market focus, attuned to the private sector and partnered with companies to address their technology issues. By developing technology solutions in concert with companies, NRC aims to increase innovation capacity in Canada, reduce risks in early stage technology development, and facilitate the deployment of innovative products and services, all within a constantly changing environment.

NRC Knowledge Management (KM) was created in 2011 and comprises the library (CISTI), records management, Competitive and Technical Intelligence (CTI), and foresight services. KM has developed a CTI service that exploits text mining, data analytics and visualization tools for data found in science, technology and business-related information. The objective is to create insights that support business and research decision-making within NRC.
The CTI service has developed the role of Strategic Information Analyst, who is often a librarian with business knowledge and expertise in gathering, analyzing and interpreting trends identified from within secondary sources. The Strategic Information Analyst is integrated in an agile way into projects with external and internal researchers, business advisors, and specialists knowledgeable in specific areas of S&T.

The Strategic Information Analyst creates many different types of reports and representations. One example is strategic S&T indicators that describe an industry or sector environment, and another would be strategic landscapes and emerging trends that identify technology trends/weak signals for a targeted technology area. The objective is to identify opportunities, anticipate emerging needs and trends, and discover new areas of application for technologies. CTI reports can reduce risk by investing resources using an evidence-based approach. This can also reduce duplication of effort, or indicate where partnerships could be advantageous, for example if a technology is found to be further advanced elsewhere in the world.

**Collaboration Services and Tools**

As part of the transformation and implementation of the new enterprise business model described above, NRC needed to fully leverage the organisation’s diverse knowledge and resources. This required heightened communication at all levels to identify opportunities and touch-points for collaboration, enabled by enterprise-wide collaborative platforms and tools.

NRC Knowledge Management is developing some of the collaborative tools (e.g. wiki, SharePoint) that support the organisation’s research programs. As one example, there is an important requirement for managers and teams to more easily locate internal technical competencies and resources. NRC’s staff, equipment, and facilities are located across Canada. To bridge an important gap in the project toolkit, NRC KM is creating an “internal market” to pilot within the enterprise wiki. A Kijiji-like discussion space will be implemented for managers and team leaders to post available and/or required resources as well as pose technical problems to elicit ideas for solutions. NRC KM will create a light-weight information architecture to allow easier categorisation and searching of content.

Facilitation of enterprise information exchange and collaboration helps the organisation to more effectively meet research challenges and keep pace with an accelerated and competitive environment.

---

3 Kijiji is a centralized network of online urban communities for posting local online classified advertisements.
Scholars’ Portal, Ontario Council of University Libraries

Collaborative Infrastructure
Scholars Portal provides the technological infrastructure that preserves and provides access to information resources collected and shared by Ontario’s 21 university libraries. Through Scholars Portal’s online services, Ontario’s University students, faculty and researchers have access to millions of e-journal articles and an extensive collection of e-books, geospatial data, and social science data sets. Scholars Portal also offers an online inter-library loan platform for Ontario’s universities as well as providing support for the RefWorks and WizFolio citation management systems and other tools designed to aid and enhance academic research in Ontario.

Research Data Services
One of the innovative services offered by Scholars portal is ODESI (pronounced Odyssey), short for the Ontario Data Documentation, Extraction Service and Infrastructure Initiative. ODESI is a web-based data exploration, extraction and analysis tool. It is the product of a unique partnership between university libraries, business, and government, which greatly improves access to statistical data for researchers, teachers and students.

ODESI provides researchers with the ability to search for survey questions (variables) across hundreds of datasets held in a growing number of collections. It supports basic tabulation and analysis online, and allows for the downloading of most datasets into statistical software for further analysis. ODESI provides unprecedented access to extensive collections of polling and social survey data. Key polling data collections include: Canadian Opinion Research Archive (CORA), Canadian Gallup, and Ipsos Reid. Statistics Canada's public-use survey data forms the core of ODESI’s social survey data holdings. ODESI inspires, develops and supports excellence in quantitative research, data publishing and statistical literacy. It is of benefit to both the experienced and beginning researcher. It introduces undergraduates to data literacy and data discovery at an early stage in their careers; it provides the experienced researcher the ability to search immediately across hundreds of datasets and collections, allowing for faster and more meaningful data reviews, and instant access to data for further study.

Columbia University Library and Cornell University Library - 2CUL

Columbia and Cornell University Libraries have built, and continue to strengthen, a transformative partnership called 2CUL (pronounced ‘too cool’). The two libraries joined forces to address budgetary challenges and to improve library efficiencies, enhance quality, promote innovation, and meet new and emerging academic needs. The Phase I Final Report notes that there were considerable accomplishments in three
key areas – improving collections and services, integrating library operations and co-investments, and goals for communications and spurring change in the broader library community.

These two great library systems pooled resources to provide content, expertise, and services, and the vision imagined broad integration on a number of fronts, in such areas as cataloging, e-resource management, collaborative collection development, and digital preservation. Early focus was placed on the enabling infrastructure, such as a shared back-end cataloging/acquisitions system, a shared long-term digital archive, fast and reliable book and digital document delivery, a better sense of collection strengths and gaps, and a more refined understanding of user expectations.

Phase II has now begun, again with seed funding from the Mellon Foundation. The two libraries will integrate their technical services departments. These departments purchase and license library materials, such as books, e-books, e-journals, databases and more, and they provide data so that users can find and use those materials. They will also pursue other goals for advancing the partnership, including: seeking a common library management system that integrates data and workflows; establishing collaborative collection building and coordinated processing. And to support these initiatives there are foundations that must be built, including policies, practices, workflows and job responsibilities at each institution, best practices and guidelines; and adopting a new organizational structure and culture.
4. Insights

Technology

The impact of technology on research information has been enormous. It has changed how we acquire, use, distribute, share and find information. Libraries and archives have a challenge in that they have both growing electronic collections and large analog collections. Contrary to the mythology that “everything is available on the Internet”, there are still vast collections of unique or valuable information that is only available in its original paper form. As one example, it is estimated that only 1-2 % of Canada’s documentary heritage is digital. The result – libraries must offer access and stewardship for both digital and print collections. It’s not one or the other – it’s both. This is costly but necessary; it may be a transition stage or permanent, but it cannot be avoided at present.

Competencies are changing

Core library and information management competencies are essential. In addition, STEM and business organizations are looking for librarians with a specialization in a scientific discipline. Expertise in a scientific discipline increases the opportunities that librarians contribute optimally to project teams and bring a shared understanding of project goals and objectives. Librarians with science backgrounds are better able to understand research methodologies, key resources (journals, publishers, digital repositories, databases), as well as processes and analytical tools that are deployed. There are emerging service areas such as data management that will require librarians to support researchers in various ways including data management planning, expert guidance in managing data file formats, metadata, and preservation practices. In addition, librarians in scientific organizations working on projects may be asked to assist the team with risk management, costing, business modelling or analysis of data. The librarian of the 21st century will need to be a lifelong learner and a user of modern communication tools and applications - Internet, ontologies, mobile devices, social media tools. And finally, there are ‘soft skills’, such as the ability to collaborate and communicate well, an ability to make presentations and report findings to groups, and the flexibility to integrate quickly into research workflows and ad hoc project teams, and contribute to their success.

5 Canadian Archives Summit, Toronto, Jan. 17, 2014
Collaboration

Libraries are collaborative by design – they share records, books and all types of materials, in order to provide access and better services to their patrons. They also take common approaches to their acquisitions (CRKN, Federal Science eLibrary, provincial and regional health networks), preservation (DPN, LOCKSS), and even technical services (OCLC, 2CUL, Scholars Portal).

Is deeper or more radical collaboration possible or needed? What does greater interdependence among libraries mean and what could it look like? Do libraries (and archives) each need to have one of everything, whether resources, services, collections and expertise?

Anne Kenney, University Librarian at Cornell University, has written extensively about the concept of ‘radical collaboration’, envisioning research libraries as multi-institutional entities. She points to “the collective wealth bound up in redundant operations and duplicative collections … and asks “Can we stop measuring success by how much money is spent at individual libraries and instead measure success by increasing the % of scholarly resources collected and preserved, by operational efficiencies and effectiveness and by addressing big challenges at the university?”

Some of those challenges include collectively filling gaps in the scholarly record, demonstrating ROI, supporting multi-disciplinary work, and partnering in data curation, and meeting emerging needs. The 2CUL Project, mentioned above, has put this proposition into practice.

Value and Impact

“Value” must be demonstrated and measured, and contribute to the organization’s goals. So value will be measured differently in different organizations.

Business and R&D organizations may require market and technology information and insights. Government libraries are asked to deliver a broader range of services as part of strategic information management priorities.

National science and medical libraries are responding to mandates and support for broader access to the results of publicly-funded research.

University science and technology research libraries are creating new value by capturing faculty publications and providing assistance in the scholarly communications process and in management of copyright. University research libraries deliver value by providing access to scientific data and publications produced by the organization’s researchers.

While the organization’s needs may differ, there are some fundamental measures that libraries use to measure impact, including usage (article downloads, loans, reference

---

6 Kenney, Anne R., More than the Sum: Reconceiving Research Libraries as Multi-Institutional Entities, presentation at INULS, 2010
requests, etc), as well as quantitative and qualitative measures of service delivery and client satisfaction.

Value must be both linked to the organization’s goals, and demonstrated vigorously to funders, clients, and stakeholders. One cannot assume that all of these necessarily share a common understanding or appreciation of the value of the library or information services. Libraries are committed to excellent service, and adept at integrating new tools and technologies. Some services such as access to licensed content can be so transparent to the user they may not always realize they are accessing content chosen, licenced and made accessible by their library.

Promotion of the library’s value and impacts is not self-serving – it is essential to support and sustainability.