CISTI and the NRC Virtual Library*

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CISTI operates as a national information resource for NRC and for Canadian researchers, with the mandate to:

> " *..support the research and innovation communities by managing and disseminating high value scientific, technical and medical information products and related services*."

At present, CISTI has three major business lines:

1. The Library and Document Delivery

As a library, CISTI offers:

- Reference and referral services
- An online catalogue that contains collection records, tables of contents of books in the collection, acquisitions data, access to freely available full-text within the context of the collection policy and a document delivery order feature
- A collection of about 13,000 journals in science, technology, and medicine and over half a million books and conference proceedings
- Document delivery services from CISTI's own and partner collections
- Canadian coordinator for the U.S. National Library of Medicine's DOCLINE.

2. NRC Research Press

CISTI has become Canada's foremost scientific publisher through the merger of CISTI with NRC's well-established publishing program. NRC Research Press published 14 scientific journals in print and online, about 12 to 15 books and conference proceedings each year and has co-publishing ventures with universities and scientific societies. Numerous gateway agreements make the journals readily available to a growing international audience.

3. Current Awareness

In recent years, CISTI has developed a Table of Contents service, CISTI Source, offering researchers direct article level access to CISTI's collection of 13,000 serials in all areas of science, technology and medicine. Plans to enhance CISTI Source with abstracts and more functions are underway. A specialized service for information technology and telecommunications researchers, BiblioNet, was developed in 1998 to provide a full service, single source of both scientific and business information.

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* Based on a paper by By Allison Ball, Carol Julien, Elizabeth Katz, Scott Mellon and Mary Zborowski

Historical Context

In 1924 the Canada Institute for Scientific and Technical Information was formed by an Act of Parliament under the name National Research Council of Canada (NRC) LibraryIn 1938 NRC extended the use of its library to Canadian universities and industrial research centres. This solidified the library's national role in providing worldwide scientific information in support of Canadian research.

During the 1950s and 60s, this role was reinforced in several ways. First, with the founding of the National Library of Canada, agreement was reached to separate the function of information in support of scientific research from that of national heritage preservation. Secondly, the NRC Library was given the mandate to create and operate a national electronic network of scientific databases.

The explosion in online information that characterized the 1970s and 80s transformed the library into a centre for electronic information serving a diverse clientele, including the medical research community when the NRC Library became the Canadian national coordinator for MEDLARS. By 1974, the library had outgrown both its space and its name. In one whirlwind weekend, without any disruption in service, the library moved into its own futuristic building and was transformed into the Canada Institute for Scientific and Technical Information (CISTI), where over the years it grew in size and reputation.

Today, the National Research Council's 3,000 employees remain one of CISTI's most important client groups. They are served by a network of information specialists in Ottawa and across the country within NRC research facilities and by a Virtual Library that gives NRC researchers access to online database services, publications and other resources.

NRC Virtual Library - a technical perspective

From a technical perspective, the NRC Virtual Library is truly virtual, in the sense that it resides on many machines and platforms. The main site consists of top-level, static HTML pages served from Silicon Graphics machines running Netscape Enterprise server, soon to be upgraded to iPlanet Web Server, Enterprise edition.

However a variety of machines are involved in the background to deliver specialized applications. These include Windows NT machines running Cold Fusion Application Server, and several mid-powered PentiumII running Linux to support Java and Oracle applications (many of these linked in a Linux cluster). In addition, SGI and Sun machines support ERL and the SilverPlatter databases. Finally, the technology network in place which support CISTI's regular business operations also figure into the architecture of the Virtual Library: the catalogue and acquisitions system from Innovative Interfaces, document delivery's IntelliDoc order processing system, and the client registration system, to name a few.

CISTI is probably best known as a document supplier, and this holds true for our internal clients as well. CISTI delivers close to 500,000 documents each year, about one fifth of them to NRC clients. NRC orders are largely generated from some part of the Virtual Library. It is important, therefore, that all of the bibliographic databases on the Virtual Library have document order modules, and that these interface correctly with the Document Delivery operations. This often involves considerable customization of commercial products such as SilverPlatter's WebSpirs software.

To reduce the burden of maintaining thousands of static HTML pages, the Virtual Library makes use of Server Side Include technology, where applicable. Such technology has assisted the sharing of resources between the Virtual Library web site and other CISTI and NRC web resources. Hundreds of browsable pages are produced on-the-fly from MySQL and Oracle databases. Such databases help staff maintain accurate listings and linkages to our electronic journals and internet resources, while not affecting page layout or delivery.

A number of servers are required, working in conjunction with each other, to produce the various pages and features which together make up the Virtual Library. Additional technologies deliver proper functionality and also to provide symbolic linking, redirection capability and machine-name aliases, all needed to satisfy the federal government's bilingual (English and French) policy requirements. A back-up system is also in place, so that the service is not interrupted by downtime. In addition, staff are assigned to monitor server interruptions and to restore functionality remotely during non-business hours.

CISTI has historically maintained close collaboration with other NRC institutes. One benefit is the ability to use the Virtual Library as a test-bed for new NRC technology, such as the ***Extractor*** (http://extractor.iit.nrc.ca/) a Text Summarization software, that has been successfully used to improve access to a valuable set of competitive intelligence resources. ***Extractor*** was developed by NRC's Institute for Information Technology which performs original research in such areas as information visualization and artificial intelligence.

Security is a major concern for any library offering site-licensed resources. The primary access control mechanism is through recognition of the user's IP address; however this is not entirely satisfactory, because it does not meet our users' requirement for remote access. It also becomes quite cumbersome to administer access to anything less than the entire enterprise-wide Council such as local groups or Institutes. For this reason, proxy applications have been developed, running on the Linux platform. NRC staff now log in to the proxy before visiting the Virtual Library, and are subsequently granted access only to those licensed resources identified for them in the license agreement with the publisher.

In addition, we are evolving towards an authentication scheme based on unique logons. An LDAP (Lightweight Directory Access Protocol) server is being developed to be

linked in real-time with other CISTI databases. This feature will avoid multiple log-ons to different services.

Most NRC staff have workstations meeting the Virtual Library recommendations, namely, T1 or better access to the Internet, with Netscape v.5, and a PentiumII processor with 64MB RAM at 300 MHz. The minimum requirements include 28.8 modem, Netscape v.3 and Pentium processor with 32MB RAM. Ultimately it is the browser version and the quality of the Internet link which most affect the use of and satisfaction with the Virtual Library.

Evolving roles of library staff

The roles of NRC librarians and para-professionals have evolved considerably over the course of the development of the Virtual Library. Routine enquiries and document delivery requests, which formerly consumed much of the library staff's time, have steadily decreased, allowing staff to concentrate on adding more value to their work. For example librarians formerly involved exclusively in traditional searching of scientific literature now prepare competitive intelligence business reports for NRC.

The Virtual Library has lead to an increased need for end-user training and documentation. All NRC staff are linked with an information specialist and are encouraged to contact them with questions and feedback related to the content of the NRC Virtual Library and for information not available on the NRC Virtual Library.

There are training seminars for individuals and small groups tailored to their needs and hands-on training. News about the content of the NRC Virtual Library is posted to an electronic mailing list and to the news section of the NRC Virtual Library. Periodically, articles are written about the NRC Virtual Library for the NRC intranet.

Virtual Library Content

The NRC Virtual Library includes information products in science, technology, medicine and related business information. Product selection is based on the results of usability studies, experience with current electronic products, troubleshooting logs and on surveys of user needs.

Currently there are approximately 100 databases, 3000 full-text electronic journals and many electronic reference books. If the full-text is not available on the Virtual Library, documents can be ordered. Database records range from bibliographic references, with or without abstracts to full-text documents to directory listings of organizations or people. Thus, access to both published literature and expertise is provided. Clients can subscribe to various alerting services such as journal tables contents or subject-specific profiles.

Both free and fee-based products are included in the collection. For fee-based products, there are a variety of pricing arrangements and licensing agreements. While some

licenses allow for unlimited use within NRC, others may restrict access to a specific number of concurrent users, to specific institutes or to a fixed number of searches and document downloads. Some licenses offer a mixed costing formula such as an annual subscription plus pay-per-view. For several products, license costs are shared with other organizations such as other government departments or other NRC institutes.

Keys to Success

The success of the Virtual Library can be measured by the results of user satisfaction studies as well as by rapidly rising statistical counts for services such as end-user initiated document delivery and use of electronic journals. This is mainly due to the enthusiastic participation of a large number of CISTI staff who are convinced that they are building a viable model for the future of the library. It is managed by a CISTI-wide team which draws on the diverse skills of computer scientists, cataloguers, document delivery specialists, reference librarians and acquisitions staff.

The Virtual Library is considered to be an expansion and improvement of CISTI's traditional information services not primarily an electronic information service. In other words, it is a Virtual Library with "a human face". Information specialists give high priority to helping, marketing and training their clients, whether in person, by telephone or e-mail. Furthermore, CISTI has not abandoned those clients who are uncomfortable with newer technologies, and will continue to offer traditional services as required.

The Future

In the near future we plan to provide uniform subject access to an integrated collection of free Internet and site-licensed Intranet resources by generating all resource descriptions from a common underlying database. We are also working on a common user interface to all available databases, which will considerably simplify our clients' searching. In the longer term we plan to make the NRC Virtual Library an integral part of a larger knowledge management strategy, which will provide NRC staff with the tools they need to collaborate and to share information with each other. Our Virtual Library will continue to evolve to incorporate new technologies and expanded information resources.

There are plans to:

a. Provide remote access to all NRC staff. Currently, only some of the staff have access via a proxy
b. Provide personalized access so clients have the option of seeing only the Virtual Library products they have selected or information and documents they have requested.
c. Investigate collaborations with organizations related to Hotlinks and licenses.
d. Improve access to full-text documents and information produced by NRC staff.
e. Develop online training modules.