

**National Research Council of Canada,
Canada Institute for Scientific and Technical Information
(CISTI) Document Delivery Division
Ottawa, Canada**

North America Excellence Award: Workflow, Finalist

The Challenge

The National Research Council's scientific library, Canada Institute for Scientific and Technical Information (CISTI) is the largest scientific library in North America with over 300,000 square feet of document storage. CISTI offers one of the world's best collections of journals, conference papers and reports in physical and life sciences, engineering, technology and medicine for its world-wide base of over 15,000 clients.

Traditionally, CISTI relied on photocopying paper copies of articles and conference papers to fill orders for specific documents. The paper copies were then delivered to the client using various mail and courier services, nationally and internationally. Approximately 20 staff members used 17 photocopiers to fill these orders.

In 1993/94, CISTI received over 330,000 orders for documents or over 1,100 orders per day. (The volume has since doubled.) From this over 244,000 photocopied documents were supplied resulting in delivery of almost 1,000 documents per day. With the average document consisting of 10 pages, CISTI delivered approximately 200,000 pages of requested materials monthly. CISTI projected that during the 1994/95 time frame, the daily number of documents delivered would have to increase to 1,200 documents supplied per day to keep up with the current information demand.

CISTI's Document Delivery operation was spread over six floors with the paper orders traveling from floor to floor during the course of the day. Once in process there was no way to isolate a specific order in the identification, document selection, photocopying and delivery processes.

CISTI realized that they would need to expand the range of ordering and delivery options and offer faster turnaround times on providing documents. To do this it was necessary to move into an electronic environment and offer electronic delivery options to clients. This necessitated moving from the traditional photocopying operation to an imaging environment and producing scanned images of requested documents that could then be sent electronically, according to the clients' preferred delivery method. The new electronic system baseline capability had to be able to scan 10,000 pages of documents and fulfill 1,000 separate document requests daily. The new system would also provide the basis for moving into an environment where documents could be stored electronically, copyright permitting.

CISTI also recognized that they would need to establish a new document order and delivery service business electronically via the Internet. With their extensive information holdings, CISTI was very concerned regarding the security and configuration of this groundbreaking new electronic commerce application.

Technology Challenges

- Set up the new imaging environment to scan images of requested documents that includes 13 scanning workstations distributed over five stack floors including the design and engineering of a new high speed imaging environment and system.
- Utilize business process reengineering to design an automated business process which would transform the current manual processes and accommodate a fully automated electronic document order, selection and delivery system.
- Design and develop a reliable and secure Internet order and delivery business process to establish a new electronic commerce line of business for CISTI. This entailed creation of an Internet based ordering system, where orders were received in a delimited file or standards based format for input into an SQL database, and an internet based transfer of order/client information from a mainframe to the IntelliDoc document management system.
- Ability to shift order receipt and document delivery from a paper based to an electronic environment, with resulting savings to CISTI and clients.
- Develop a series of MS Windows compliant interfaces to allow for documents to be automatically converted and sent out by Internet and fax, or to be printed at a high speed printer for courier delivery.
- Develop a system which would access information from several databases (catalogue of library holdings, client delivery preferences) in the course of order fulfillment.
- Develop a system to allow for the tracking of an order to any point in the workflow
- Combine many commercial “off the shelf” products to work with each other, and with CISTI’s existing systems, to provide the most automated processing available, while providing the largest number of ordering and delivery options for end users.

Integration Overview

The principal business objective was twofold to provide a facility to allow the organization to automate manual paper based information gathering and dissemination and to establish a secure electronic information order, receipt and delivery business process which utilizes the Internet.

The process definition was based on a modified SDLC (System Development Life Cycle) oriented to process definition that was then used as the overall system definition. The FLOWMAN tool set was used to define and implement the electronic processes within the overall workflow process.

The integration included business process reengineering as well as designing new business processes required to support the system. The basic purpose was to provide the end user with worldwide desktop access to the CISTI information resources.

The objective was to ensure that CISTI would not have to make changes to the systems already in place, while integrating the new enhancements, and allowing the integration of more packaged software as business needs changed.

As CISTI’s holdings and the number of requests for documents continued to grow, and as end users asked for more options, it was essential that a new system be developed to allow for the expansion of CISTI’s business. The new system would allow for the dissemination of documents to the widest possible audience.

- The project team consisted of:

- Clare MacKeigan, Project Manager, CISTI
- Bill Ruane, Project Manager, System Architect, NSI Network Support, Inc.
- Michael K. Bennett, Project Manager, Logical Software Solutions Corporation

Product Selections

The key to success in this project was the selection of the right products for the tasks. Logical Software Solutions' FLOWMAN production workflow product and PSS' RIMS document management system were selected as the basic system in a Novell Server environment which utilizes SQLBase from Gupta as the database of choice.

The key attributes of both the FLOWMAN and RIMS products are as follows:

- A common SQL database that was not platform dependent, allowing FLOWMAN and RIMS to share data,
- External APIs for both FLOWMAN and RIMS allows easy integration with other MS Windows compliant applications;
- Open architecture that uses PC technology for the client functions and allows integration of the client desktop and database of choice;
- Utilizes rapid development tools for custom client requirements and system specifications

As described, the integration of FLOWMAN and RIMS was facilitated by the products' common open design philosophies. This architecture also allows integration of other products required to manage the document creation and delivery process.

These products included:

- WinFaxPro from Delrina
- Windsprint from Eureka Software
- SCO Enterprise server for Internet order receipt and delivery
- DIMS from PSS for scanner management and image creation
- SQLWindows for application interface development

All the software suppliers are leaders in their areas of expertise and have based their products on open system principles facilitating integration. This shortened the development for this complex system and allowed the team to concentrate resources on testing the new delivery methods and refining the supporting business processes.

Research and Development

The project team built a series of reproducible and configurable interfaces using messaging, OLE, and database access methods to link FLOWMAN for task sequencing to the communication interfaces needed for data capture and delivery to the various document management systems that are available. This approach provided information control, and the applications required for decision support services for automated document delivery by the CISTI staff.

The project team concentrated on the following activities:

- Interface and ergonomic design of user controls that included touch screen computer stations, high speed specially engineered foot pedal operated scanning station and scanner bed modification;

- Object-oriented design and programming for exchange of objects between common interfaces;
- Common indexing of workflow rules and information management holdings databases, and;
- Automated interface design between off-the-shelf communications packages (e.g. Delrina WinFaxPro) and the RIMS document management system.

Integration Results

- Automated file transfer based on internet with end-to-end messaging for application recovery of order/client information from a mainframe to the IntelliDoc server.
- Automated interface between the document management database (RIMS) and the workflow software (Flowman) using common tables for workflow rules and order information.
- Automated document delivery for a variety of interfaces including FTP, Internet, and Fax, including automated re-sizing, re-formatting and rotation as required.
- Productivity Gains and Economic Achievements from Project

Productivity and Efficiency Dramatically Increased

First, the CISTI library has now gone from a manual order processing operation with only one method of delivery at a fixed time, to one which is fully automated and can process orders on a 24-hour turn-around basis.

For the first time, CISTI can now receive a constant stream of orders and process them on a continuous basis for a much lower cost per transaction. This allows them to receive normal orders to approximately 1:00 p.m. and still be able to deliver in the same daily cycle. Prior to this, an order would take up to *three or four days* to be processed. Also due to delivery time restrictions, the workforce only had a small four-hour window to process the daily order volume that hampered productivity.

The new electronic Document Delivery system is available 24 hours per day. It is connected to a host for 21 hours per day and delivers electronic orders based on a service type schedule. In order to facilitate the operation, a lights-out operation was developed for data base backups, order purging, etc. A significant effort has been made to make the client/server architecture both stable and “hands free” to reduce maintenance costs.

There are currently 8,000 member users served on a continuous basis both throughout Canada, and internationally. Primarily the users are located in North America, but there are some customers in Europe and Japan.

New Services Result in New Revenues

Second, the new electronic environment permits multiple levels of customer document information services for the library, which allows additional premium service options to be introduced into the regular processing stream.

Presently, CISTI is instituting a marketing effort targeted at expanding its international customer base, particularly in Europe and Japan. The new automated electronic systems and a delivery method developed by this system using the Internet makes this feasible now.

With management statistics now available from workflow, CISTI can now measure the effort associated with service and determine the most popular information sources requested by customers. This has already allowed CISTI to rethink the type and pricing of future services to be offered. This translates to increased revenues from premium service charges on certain information requests, increased productivity from the existing workforce, improved delivery services, as well as, a decreased cost for filling and delivery of normal orders.

With the installation of the integrated electronic Document Delivery operation, CISTI has embarked on a five-year plan that calls for a *doubling of annual revenues with no increase in personnel or costs* in a highly competitive international information supplier marketplace and in light of Canadian government funding cutbacks.

It is intended to extend the interface capability to allow the same process interfaces to the end user whether at work or in laptop/home environments.

Summary

Instituting Line of Business Workflow resulted in:

- Reduced delivery cycle time by 75 percent.
- Doubled production capability, by increasing production service to 24 hours per day.
- Instituted a groundbreaking new electronic commerce library and document delivery service via the Internet.
- Project an average annual increase of 20 percent in service revenues alone.
- Reduced international delivery costs by \$1 per page (\$10 per average length document), improved timeliness and improved quality of transmitted document by eliminating dependency on fax transmissions.
- Five-year business plan calls for 200 percent revenue increase overall.
- Expansion of international client customer base.