THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA

NORTH AMERICAN EXCELLENCE AWARDS: WORKFLOW, GOLD

SUMMARY

The University of Alberta, Canada's largest interlibrary loan lending system filling 110,000 information requests annually and serving over fifty client institutions and tens of thousands of researchers throughout North America, used Logical Software Solutions' FLOWMAN® software to redesign its interlibrary loan (ILL) process and develop an Internet document delivery services.

The University of Alberta and Network Support, Inc. (NSI) developed and implemented Relais—an automated electronic documents ordering, processing and delivery workflow system using imaging, documents management and workflow technologies—to provide research clients with convenient methods of document request as well as a variety of delivery options including the Internet.

Clients, who previously had to wait for up to six weeks for requested information, can now receive documents in just 48 hours. The University of Alberta's Relais system, now in production prototype, has dramatically improved staff service productivity by eliminating over 70 percent of the previous paper-based work process, increasing service capacity, and expanding operations to 24 hours per day. The system has cut the document order time from hours to minutes, provided new electronic document order and delivery options on-line via the Internet, reduced operational costs of service, established automatic copyright accounting and tracking, trimmed document delivery costs by over 50 percent as well as saving the costs of additional staff hiring.

The Relais system innovation benefits go well beyond these basic operational and service improvements by establishing two key innovations in on-line library document technology:

1) Relais links today's library collections which are almost 95 percent paper document based to technologies for electronic ordering, digital conversion on demand, and electronic delivery to client institutions on-line via the Internet or other electronic system.

2) Relais provides the key bridge technology by providing an integrated method for on-line users directly to access large digital repositories, commercial electronic publishers and even the emerging technology of full-text retrieval services, and have these documents delivered electronically to the desktop where licensing permits.

EXCELLENCE IN PRACTICE

THE SYSTEM APPLICATION

The University of Alberta is Canada's largest Interlibrary Loan (ILL) lending system providing documents and technical materials to its campus academic community, a regional client network of government and medical libraries, Canadian universities and a growing number of North American and international library consortia.

The ILL department is the "back office" operation that locates and supplies document requests from multiple collection holdings. These services are traditionally highly manual, paper-based, staff intensive and slow while at the same time ILL has become the fastest growing library service industry-wide.

The Relais system is primarily a staff-based tool that automates document ordering, processing and delivery system using imaging, document management and workflow technologies. Through Relais client institutions and researchers can conveniently place document orders directly to the University of Alberta from a variety of sources: Internet electronic forms, telephone, fax, or paper requests depending on the technology available. They can specify a preferred method of document delivery—fax, courier, Ariel or FTP.

The Relais workflow system then processes those orders transparently against its library catalog. It retrieves the requested materials from its various collection sites; scans the materials; tracks copyrights and billing information, and then delivers the information either electronically via the Internet or through the clients' specified method of delivery.

The Relais solution uses the LSS FLOWMAN® workflow software to bring together at each step the appropriate staff, data elements, decision rules, and helper applications. Configurable interfaces use messaging, OLE, and Z39.50-based retrieval protocols to link workflow to communication interfaces for data capture, verification, and delivery. This has reduced the number of manual tasks from eighteen to two or three.

Relais System Highlights

a) Paper request   electronic request: The Relais system replaces multi-part paper document request forms with an "intelligent" World Wide Web forms interface. This interface requests a user login, which allows Relais to call up and pre-populate the form with address information and delivery preferences drawn from its client database. The interface integrates a database search engine by which the citation information for the document can also be captured electronically. The completed request can be dispatched as an Internet message for immediate processing. This mechanism reduces user time in filling out forms, and clerical keyboarding (transcription) into the system. The resulting information is more complete and error-free.

b) Order processing: Because the citation is machine parsable, incoming orders can be searched against library holdings, and routed automatically to the appropriate branch

locations for retrieval. This provides the future capability for outgoing orders to be machine-searched against the indexes of a number of document supply sources. FlowMan® workflow rules permit the selection of a supplier based on parameters such as preferred supplier, turnaround time, cost, choice of document format etc. This eliminates 70 percent of the present human mediation for every order.

c) Photocopying   Electronic document capture: High speed scanning workstations have been installed in each branch library replacing photocopiers. The 30ppm pedal-activated scanner has been modified to deal with bound documents and high volumes, and tied into a Windows-based scanning software utilizing touch-screen controls. The resulting image file is now available for a range of Internet-based delivery options. This is the only manual operation left in the lending and copying cycle.

   This technology recognizes the need for a bridge between print formats (which represent 95 percent of existing research collections) and electronic delivery technologies. As more documents become directly available in electronic form, the object-oriented design of Relais allows the system to easily adapt to the direct retrieval of documents from digital repositories in a variety of image and portable document formats.

d) Mail/Fax Delivery Internet Delivery: The Relais system extends the delivery options of conventional mail (with labels generated automatically) and fax (direct through a WinFax server) to include delivery through an Internet-based fax technology known as Ariel (toll-free, high resolution), Internet FTP (file transfer), and, as e-mail standards stabilize, MIME electronic mail attachment. These options reduce staff handling of documents and delivery costs, and increase options to the user desktop, providing the user with e-file formats that permit further processing.

e) Automated royalty tracking: The Relais system tracks amount of use to be able to provide accurate information for publisher's royalty tracking.

EXCELLENCE IN PRACTICE

Diagram A. (copyright Network Support Inc.)
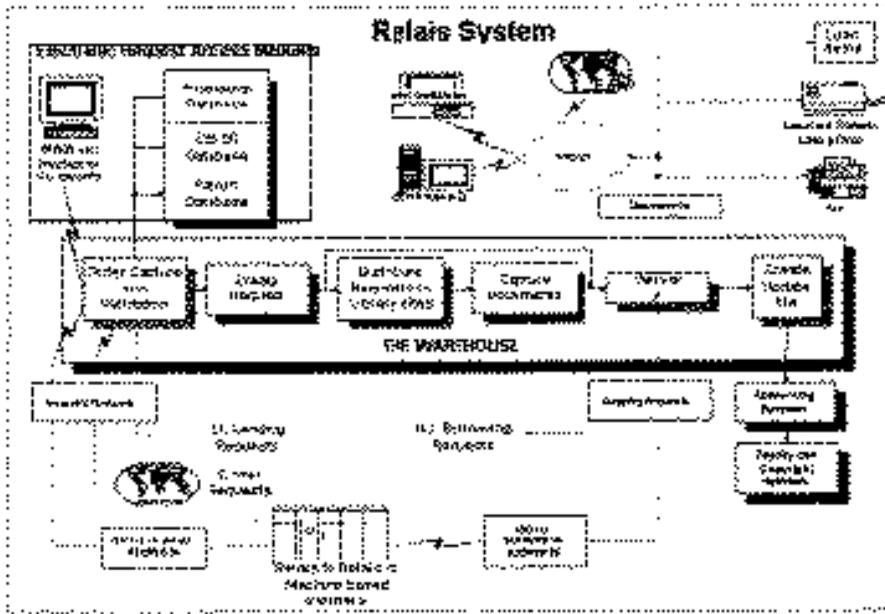
THE KEY MOTIVATIONS BEHIND THIS SYSTEM

Decreased local purchasing, greater database access through Internet connectivity, and the integration of Canadian holdings into the United States ILL system—information "free trade"—has increased ILL transaction volumes by 104 percent in the past eight years. Increased demand due to the expansion of Internet access has only begun to impact these numbers. At the same time, users demand much faster turnaround times on their requests.

The University of Alberta Library is among the leading research libraries moving from a warehousing model ("just-in-case collections") to an access model ("just-in-time collections") based on the use of new technologies. This model generates substantial demand and performance expectation for network-based on-demand document delivery both between libraries, and ultimately direct to users.

This has created two management problems. On the service side, the proliferation of document delivery options, both internally and from commercial providers, has made the "customer presentation" of these services in the Library extremely complicated—how to request documents, from which collections to request, how much it will cost, who will pay, what format and delivery modes are available, etc.

On the operations side, the interlibrary loan/document delivery (ILL/DD) units have reached staff limits given traditional interlibrary loan processes based on paper request forms,

photocopy and fax, and the current generation of back-end ILL management software which demands human mediation on each request in determining suppliers and delivery options.

Digital document delivery technology is a key element of improved interlibrary loan processing, the implementation of the electronic reserve room, and more effective interfaces to the growing number of digital text repositories emerging from publishers, libraries and scholarly societies.

Moving from "data-centric" library automation model to a "workflow process" model represents a radical change in library technology thinking and opens up new service opportunities.

THE CURRENT SYSTEM CONFIGURATION

Description of the information technology solution:

The University of Alberta Relais system has 10 ILL staff workstations and WWW-based electronic request forms using an image server, 3 scanning workstations and 2 Ariel and interfax servers. The entire system is accessed by fifty institutions located throughout Canada and North America, on behalf of thousands of researchers associated with these institutions.

Major components:

- RIMS for document management (Public Sector Systems, Ottawa Ont.)
- DIMS for scanning and image manipulation (Public Sector Systems, Ottawa, Ont.)
- FLOWMAN for workflow control (Logical Software Solutions Corp., Calverton, Maryland)
- Windows NT (Microsoft OS)

Other components:

- WinFax Pro (Delrina)
- Imageflash (Eureka Software)
- SQL Windows
- GEAC GEO PAC search (GEAC Z39.50 bibliographic search retrieval engine)
- AVISO (Autographics Interlibrary loan management software interface for invoicing, statistics etc.)

These items are now all bundled in a product called Relais. This system will also be

installed at the National Library of Medicine in Washington DC in 1997, and by EBSCOdoc of Burlingame, CA.

IMPACT TO THE COMPANY

Time and cost reductions:

Electronic request forms reduce the client's time taken to generate a request by over 50 percent—a savings of 1.5 minutes per transaction over 100,000 transactions annually—adding up to 2,500 hours annually in increased productivity for students and researchers. Electronic messaging of requests to the ILL/Document Delivery Office reduces entry time of requests into the system from average 6 hours to less than two minutes.

Automation of order processing improves same-day turnaround from 50 percent of orders to 75-85 percent of orders with a 15 percent initial staff time reduction. The University expects this to improve further as automated exception and processing rules are refined. The system also permits greater flexibility in handling growth in demand; the prototype system at Canada Institute for Scientific and Technical Information has accommodated 100 percent increase in volume over three years without an increase in staff.

Delivery costs will be reduced as the University moves from less than eight percent delivery by electronic means (fax, Ariel) to over 50 percent, and a concomitant reduction in the use of commercial courier services.

PRODUCTIVITY IMPROVEMENTS

Increased capabilities:

Electronic request makes the Library's document ordering system available 24 hours a day from home or campus through the World Wide Web. Web access also greatly improves the profile of the service with users.

With electronic delivery, users have more delivery options, and access to the document in electronic form for integration into their research work. As more document suppliers make their services available over Internet-accessible ordering systems, the Library has greater scope for utilizing a range of document suppliers and tracking the business aspects based on cost, priority, and file formats. This flexibility makes the Library an attractive and competitive document supplier, and moves the challenge of selecting the right document supplier from the user to the Library's ILL/Document Delivery Office.

The introduction of electronic delivery also releases the operation from batching deadlines based on courier pickup, allowing more rapid continuous stream processing, and overnight

dispatch of fulfilled orders when network traffic is lighter.

The document management features of this technology give the Library an ideal opportunity to test its application to in-house collections such as for high-use course materials (professors' course notes and solution sets). This provides new avenues for the distribution of locally generated instructional materials, and opens new revenue streams for the Library's network-based campus printing services.

THE COMPETITIVE ADVANTAGE

Innovative Use & Technology:

The use of Web-based request interfaces and intelligent forms technology reflects the movement of WWW technology from passive display applications to interactive client-server program applications. The use of the Web environment positions Relais ideally to form the document request "back-end" to a wide range of Web-oriented indexing and abstracting database products from leading library vendors. Similarly, Relais is designed to function as a versatile front-end for the emerging but still chaotic field of digital [full text/image] collections.

THE IMPLEMENTATION PROCESS AND METHODOLOGY

Development Team:

University of Alberta System Integrator:	Doug Poff, Edmonton, Alberta Network Support Inc., Ottawa Ont.
Workflow:	Michael J. Bonner Logical Software Solutions Corp., Calverton, MD

Project Timeframes:

- March, 1995: Initial contract discussions

- June, 1995: Contract awarded

- July, 1995: Current workflow process analysis begins

- August-September, 1995: New process analysis

- October-December, 1995: Detailed design

- January-March, 1996: Development and prototype testing

- April, 1996- January, 1997: Installation and production prototype testing

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The business process reengineering and new business model are discussed in detail in other sections of this case study.

THE OVERALL TECHNOLOGICAL AND BUSINESS INNOVATION

While many assume that the Internet has placed the "Digital Library" within reach, the concept is in fact in its infancy. While imaging technology is viewed as the key, it represents only a small piece of the puzzle; several grand challenges stand before the University if they are to realize the digital library vision:

- means of bridging the legacy collections of print collections (95 percent of the knowledge universe) to the digital environment

- definition of standards for file formats, document structures, record and indexing structures for digital repositories

- information is not free—new models for copyright, licensing, royalty tracking and payment systems appropriate to a digital economy

- developing workflow systems which in this formative period can encompass and exploit the range of commercial and library-based document supply and digital library technologies in a way that meets and leads the expectations of the information consumer

While many universities have undertaken projects to design and build prototype digital collections, the University of Alberta Library has chosen to tackle this last challenge—the enabling infrastructure. The model is radical—to move the library from a document location system and "self-serve" document warehouse to an active on-demand document supply service.

Current library technology is centered around the holdings (i.e. "meta-data") database in the form of the on-line catalogue—with supplemental interlibrary lending/document delivery on the periphery. The Relais system reverses the model—the finding system is simply the user interface whose objective is to provide transparent on-demand access to the document. The heart of the Relais system is a sophisticated workflow processing system geared to the direct provision of documents from a range of supply sources, and utilizing a range of electronic and physical delivery systems.

The move from "data-centric" library automation model to a "workflow process" model represents a radical change in library technology thinking. The use of open systems architecture and flexible processes ensure our ability to integrate a wide range of digital library approaches during this formative period to include the use of electronic commerce.

THE UNIVERSITY OF ALBERTA'S

Technologies Supplier List

Development/ Project Management:	NSI Network Support Inc.
Hardware:	ProSpec Dual Pentium Pro 200 — Database/Image Server
	IBM Server 320— Communications/Web Server
	ProSpec Pentium 133— Fax Server
	ProSpec Pentium 200 Applications Server
	ProSpec Pentium 120— Administrative Workstations (2)
	ProSpec Pentium 90— Scanning Workstations
	Fujitsu M3096EX Document Image Scanners, Fineline Fujitsu scanner modifications for open-bed scanning, foot pedal control.
	Touch screen monitors from Mitsubishi and ELO
Software:	LSS FlowMan v. 2 — open component enterprise workflow framework software.
	RIMS— document/image database management software DIMS— scanner control and image manipulation software
	Delrina Winfax Pro 4.1 for Networks— fax management software
	Microsoft Windows NT Server— NOS for database/image server Microsoft Windows for Workgroups— OS for fax server, scanning stations Microsoft SQL Server
	SQLBase and Gupta Centura 1.1.1 — SQL database and development toolkit
	AVISO— Interlibrary loan management software