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Abstract:
This paper describes the Relais document delivery system, which enables libraries to fully automate their interlibrary loan and document delivery processes. Relais has been successfully implemented at the U.S. National Library of Medicine and a predecessor system, IntelliDoc, was successfully implemented at CISTI (Canada Institute for Scientific and Technical Information). Three central capabilities are described in detail: the use of a scanning workstation to digitize requested documents, the ability to support an array of delivery methods, including electronic delivery, and the ability to retrieve detailed data on requests processed by Relais.

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Introductory Note:
Alan Cornish (MLIS, Louisiana State University, 1991) serves as a Systems Librarian at the Washington State University Libraries. He previously worked with the Relais system at the National Library of Medicine.
The development of computing and communications technologies in the past twenty years has had a profound impact upon libraries and their resource sharing practices. As Yem Siu Fong of the University of Colorado noted, “the convergence of information technologies that allow various systems and networks to communicate is moving ILL into a changed information world” (1). The subject of this article is the Relais document delivery system, a system that takes advantage of an array of technologies in enabling libraries to achieve rapid, high volume document delivery. Relais is produced by Relais International (URL http://www.relais-intl.com/), a subsidiary of EBSCO Information Services. The Relais system evolved from IntelliDoc, which was successfully implemented at CISTI (the Canada Institute for Scientific and Technical Information) (2). Relais has been successfully implemented at the U.S. National Library of Medicine and in several other libraries (3). Relais is capable of supporting the interlibrary loan and document delivery (ILL/DD) efforts of libraries in an integrated manner.

The Relais system provides an innovative model for library resource sharing. The system enables libraries to shift from a photocopy based interlibrary loan process to a process based on digital images. Relais supports a range of delivery methods, including local document printing for mail delivery, along with fax, Ariel, and electronic mail delivery. By handling the details of article delivery in the background, Relais enables staff members filling interlibrary loan requests at scanning workstations to focus their attention on creating high quality documents. Additionally, the system enables libraries to retrieve detailed data on the ILL/DD processes. These capabilities illustrate the strength of the Relais product and how the integration of technologies is capable of redefining library resource sharing efforts.

A simplified diagram of the Relais system is shown in Figure 1. Interlibrary loan requests (requests received from borrowing libraries) and document delivery requests (requests received from both external and onsite users) can be submitted to Relais from one or more source
systems. Requests from several types of systems can be submitted to Relais, including OCLC, DOCLINE, and systems using the ISO ILL protocol (4). The Download Requests application downloads request files from the source system(s) and the Load Requests application loads the requests into the library’s Relais database. This relational database can use either Microsoft SQL Server or Oracle Enterprise Server (5). The requests are then processed by the Create Requests application. The Create application tests each request against a series of auto-reject rules defined in the system and sends the remaining requests to print queues. Requests are picked up at a print queue based upon criteria such as call number and publication date. These virtual print queues are associated with physical printers, enabling Relais libraries to print ILL/DD requests at the stack location closest to the items being requested.

Once request slips have been printed, the physical items are retrieved from the shelf; the slips and corresponding items are taken to a Relais scanning workstation for processing. An operator uses the workstation’s modified Fujitsu 3096EX scanner to digitize documents. Relais permits a no-fill code to be entered if the requested item cannot be located on the shelf or if the request cannot be filled for another reason. Additionally, Relais permits a supply code to be entered in the case of an original or audiovisual item that cannot be scanned. In both of these cases, an update is sent to the source system indicating how the request was processed (6).

After the requested items have been scanned, requests are processed by the Update Scan application, then by a Relais Delivery application. The requested articles are delivered to the borrowing library or customer based upon the delivery method entered into the source system. At the end of the process, the Update Complete application creates an update file that provides information on the processing of each request to the appropriate source system.
The central component of the Relais system is the Relais scanning workstation. The workstation, along with Relais application software, enables libraries to digitize materials requested in the interlibrary loan and document delivery processes to as great a degree as possible. An important concept behind Relais is that requested items are converted to electronic format as early as possible in the workflow (7). The Relais scanning workstation consists of the following components:

- A modified Fujitsu 3096EX scanner, with its automatic document feeder removed to allow bound volumes to be more quickly and precisely positioned on the scanner
- A computer workstation running the Relais scanning software, keyboard and mouse
- A 21-inch touch screen monitor, enabling the scanner operator to view images and to interact with the scanning software
- A foot pedal, permitting the operator to actuate the scanner while using both hands to position an item
- A barcode reader, to permit rapid and accurate entry of request numbers into the Relais scanning software

The Relais scanning software supports an array of paper sizes for scanned items, including 8.5 by 11 inches, A4, B5, and 10 by 14 inches. Documents are created at a resolution of 300 DPI. The scanning software allows operators to delete, rescan, and insert scanned images and to remove
black borders from images during the scanning process. The equipment is housed in an ergonomic workstation that permits the operator to remain seated while scanning documents (8).

In addition to the standard Relais scanning workstation option, the Minolta PS 3000 cradle book scanner can be used to scan documents into the Relais system. The PS 3000 uses the Minolta EPIC 3000 software, in batch processing mode, to drive the scanner. A custom Relais application is used to process requests scanned on the Minolta PS 3000. The ability to use this scanner for special items such as older, fragile monographs or journal volumes allows a greater percentage of ILL/DD requests to be converted to digital format in the Relais system (9).

Using Relais, libraries can establish a workflow for interlibrary loan requests based upon the creation of multi-page TIFF document files generated through the scanning process. One advantage of this arrangement is that in cases of delivery problems, documents can either be reprinted and resent or retransmitted in electronic format. Monographs, audiovisuals, and other items beyond the reach of digitization can be processed in Relais as filled, non-scanned requests, allowing accurate counting of the total number of filled requests by the library.

Another strength of the Relais system is its support for a range of delivery methods. Relais delivers documents to borrowing libraries and other customers according to the delivery method requested in the source system. Relais supports the use of the Xerox DocuPrint 4050 document printer and Hewlett Packard LaserJet printers for local document printing. In addition, electronic mail, fax, and Ariel article delivery methods are supported by the Relais system. For electronic mail delivery, requests are sent to borrowers in the form of an electronic mail message with two attachments. One attachment, a text file, contains a cover sheet providing basic information on the request, including the title of the item requested, the journal volume/issue number, and pages requested. A second attachment, a multi-page file in TIFF or PDF format,
contains the scanned article. For requests delivered using the fax and Ariel delivery methods, Relais uses supporting software packages that perform the actual article delivery. Requests processed by the Delivery Fax application are sent to a copy of Alcom LanFax running on a local server, then transmitted by LanFax to the requester. Requests processed by the Delivery Ariel application are sent to a copy of the Ariel document transmission software running on a local server, then transmitted to the requester’s Ariel workstation (10).

The issue of delivery method raises one shortcoming of Relais relating to its use of supporting software packages for fax and Ariel requests. In the case of a request delivered via Ariel, the request is processed by the Delivery Ariel application and sent to a local copy of Ariel configured as a store-and-forward workstation. The Ariel software receives the request containing a scanned document from Relais and places it in the Ariel Send Queue. When the Ariel software is able to establish a connection to the requesting library’s Ariel workstation, it will transmit the document. The problem relates to when the Relais database is updated to indicate that the request was successfully delivered. In the case of the fax and Ariel delivery methods, this database update occurs when the Relais Delivery application transmits the request to the supporting software package (LanFax for fax requests, Ariel for Ariel requests). This has an important implication. Referring to Figure 1, once the Delivery application has processed the request, the Update Complete application, which normally runs at scheduled intervals throughout the workday, will process the request. Once this occurs, Relais will send information back to the source system indicating that the request has been delivered, regardless of whether the supporting software has transmitted the document to the borrower. As a result, Relais libraries must carefully administer the queues in the LanFax and Ariel software in order to ensure that all requests received by these supporting software packages are actually delivered to requesters. If requests cannot be delivered using the supporting package (for example, if a requesting library’s
Ariel workstation is out of commission), then the request can be printed out and delivered using
an alternative delivery method.

A final capability of the Relais system is its ability to provide detailed data on a library’s
interlibrary loan and document delivery processes. The relational database stores information for
all requests processed in the system. Two levels of data are available. First, a set of data items is
available for requests currently in the processing stream. Some examples:

- The requesting library’s identification code
- The specific point in the processing stream (or Case Status) at which a request is
currently located
- The date/time that a request arrived at its current Case Status
- The next step in the workflow (or Task) for a request

Second, a set of data items is available for all requests that have ever been submitted to and
processed in the system. Dozens of these data items are available for each request, including full
audit information. Some examples:

- The date/time that a request was submitted to Relais
- The date/time that a request slip was printed
- The date/time that a request was processed by a library staff member
- Any exception codes, used to indicate the reason that a request cannot be filled,
  assigned to a request
- Any supply codes, used to indicate the reason that a request is being filled outside of
  the scanning process, assigned to a request
• The location of the document TIFF file created for a request during the scanning process
• The date/time that a request was delivered
• The date/time that the source system was updated with status information for a request.

Using the Relais software, library staff members can query the database in order to determine the status of a request. Additionally, query tools such as Cognos Impromptu and Seagate Crystal Reports can be used to generate detailed reports against the Relais database. Through the retrieval of these reports, libraries can engage in a process of continuous improvement by identifying problems with the interlibrary loan and document delivery processes, taking corrective actions, and monitoring the results of any changes made in library work processes. At the individual request level, library staff members can use the Relais client software to perform a query and determine the location of any request in the workflow (11).

In conclusion, the Relais system uses a range of hardware and software technologies, resulting in a product capable of supporting libraries in their interlibrary loan and document delivery efforts. High-end Windows NT-based servers support the Relais applications shown in Figure 1 and the relational database software. The Fujitsu 3096EX scanner permits a large percentage of the items requested by internal and external users to be converted to digital format. Off the shelf software programs such as the Research Libraries Group’s Ariel software and Alcom’s LanFax are used to support the Relais system in the Ariel and fax delivery processes. Through data retrieval against the relational database, Relais enables libraries to monitor the requests currently moving through the system and to build reports identifying ILL/DD problems. The results gained through the application of these technologies are impressive. As a result of the Relais deployment at the National Library of Medicine, NLM fills 50 percent of its requests in
four hours or less, and 96 percent of its requests in less than twenty-four hours (12). Qualitative improvements can be achieved as well. With system applications handling issues such as the preferred delivery method and addressing, operators working at Relais scanning workstations can focus exclusively on document quality. In short, the Relais system applies software and hardware technologies to library interlibrary loan and document delivery processes, enabling libraries to serve their customers more quickly and more effectively.
References


