Planning an Experimental OSI-Network for Interlending in Europe

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1. Introduction
In the beginning of 1989 a working group, consisting of representatives of the London and South Eastern Library Region (LASER) (UK), the Direction des Bibliothèques, des Musées et de l'Information Scientifique et Technique (DBMIST) and its host organization Serveur Universitaire National pour l'Information Scientifique et Technique (SUNIST) (France), and the Centre for Library Automation Pica (Netherlands), presented a proposal to the Commission of the European Community. The proposal calls for the Commission to fund, in part, an (OSI*) Pilot Demonstration Project for Interlending between Library Networks in Europe.

The three partners in this enterprise started with the development of the proposal during the summer of last year, after an initiative was developed by LASER and the Library and Information Centre in the UK. The proposal gives a detailed outline of a project which aims to:

(1) demonstrate the capabilities of OSI developments for international interlending services;
(2) improve the efficiency of interlending services internationally and nationally;
(3) develop a strong Community service market for interlending services;
(4) achieve interconnectivity between three major networks in Europe — LASER, Pica, PEB — and their users for interlending services;
(5) apply OSI and other network-standards to library networks for interlending services;
(6) achieve a flexible model for international interlending which accommodates the requirements of interlending services in different member states;
(7) prepare for the development of charging mechanisms for interlending services which facilitate the availability and supply of literature within the Community;
(8) assist member states which are less advanced in the development of automated interlending and network services.

* Open Systems Interconnection
Before I outline the proposal in more detail I will give a brief introduction to the capabilities and structure of the three networks which are involved in this proposed project.

1.1 LASER
In the UK the formal interlending structure consists of the British Library Document Supply Centre (BLDSC) and ten Library Regions which compile union catalogues. LASER is the largest of these Library Regions and the only one which runs its own independent online network.

LASER's network was started in 1975 and was extended to four more Library Regions in 1985. Before the end of 1989 LASER plans to link the seven English Library Regions and the National Library of Scotland Lending Services to the LASER host computer system thus covering an important part of the UK interlending services.

LASER's central Union Catalogue-database contains about two million title descriptions of mainly monographs and some 25 million holdings.

The current messaging system provides for ILL requests between members of a region, requests between a member of a region and BLDSC, especially for journal articles, and between members of different regions. On an annual basis about 440,000 requests are being fulfilled through the LASER network.

1.2 DBMIST/SUNIST
Interlibrary lending in France has undergone constant development over the last ten years and is now established as an essential service to both libraries and documentation centres.

The Catalogue Collectif National des Publications en serie (CCN), has been accessible online since 1984 and has demonstrated its efficiency in document retrieval, and it now contains 425,000 titles of periodicals (of which 180,000 include holdings).

Apart from the Catalogue Collectif an interlibrary loan system has been developed running on SUNIST's IBM 3090 central computer system. The ILL system called PEB (Prêt Entre Bibliothèque) can be seen as a database which holds a collection of interlibrary loan forms sent in by different users. Both the requesting and supplying parties have access to the forms, and can manipulate the requests online, depending on the status of the request.

In addition the Catalogue Collectif has been made available on CD-ROM. This CD-ROM with the French Union Catalogue of periodicals is being increasingly used for location of items and holdings by the participating libraries and even by end-users.

Moreover, in the French situation there are a number of important document supply centres which cover a significant part of the interlibrary loan requirements of the other libraries, and an ILL system for monographs is being implemented. On a yearly basis a total of some 350,000 requests are being handled.
1.3 Pica

In the Netherlands the computerized ILL facility was introduced in 1983. At present the central database contains the titles of about 250,000 serial publications available in Dutch libraries, to which the holding information of about 400 libraries has been attached, in total now about 1 million holdings. In addition, Pica's central database contains about 5 million titles of monographs with about 6.5 million holdings.

The ILL system for serials is now being used in an online fashion by about 250 libraries, and in 1988 a total of 295,000 requests was processed, of which 89% was fulfilled. Since October 1988 the ILL system for monographs has been operational on an experimental basis and for a limited number of users. On a monthly basis some 6,000 requests are processed and the system is functioning satisfactorily.

2. Feasibility study

In order to define the objectives and to identify the problems of implementing a pilot interlending system in the European context, LASER, DBMIST/SUNIST, and Pica undertook a feasibility study between August 1988 and January 1989. The study focussed on the functional facilities required, models for item and location verification, evaluation of the ISO ILL draft protocol and of the services needed, and on an X.400 product review and mapping exercise. The study showed that the requirements of LASER and Pica were not fully identical with the requirements of DBMIST/SUNIST.

The LASER and Pica databases are essentially union catalogues of the stocks of many individual libraries. In order to achieve an efficient interlending service in this situation it is necessary to carry out a search and to identify the item and holding libraries before sending an ILL request. In the DBMIST/SUNIST situation the interlending services rely mainly on the use of document supply centres which cover a large percentage of the required material, so that searching is not a requirement in order to achieve a high fulfilment percentage. As a prime example of this latter situation the BLDSC handled over 2,000,000 requests for serial publications during their fiscal year 1987/88 with a fulfilment rate from their own stocks of 90%.

For this reason it was decided that in order to accommodate these different requirements two different levels of service were to be proposed. One level of service was to accommodate the LASER and Pica requirements where, in addition to the ILL messaging service, a search and retrieve service would be implemented. And a second level of service was to accommodate DBMIST/SUNIST requirements where only the ILL messaging service is to be implemented. DMBIST/SUNIST has decided however that the implementation of the full service, including the search and retrieve service, is a medium-term requirement and will be realized during an additional development phase of the project.

In addition a number of starting points were identified, as follows.
(1) As the national ILL infrastructures of the UK, France, and the Netherlands are all different, and often politically sensitive, it was decided that the proposed ILL facility should not put restrictions on the way ILL on a national level is conducted.

(2) Since the Commission of the European Communities required the use of X.400 messaging services as a carrier for the ILL messaging services, it was clear from the beginning that the project would use the ISO draft protocols defined by ISO TC46/SC4/WG4 and specified in ISO DP 10162–10163 (Search/Retrieve Protocol) and ISO DP 10160 and 10161 (ILL Protocol).

(3) Moreover, it was a requirement that user-involvement should be ensured from the beginning of the project; for this reason, in each country, test-site libraries have been identified which have agreed to co-operate in the proposed project.

(4) In addition to national advisory bodies which will be involved in the implementation and evaluation processes, an international user panel is proposed, to be established from the participating test-site libraries.

As it is already becoming more and more clear that even on a national level ILL cannot be supported for much longer free of charge it is a requirement of the project to determine a fair charging mechanism for interlending services which will facilitate the availability of documents within the European Community while also compensating the supplying libraries for their efforts.

Finally, it was decided to propose to keep in close contact with the National Library of Canada and the British Library Document Supply Centre, which are presently conducting a feasibility study to define a project to interconnect each other's systems using the ISO draft ILL Protocol. For this purpose of liaison an International Forum on ILL Protocol Implementations Issues has been established of which a first meeting took place in Canada in December 1988. The Forum decided that it would be of the utmost importance to synchronize the two projects and to resolve the protocol issues in such a way that interconnectivity would be ensured. The next meeting of this Forum will take place in Leiden in August 1989.

3. Basic principles

The feasibility study determined a number of requirements and basic principles which were subsequently used in the design of a model for interlibrary loan on a European scale.

The first level is the national level, at which libraries within a country are functionally interconnected. Functionally in this respect means that there is some mechanism by which libraries can send each other messages or communicate interactively. By these mechanisms, searching of databases to find locations and for verification purposes, and the intercommunication necessary for processing interlibrary loans can be effected.

The second level is the international level, in which national infrastructures are interconnected. A number of different methods to achieve this interconnection are possible. One of these is the situation where one node in every national infrastructure acts as a gateway, being connected to other gateway nodes in other countries. This is the configuration chosen for this OSI
An experimental OSI-network

pilot/demonstration project. Three systems will communicate on the international level: the LASER, Pica, and SUNIST systems. In the terminology of the project, they are called focal points.

These three systems are interconnected in a triangular network topology and form part of their own national infrastructures in the UK, the Netherlands, and France. Functionally, they provide a service to their own national infrastructure by acting as gateways into the international infrastructure (Fig. 1). The communication that is needed to support that service involves communication on both the national and the international level. Only the communication between focal points will be described in detail.

4. The process

The overall process will consist of two stages. The first is the identification stage which leads to the identification of the focal point which will be the target for the subsequent loan request. It can involve the application of interlending expertise and/or the performance of a search. Depending on the level of service offered to the user and the information supplied by the user, this stage could be bypassed. The second stage is the actual international interlibrary loan stage, where messages are exchanged between focal points, and items move from one location to another.

4.1 Item identification

In this stage, two steps can be identified: in the first step, rules are applied that derive from interlending expertise; in the second step, a search is performed.
4.1.1 Interlending expertise

To begin with, certain information is known beforehand. This is information which derives from the structure of the existing infrastructures. This information can be used to define rules within the focal points which determine the actions that have to be performed given the request for a certain item. Possible elements of this information are: probability of availability of certain types of item at certain locations (serials at British Library Documents Supply Centre, French monographs at Bibliothèque Nationale, etc.); existence of online databases at certain locations; speed and quality of service as function of cost; etc. Rules derived from this information will help to determine where to perform searches.

4.1.2 Searching

The procedure for searching will be derived from the application of the rules in the first step. Dependent on the structure of the national infrastructure, searches may be performed in an interactive session with the end-user, or a process may take the content of the message sent to the focal point as input. In the latter case, additional rules and procedures to choose between multiple hits would be needed.

The result from a search performed by one focal point in another focal point's indexes will indicate whether the requested item is held within the responding focal point's infrastructure and therefore an actual ILL request will be initiated, or that the requested item is not known or not available, and that issuing a request for it is not sensible. In the latter situation, rules from the first step could be re-applied and a search performed in another focal point's indexes as well.

Finally, one of two possible events takes place at the end of this identification stage: either an ILL request to a specific focal point is issued, or the user is informed that the item cannot be obtained. In the former case, the second stage is entered, in the latter case, the process terminates. If the process enters the second stage, it is not known if the item is actually going to be supplied. That will be the supplying library's decision once the actual request arrives.

If the end user is offered the possibility of telling the system where to send the request, this identification stage is not needed, as the information needed to enter the second stage is already available.

4.2 ILL messaging

At this stage, which commences the moment an ILL request is issued by the requesting focal point, again two steps can be recognized. In the first step, the ILL request is handled: a request moves from one focal point to another and an answer to that request returns to the requesting focal point. The second step, the loan management phase, is concerned with the procedures needed to manage the movement of actual items. For the practical implementation of the
international interlibrary loan service, it must be noted that the first step is the most important step. Even if only the first step is implemented, a useful service can be offered to the end-user.

4.2.1 Request handling
This step starts when the ILL request is issued at the focal point associated with the requesting library’s infrastructure. The request arrives at another focal point, where it enters the corresponding national infrastructure.

The request can contain a ‘send-to-list’ if the requesting library or focal point can decide where to request the item, in which case in the responding infrastructure it will circulate among the libraries indicated. If the request does not specify such a list, the request will circulate according to national practice.

Eventually, the responding focal point receives an answer from its national infrastructure, either that some library has supplied the item or that none of the libraries is willing or able to supply. The requesting focal point will inform the requesting library of the answer.

In the case when the item has been supplied, the process enters the loan management phase; in the case when it is not, the requesting library or focal point can decide to issue the request again on the basis of the output of the previous identification stage, or enter the identification stage again.

4.2.2 Loan management
Different procedures are used depending on whether the item involved is returnable or non-returnable, as in the case of photocopies or monographs. For both types of items, receipt of the item at the requesting library is recorded. For non-returnable items, the process comes to completion at that moment.

For returnable items, the subsequent movements of the item, i.e. returning the item by the requesting library and checking in the returned item by the supplying library, are also recorded. Additionally, services to enable the responding library to signal overdues and to request the immediate return of items, and to enable the requesting library to extend the allowed duration of a loan are available.

5. The model
In Fig. 2 a model based on the stages and steps which were mentioned before is described in a schematic way. Within the two focal points in Fig. 2, the software components which are present at the focal points’ systems are indicated. At the edges left and right, the libraries are situated (LIB). These are connected to the national interlending infrastructure (NAT ILL). The larger ellipses in the centre represent the focal points. These are connected to the national infrastructures at one side, and to the other focal point at the other side.

In a focal point, four ellipses represent the four elements of software in the focal point’s system which are needed to support the proposed full international interlending facility. The elements are:
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Fig. 2 Overview of processes involved in interaction between the focal points.

(a) the international interlibrary loan (INT ILL) module, that provides the logic for the co-operation between the national infrastructure and the other three elements;
(b) the intelligence (I) module, that contains the rules that derive from interlending expertise as described in the first step in the identification stage;
(c) the search (S) module, that contains the logic to perform online searches in other focal points' databases;
(d) the messaging (M) module, that contains the logic needed to send and receive the appropriate ILL messages.

The figure also indicates that the two S-modules are interconnected directly (the uninterrupted line), whereas the M-modules are interconnected through a store-and-forward facility indirectly (the interrupted line).

Other entities involved are a database associated with the I-modules containing the interlending expertise and rules for the identification phase (the K-file), and with the S-modules containing bibliographic data, the Union Catalogue.

From the user point of view the process will now be as follows.
(1a) When a User request enters the INT ILL-module, the system using the I-module will apply the rules from the K-file, together with the contents of the user request to determine if a search is needed and, if so, where it should be performed. If the result of this phase indicates that a search cannot be performed at the intended responding focal point, the process continues with phase (2a).
(1b) If appropriate, a search will be performed. This will involve the activation of an application association, which means real-time communication, between the two S-modules. The two S-modules will both be able to assume two roles. They can act either as the initiator of the search session or as a responder. In a search session, the one S-module will act as the initiator, offering the search facility to the user, while the other S-module will act as the
respondent and give access to a database containing bibliographic information, the B-file. In this file, information on items available for loan in the national infrastructure is stored. An important data-element in this file is the holding information.

Additional supporting standards that can be important in relation to this step are the International Standard for Commands for Interactive Text Searching (ISO DIS 8777) defining the format of the search argument, and a standard for the presentation of bibliographic data, yet to be defined, conforming to the general structure of the MARC-format (ISO IS 2709).

Search results can be manipulated automatically if mechanisms to choose between multiple hits are implemented, or reported back to the user, depending on existing practice in the national infrastructure.

At the end of stage 1, it will be known whether the item can be requested and where the request can be sent.

(2a) An ILL-REQUEST protocol message will now be built and transferred to the desired focal point in the M-module. The information contained in the request message derives from information on the item requested and the focal point to be addressed, resulting from the original request and/or the application of the additional rules in (1a) and/or the search results from (1b). The conveying of messages will take place through a store-and-forward mechanism as specified in the CCITT X.400 recommendation.

At the responding focal point, the message will be received through the M-module. The INT ILL module will interpret the contents and, from that information and national practice rules, will forward the request to candidate libraries through the national infrastructure NAT ILL. Termination of that process will occur whenever one of the candidate libraries reports back to the responding focal point that it supplied the item as requested, or when all the candidate libraries have reported that they will not supply.

If the final answer is that the item cannot be supplied, it will be possible to enter the identification stage again in order to try another focal point. Eventually, the result of the process will be reported back to the requesting library.

(2b) If the item arrives at the requesting library, this fact will be reported to the focal point. For non-returnable items, the transaction terminates at that moment. For returnable items, the fact that the item is returned by the requesting library will also be reported to the requesting focal point, and the checking-in of the returned item at the supplying library will be reported to the responding focal point. This last action terminates the transaction for this type of item.

6. Conclusion

Although it is obvious that many problems will have to be resolved and that the realization of the proposed system will not be easy, the three partners in this enterprise feel that the proposed pilot project will give an impulse to European interlibrary co-operation and will help libraries to cross borders which are now often barriers.