

Standardisation in Electronic Document Delivery

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Introduction

Many document suppliers, both commercial and not-for-profit are beginning to look at the implementation of electronic document delivery systems. To date most electronic document delivery has tended to be used as a faster version of conventional document delivery in which a photocopy of the requested article is despatched to the requester. However, there are other benefits that can be taken advantage of in the use of electronic document delivery. Many of these relate to the fact that the processes of ordering and delivering the document can take place over the same network. This allows the requester to carry out a search, order a document and have it delivered all on the same workstation. For a supplier, the major benefit accrues in cases where the requested document is stored in electronic format. In such cases, which are very few today, it becomes possible for the supplier to provide a fully automated (and very rapid) service. It is also possible to integrate automatically the various pieces of housekeeping and accounting processes required in a document delivery system.

One possible general model for the process of electronic document delivery is shown in Fig. 1. The main characteristics of the model can be described as follows:

- the interchange involves two parties, the supplier and the consumer;
- the supplier and the consumer are linked through a facility enabling the transfer of an electronic document from supplier to consumer;
- the transfer handles one document at a time.

Fig. 1 General Model for Document Delivery Interchange

The complete cycle of interchange, starting with an electronic document residing at the supplier and terminating with the completed delivery of that document to the consumer is called an electronic document interchange transaction. It is important to note that the input and output functions as shown in the diagram do not participate in the transaction. In practice, some form of input and output will be available. Input may be from hard-copy documents through scanning, from files of stored images or from electronically published documents; output can take the form of electronic storage or printing. The implementation of some of these possibilities may be dependent on legal and copyright regulations. As more and more suppliers begin to offer electronic document delivery systems, irrespective of the method of storage of the documents, there is an ever increasing danger of the development of incompatible systems.

The Development of a Standard

In an attempt to avoid the development of totally incompatible systems, several libraries and other interested parties met in late 1990 to discuss the possibility of developing a standard for the electronic delivery of documents in image format. Those present included representatives from the following:

France:

Ministere de l'Enseignement Superieur et de la Recherche (MENESR)
Questel
Telis (formerly Telesystemes)

Germany:

Universitätsbibliothek Hannover und Technische Informationsbibliothek
(UB/TIB)

The Netherlands:

Pica - Centrum voor Bibliotheekautomatisering

United Kingdom:

The British Library Document Supply Centre (BLDSC)

United States of America:

The Online Computer Library Centre (OCLC)
The Research Libraries Group (RLG)

The work was partially funded by the European Commission (DG XIII B). All agreed to the development of a standard for electronic document delivery. The group was called GEDI - the Group on Electronic Document Interchange. Several meetings followed, and in surprisingly short time, agreement was reached and a Recommendation was published in October 1991.[\[1\]](#)

The Group made several decisions before completing its Recommendation. It was agreed that GEDI should support existing standards, protocols and profiles as much as possible. It was recognised that electronic document delivery would take place between a wide variety of organisations, some of which would already have electronic document delivery systems in place. It was, therefore, agreed that GEDI would concentrate on the document interchange format and a description of the interchange mechanism.

It was also recognised that it would not be practical (certainly within the short time scale) to reach a common, international agreement on all the functional and technical details of electronic document delivery. The GEDI Recommendation is, therefore, based on the concept of domains. A domain is defined as a group of one or more suppliers and one or more consumers capable of engaging in electronic document delivery transactions (Fig. 2). This concept means that solutions can be developed under private responsibilities in private domains that are more or less independent of the solution used in the common, international, GEDI domain.

Fig. 2 Interchange Across two domains

Common agreement is required only within the GEDI domain; GEDI agreements may or may not be implemented in private domains. One important part of the GEDI Recommendation is to describe the boundary between the private domains and the GEDI domain, especially the relay functions for such boundaries (Fig. 3).

Fig. 3 Communication through the GEDI Domain

The GEDI Recommendation described how a document should be transmitted as well as the format of the document. In brief the recommendation was as follows (which includes revisions made by the Group in 1995):

Resolution:	300 dpi
Compression:	CCITT Group 4
File interchange format:	TIFFv6
Document transfer mechanism	FTAM or FTP
Network protocol:	X.25 or TCP/IP

The document interchange format structure consists of two parts; the cover information and the document image. The cover information, or GEDI header, describes, various attributes of the document as follows:

- Type 1 Document interchange format information
- Type 2 Destination and storage information
- Type 3 Electronic document delivery transaction information
- Type 4 Document description
- Type 5 Padding (optional)

Because most of the members of GEDI were closely involved in the development of two library International Standards Organisation (ISO) Open Systems Interconnection (OSI) application protocols, Search and Retrieve [2] and Inter Library Loan [3], many of the fields used in the GEDI header are closely related to those protocols. This greatly facilitates the integration of the searching, ordering and delivery processes. It should be possible to use several elements of an electronic request to generate the GEDI header.

The Group has recognised that, if the Recommendation was to gain widespread acceptance, it must be more versatile and it should have more formal status. Other document types should be accommodated; for instance, SGML, PDF and PostScript documents have all been suggested. Other transmission protocols should also be supported, electronic mail, (X.400 and MIME) being the most favoured. It has also been agreed that it would be sensible to decouple the method of transmission and the

document type. This would require the need for some sort of profiling and registration. The Group are currently exploring various possibilities for this.

Practical Implementation

Although all the members had a mutual interest in the electronic exchange of the full text of documents, none of them had any immediate plans to implement the GEDI Recommendation. The only members which had an operational system were RLG, with its Ariel electronic document delivery workstation [4], and MENESR with the Foudre system [5]. However, all the GEDI members did have medium term plans to provide electronic document delivery services and all were obviously committed to GEDI. The European members, with an additional partner from France, (the Institut de l'Information Scientifique et Technique [INIST]), agreed to make a submission under the European Commission Library Programme to test the Recommendations. A proposal was submitted in December 1991 for a system, using the GEDI Recommendation, to link the proposed electronic document delivery systems of Pica, TIB, MENESR, INIST and BLDSK with Telis as Project Manager. The original partners were joined by the Fundacao para Computacao Cientifica Nacional (FCCN) in Portugal who were responsible for the dissemination of information about the project. The consortium bid was successful and in January 1993 the EDIL Project (Electronic Document Interchange between Libraries) was born. It was an ambitious project. The total cost was about \$2.5 million over a 3 year period.

Background of the Partners

The various partners all have different methods of working as far as document delivery is concerned and all have different technical infrastructures. The one thing that the partners did have in common was a wish to improve the existing methods of document delivery.

In France, there are two separate systems for document supply. A system of subject specialisation is operated by MENESR. Separate university libraries have collections of journals and periodicals in differing subject areas with records in a central catalogue. These libraries make these collections available to all other university libraries in France. MENESR was the only partner with any practical experience of an electronic document delivery system. The Foudre system had been developed by Telis and had been implemented in 6 French universities. In the Foudre project documents were scanned and compressed using the same techniques as GEDI but different transfer protocols and networks were used. Articles were stored on an optical disk after scanning in case of any future use.

INIST works on a totally different principle. It has a central collection of journals and periodicals in the fields of science, technology and medicine which it makes available to users from its building in Nancy in eastern France. INIST has installed a large scale optical storage system for 1,800 journal titles (subsequently reduced to 1,000 titles), but little of the output is transmitted to customers in electronic format.

In the UK there is a hybrid system. The majority of requests are satisfied from the central stock held by BLDSK at Boston Spa, but requests for items not held in the central collection are forwarded to other libraries either in the UK or abroad. Unlike

most of the other partners, BLDSC also receives requests from international customers. This means that BLDSC has, for a long time, looked at ways of reducing the time for the delivery of documents. BLDSC is using the Adonis system, which stores some 600 journals on CD-ROM, but again there is no link to electronic document delivery. BLDSC is formulating plans for electronic document delivery. It has carried out several trials with a variety of systems and networks [6]. At the time the EDIL Project was launched, BLDSC was planning a system for electronic document delivery over JANet, the UK Academic network. This system has implemented the GEDI Recommendations but uses electronic mail, X.400, as the transport mechanism [7].

In the Netherlands, Pica operates a periodical union catalogue system. The periodical holdings of all Pica members are held on a central, automated catalogue. A highly sophisticated ILL requesting system is also based around this automated catalogue. Requests are sent to Pica, where an automated system identifies potential suppliers and forwards requests. Pica has implemented a system called RAPDOC [8]. This makes information about individual articles available on the existing database of periodical titles and assigns supply of specified periodical titles to designated libraries to guarantee fulfilment. Pica is using a modified version of the Ariel workstation for electronic document delivery within RAPDOC. In its original form Ariel was not conformant to the GEDI Recommendation; the modified version is much more GEDI conformant.

In Germany, there is a regional system of supply with a back-up system of subject specialisation. UB/TIB holds the collection for all scientific, technical and engineering subjects. When a local library does not hold an item in these subject areas and it is not held elsewhere in the local region, it forwards the request to UB/TIB. In Germany, little progress had been made with electronic document delivery. In 1993 the regional library system of Lower Saxony, in which UB/TIB is situated, implemented the Pica system and thus can use the RAPDOC system.

Technical details

The EDIL Project began in January 1993. The Project implemented a pilot electronic document delivery system between the private domains of the five partners. In spite of the delay since the GEDI Recommendations were issued, EDIL was the first practical test of the Recommendations. The major deliverable of the Project was the implementation of four interlinked relays, one in each country of the partners. A secondary aim was the dissemination of information about the Relay to all interested organisations both inside and outside Europe.

The Project had 6 main stages. These were as follows:

- Requirements
- Specifications
- Development
- Integration
- Installation and Testing
- Use and Evaluation

Different partners were responsible for each stage. Requirements were split into user requirements, for which BLDSC was responsible, and technical requirements, which were co-ordinated by Pica. Both were completed in July 1993. The specifications were prepared by INIST in March 1994. The development stage was carried out by Telis and the Relay became operational at the end of 1994. Each Partner was responsible for the integration of the Relay with its national system and for the installation and testing that took place in the first half of 1995. Use of the system, which was planned to be a 6 month operational trial in the second half of 1995 was co-ordinated by MENESR. In practice, because of delays in implementation, the operational trial was somewhat curtailed. BLDSC was responsible for the final evaluation.

The analysis of user requirements of the system was developed from a combination of questionnaires and meetings of potential test site libraries. In some cases, for example some French university libraries, previous experience of using an electronic document delivery system meant that it was fairly easy to specify details of the level of service required and how the proposed trial system would be integrated with existing procedures. In other cases, it proved quite difficult to obtain this information. This was because electronic document delivery allows the possibility of delivery directly to the desk of the end-user. There was a great deal of difference in the needs of end-users in different market sectors. These differences were even more apparent in the price that end-users were prepared to pay.

The technical requirements of the Relay were defined fairly easily. However, a great deal of effort went into developing the requirements for the document ordering system. It had originally been intended not to cover this aspect, but during the preparation of the technical requirements, it became clear that certain tasks, especially those concerned with the preparation of the GEDI header page information, were inextricably linked to the requesting process. It was, therefore, necessary to co-ordinate the ordering process and integrate it with the delivery process. As mentioned earlier, most of the Partners had been involved in the development of the ISO ILL protocol. Many of the fields in the GEDI Header are derived from the ILL protocol. It was agreed, therefore, that the use of these fields in requests would simplify the production of the GEDI Header for the EDIL system. Only two of the Partners, Pica and MENESR had partially implemented the ISO ILL protocol. It was agreed that it would not be necessary to implement the full OSI ILL Protocol as long as the required fields were included in requests.

The Trial

The trial stage of the project was due to take place in the first half of 1995. A variety of reasons caused delays which meant that documents were only being exchanged between France and the Netherlands by June 1995. The decision was made to extend the project, eventually until December 1995. As well as the main suppliers in France, Germany and the UK, there were up to 5 test site libraries in those countries. These test sites acted mainly as requesters although one also acted as a supplier. In the Netherlands there were 10 test sites which acted as both requester and supplier. Real documents were transferred between all four countries for a relatively short time, but, nevertheless, much useful information was obtained and over 1,000 documents were exchanged.

Evaluation

EDIL was successful in its attempt to demonstrate that electronic document delivery could operate between totally dissimilar technical environments or domains. This success, which took place in a pilot experiment, needs to be built on. As might be expected the project did run into a number of problems. Some of these were resolved during the life of the project but there are still some problems to overcome, a few of them are mentioned below.

It became apparent at a fairly early stage of the project that there were some defects in the original GEDI Recommendations. Some of these were of a technical nature, for instance the difficulties encountered in attempting to implement the FTAM protocol; others concerned the GEDI header. Most of these defects were resolved in a revision of the original document which was issued in 1995 and these changes were incorporated into the system implemented by EDIL.

As stated above, the operational trial was shorter than originally planned. Although it was of sufficient duration to test most of the technical aspects of the EDIL Relay, it may be necessary to extend the period of article exchange through the present EDIL system by up to six months in order to determine the full range of operational difficulties resulting from EDIL implementation. One technical issue that remained was the problem of the relay losing a small number of documents. This obviously needs to be resolved in any operational service possibly by means of an end-to-end transaction tracking system that was lacking in the EDIL system. This should allow the requester and supplier as well as the system administrator to monitor the progress of each transaction.

A further problem was the lack of simple, up-to date information about available serials and/or articles available for document delivery. This is required to underpin the search process so that requesters have a good chance of requesting an item that is actually available.

At the start of the Project the Partners assumed that there would be a large potential for international exchanges in documents using an EDIL-type system. It is now felt that this approach would need to be supported by market estimates. It is, therefore, recommended that market research is carried out to test this assumption. It is also believed that document delivery is a very price sensitive business, any possible extension of the EDIL system should pay particular attention to pricing issues. It will be necessary for any electronic document delivery system to take into account the true costing of article delivery if it is to become a credible part of a document delivery service. If too much cost is added to the article supply because of the technical implementation and its support infrastructure, it could prevent a viable, cost-effective service.

Since the EDIL Project started there is a new publishing paradigm emerging, one which focuses on the Internet and electronic only material as the base of research publishing. This may have consequences on the longer term needs for document delivery based on a printed journal. It will be necessary to monitor closely this situation to ensure the continuing viability of a system such as EDIL.

EDIL was a limited trial system and reviewing copyright issues was not part of the project. The Partners were well aware of the rights issues and made several unsuccessful attempts to open up dialogue on the subject. For any electronic document delivery system to succeed it will be necessary to come to some form of agreement with rights holders. Otherwise publishers could make the results of this project academic by limiting the extent to which EDIL, and systems like it, can be applied in practice.

Conclusion

The GEDI Recommendation is an important milestone in the rapidly evolving world of electronic document delivery. It allows the receipt of documents on a local system of items transmitted by a supplier using a different system. This gives users a much wider choice of suppliers and hence a much wider range of source material. At a time when wider bibliographic access is becoming much easier, through protocols such as Z39.50, it is important that access to source material keeps pace.

EDIL was the first demonstration of the GEDI Recommendation in practice. Users in one country received documents in electronic format on their system which had been produced on a different system. Time alone will tell the true importance of this, but to the participants, bearing in mind the tremendous effort involved, it seemed like a giant leap forward.

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