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# Bringing the national interlending system into the local document supply process – a Swedish case study

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## Abstract

**Purpose** – The purpose of this paper is to describe how systems automating the local document supply process (such as integrated library systems and ILL management systems) can be integrated with systems automating regional document requesting (interlending). This is illustrated with a case study of DocFlow, an ILL management system developed in-house at Karolinska Institutet and its integration with Libris, the national interlending system in Sweden.

**Design/methodology/approach** – The present paper describes how system integration between Libris and DocFlow was accomplished in practice. It also discusses various aspects of integration between systems offering automation of document supply.

**Findings** – Integration between local document supply workflows and regional document request flows may involve techniques such as import of outgoing and incoming interlending requests, synchronization of status values between systems, exchange of messages between systems and quick links to the native interfaces of external systems.

**Practical implications** – The paper brings up various aspects to consider when developing or procuring a system for the local management of ILL workflows.

**Originality/value** – The paper may provide a deeper understanding of system integration, as it applies to the document supply process.

**Keywords** Sweden, Interlending, Document supply, Library automation, System integration, Workflow management

**Paper type** Case study

## Introduction

Library work is about providing access to documents – returnables (typically books), non-returnables (typically journal articles or book chapters), web pages, etc. Document requests are handled in various local workflows. A document request from a patron may incur ILL. ILL and related processes are also known as “interlibrary loan”, “interlending”, “resource sharing”, “document supply” or “document delivery” (although the latter term is often limited to the somewhat narrower scope of delivery of non-returnables). In addition to outgoing ILL requests submitted on behalf of patrons, the library may handle incoming ILL requests from other libraries. The ILL request flows between libraries take place at a regional level (typically national, but sometimes global).

In all, document supply involves at least four document request flows (local requests for returnables, local requests for non-returnables, regional requests for returnables and regional requests for non-returnables). Various systems offer automation of the steps from discovery to delivery of a document. For the process of document supply to proceed

smoothly, a request should preferably move seamlessly between the systems involved. Not all products claiming to provide automation of ILL actually do support all the workflows and request flows associated with the ILL process. For example, the ILL module of the integrated library system (ILS) may not be able to handle requests for non-returnables and/or incoming ILL requests from other libraries.

This paper presents a Swedish case where a local ILL management system (DocFlow) was integrated with the national interlending system (Libris).

## Local ILL workflows

Many steps in the workflows associated with document requests can be automated. Systems offering support for local ILL workflows are often referred to as ILL management systems (although they may also offer automation of other aspects of document supply, such as local requests for articles from journals held locally). Typical examples include well-known off-the-shelf products such as ILLiad, Relais and Clio – see Jackson (2000), Knox (2010), Gavel and Hedlund (2008) and Breeding (2013d) for reviews. Many ILS systems come with ILL modules offering varying degrees of support for the local ILL workflows. Some libraries develop home-grown solutions for ILL management, and ILLiad began like that (Kriz *et al.*, 1998).

ILL often involves circulation (checking out books to be lent to other libraries and keeping track of books obtained

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from other libraries) or document delivery. The term “document delivery” usually refers to the delivery of non-returnables such as journal articles. Circulation is typically handled by the ILS. Many ILL management systems come with document delivery modules, but document delivery can also be handled by standalone products such as Ariel, Prospero and Odyssey (Weible, 2004, Hosburgh and Okamoto, 2010). Document delivery software typically supports electronic delivery, but due to restrictions imposed by copyright law and license agreements for electronic media, the library may still be obliged to transmit some documents on paper. The medium of the document delivered does not necessarily reflect the originating medium.

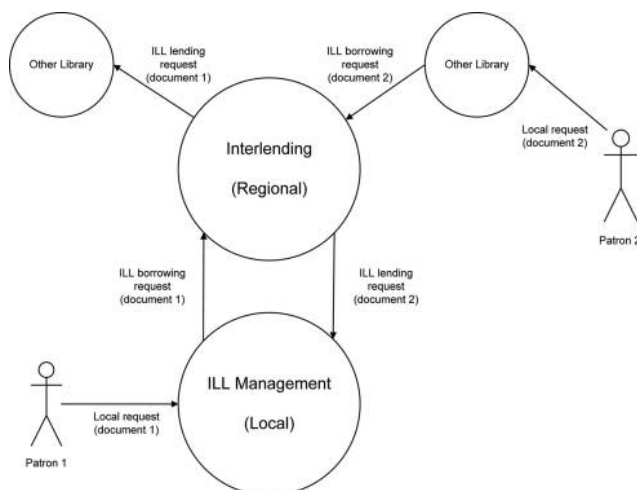
### Regional ILL request flows

The ILL process involves regional request flows occurring when libraries turn to external suppliers to obtain documents on behalf of patrons. The external suppliers are typically not only other libraries but also commercial services such as Infotrieve. There are different national models for the handling of regional document request flows. The UK ILL scene is dominated by a single supplier (i.e. the BLDSO) (Lowery, 2006). Countries such as Sweden have a national interlending system. In other countries, there are several coexisting regional ILL networks. Typically, the library will use the regional interlending system(s) for lending (supplying documents to other libraries) and borrowing (requesting documents from other libraries on behalf of patrons). See Figure 1.

A library may have to rely on more than one interface to submit requests to its favorite suppliers. Automation of the regional workflows is offered by systems such as union catalogues and interlending systems. Interlending systems offer capabilities such as routing of requests between libraries connected to the system. An interlending system usually relies on a union catalogue to suggest potential suppliers for a document.

Few off-the-shelf products support the automation of regional ILL workflows. Examples include VDX (Farrelly and Reid, 2003; Braun *et al.*, 2006) and consortial borrowing solutions such as INN-Reach (Breeding, 2013c). Interlending systems such as Online Computer Library Center (OCLC) (Jordan,

**Figure 1** ILL borrowing (requesting) and lending (supplying) at local and regional levels



2009), DOCLINE (Collins, 2007) and RapidILL (Delaney and Richins, 2012) have a wide usage. Many countries have developed their own national interlending systems to meet local policies and needs. Examples in the Scandinavian countries include Libris in Sweden (Olsson, 1996; Thomas, 2012; Sagnert, 2008; Lindström and Malmsten, 2008), DanBib in Denmark (Andresen and Brink, 2011) and nordic/baltic union catalogue of serials (NOSP) in Norway (Gauslå, 2006).

The distinction between interlending systems supporting regional request flows and local ILL management systems is not always entirely clear-cut. Some of the regional systems also offer support for local workflows. For example, OCLC/WorldCat is bundled with products such as ILLiad and WorldShare ILL (OCLC, 2002; Breeding, 2013d).

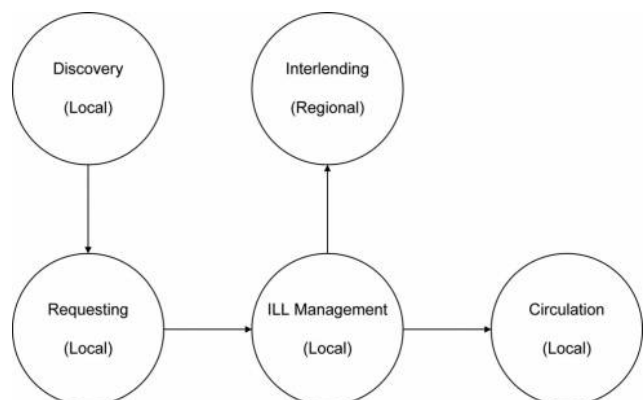
### The need for system integration

During its life cycle, a document request may flow through several systems (Breeding, 2013b). For instance, requests must make it between systems supporting ILL workflows at a local level and systems supporting ILL request flows at a regional level. Document requests from local patrons incur interlending requests at a regional level, and interlending requests from other libraries need to be handled locally.

A possible scenario might be as follows (Figure 2): A patron finds a document of interest in a database or discovery tool and brings up the menu of a link resolver such as SFX. No full text is available, so the link resolver menu displays a pre-populated ILL request form. The ILL request from the patron is handled in the local ILL management system. This system, in turn, relays the request to a regional interlending system. If the request is filled, the document is sent to the requesting library rather than the patron that requested it initially. If it is a journal article, it may be delivered through the document delivery module of the local ILL management system. Delivery of a book may involve the creation of a circ-on-the-fly record in the ILS so as to allow the book to be checked out by the patron.

There is a need for system integration, as otherwise information about the request will have to be re-keyed whenever it is to pass the boundary between one system and another. Fortunately, there are international standards in place to allow systems involved in the ILL process to talk to each other. Standards providing interoperability between

**Figure 2** The life cycle of a document request



systems involved in ILL include OpenURL (linking), Z39:50 (search/retrieval), ISO ILL (interlending), and NCIP (circulation) (Breeding, 2013a; Nye, 2004; Needleman, 2012; Andresen, 2013; MacKeigan, 2014; ISO, 2014; Carlson, 2008; Needleman *et al.*, 2001).

Standards compliance enables off-the-shelf compatibility between systems. For example, if a regional interlending system is compliant with ISO ILL, it can be expected to integrate seamlessly with local ILL management systems supporting the same standard. Successful cases of integration have been reported for ISO ILL compliant systems such as VDX, ILLiad and Relais (Farrelly and Reid, 2003; OCLC, 2002; Breeding, 2013a; MacKeigan, 2014; Jilovsky and Howells, 2012; Moreno and Xu, 2010; Irwin, 2009; Nyqvist, 2008; Hanington and Reid, 2010; McGillivray *et al.*, 2009).

Unfortunately, although it has been around for a long time, the ISO ILL standard has not been consistently adopted (Jackson, 2005; Breeding, 2013a; Balnaves, 2013; MacKeigan, 2014). A new version that might possibly remedy some of the shortcomings of previous versions is on its way (ISO, 2014). Many regional interlending systems offer integration via their own proprietary application programming interfaces (APIs) or technologies such as structured email messages (Jordan, 2009; Rodríguez-Gairín and Somoza-Fernández, 2014; Gavel and Hedlund, 2008; Gould, 2000). In Sweden, various local library automation systems integrate with the APIs of the national Libris interlending system (see below). An API is basically a piece of software allowing external systems to speak to a system according to a predefined set of rules. Unlike the output of end-user interfaces, the output of APIs is mainly for machine consumption.

## A Swedish case of system integration – Libris and DocFlow

### The Swedish ILL scene

In Sweden, the Libris systems have been offering library automation since the 1970s. The national union catalogue has an interlending module that relays ILL requests between libraries. The Libris systems are maintained by the Swedish National Library (also known as the Royal Library). The union catalogue contains bibliographic records of books and journals held by university and research libraries, and also some public libraries. Most Swedish university libraries rely primarily on Libris for their ILL needs. Some libraries [particularly in the Science-Technical-Medical (STM) sector] also use Subito heavily.

The Libris interlending module addresses the task of directing an ILL request to a library owning the item requested. The holdings data in the union catalogue makes it possible to identify potential suppliers automatically. However, the support for local ILL management is rather limited. During the 1990s, the University Library of Karolinska Institutet (KIB) developed SAGA, a system offering automation of various aspects of document supply (Gavel and Hedlund, 2008). Other libraries could subscribe to the SAGA services. Several major university libraries were connected. The SAGA libraries formed a collaboration network where ideas and resources were shared. Apart from

SAGA, Swedish libraries have been using systems such as the ILL modules of ILS systems and the Swedish fjärrlån för bibliotek (FFB) system for their local ILL management needs.

Although encouraging for the developers, the wide adoption of SAGA was a cause for some concern. For KIB, it entailed a role as a provider of ILL infrastructure, a commitment that was perhaps a bit outside the normal scope of University Library operations. Facing the upcoming retirement of a member of the SAGA team, KIB initiated an internal review of the SAGA services in 2011. It was decided to phase out the external SAGA services and focus on internal user needs. SAGA closed down in 2014. Several SAGA libraries have developed their own in-house systems for local ILL management. The libraries were able to set up their new systems at relatively short notice. Possibly, the firm understanding of ILL workflow management gained by participation in the SAGA community contributed to the successful implementation of the new ILL management systems. Systems launched at former SAGA libraries include BasILL (Lund University), Viola (Stockholm University) and EBBA (Umeå University). KIB itself replaced SAGA with DocFlow, a system with essentially the same features as SAGA.

Docflow handles document requests from local patrons and other libraries. It provides workflow management with work queues corresponding to stages in the management of a document request. The interface supports tasks such as verification of incoming requests, generation of messages to requesters, generation of pickup slips, location of potential suppliers for ILL requests, monitoring of outstanding ILL requests, document delivery, statistics and billing. Unlike SAGA, DocFlow is only for internal use by KIB.

### Integration with Libris

The national Libris system can communicate with other systems. The initial version of SAGA was integrated with Libris via simple mail transfer protocol (SMTP): email messages with ILL requests deriving from Libris were parsed automatically by a program at the SAGA server and saved in the SAGA database. Subsequent versions of Libris have offered HTTP based data export. In this case, the local ILL management system connects to an export server at Libris in order to retrieve data on ILL requests. As hypertext transfer protocol (HTTP) is the protocol of the Web, the requests at the export server can also be brought up in a Web browser for review (although in a format primarily meant for machine consumption).

The functionality for machine-to-machine communication offered by Libris made it possible to integrate Libris with SAGA. SAGA could import requests from other Libris libraries automatically. It could also import requests placed in Libris on behalf of patrons.

In the Libris interlending module, messaging between libraries is implemented as status changes. Examples of statuses that a request can assume during its life cycle include “Outstanding”, “Forwarded”, “Read”, “May Reserve”, “Reserved”, “Not Fulfilled” and “Delivered”.

A new API with richer options for system integration was launched by Libris in 2013. The SAGA libraries were invited to  $\beta$ -test the new features. Integration through the new API was implemented in DocFlow.

With the new API, the primary format for data exchange is JavaScript Object Notation (JSON), a machine readable



format that is still reasonably human readable. External systems are allowed to import data on incoming (lending) requests and outgoing (borrowing) requests. Also, it is possible to update certain status values and submit responses to requests. The responses, in turn, result in status changes in the Libris system.

### Integration of lending requests

Lending is the process of supplying documents to other libraries (Hilyer, 2006b). In the context of ILL, the word “lending” may refer to non-returnables (such as journal articles) and books – a terminology that may be a bit confusing to non-librarians. Many lending requests received by KIB derive from the national Libris system. Lending requests from Libris are synchronized with DocFlow via the Libris API (Figure 3).

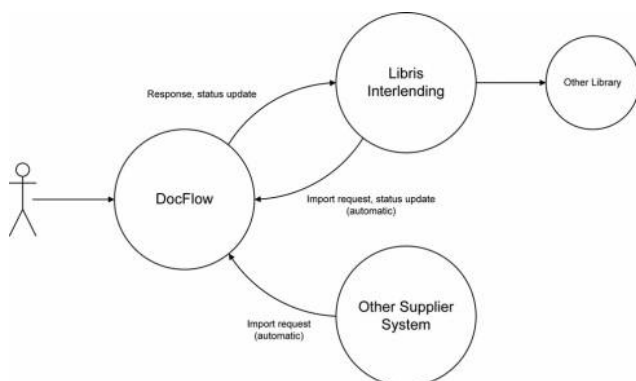
The lending requests from Libris are imported automatically by DocFlow and appear in the work queue for incoming requests. DocFlow automatically checks the holdings of incoming requests in the ILS and the electronic journal list. The lending request workflows supported by DocFlow are mainly related to pick up and document delivery. Books have to be checked out using the ILS.

Upon importing a Libris lending request, DocFlow sets the status in Libris to “Read”. In some cases, KIB is unable to supply the item requested. In the DocFlow interface, there is a button for submitting responses to Libris requests. The button performs an API-based status update in the background. A negative response moves the request to the next supplier in Libris (if any). If the item is a book that is out on loan, KIB may offer the requesting library to place a hold. The requesting library, in turn, may request a hold via the Libris interface. This results in a status change in Libris that is imported by DocFlow. Requests for holds appear in the work queue for incoming requests.

The document delivery module of DocFlow supports the delivery of copies of journal articles and book chapters (in many cases, on paper due to restrictions imposed by licenses and copyright law). When the status in DocFlow is set to “Delivered”, an API call in the background ensures that the status change is transmitted to the Libris system.

In addition to Libris requests, lending requests from the Scandinavian interlending systems DanBib, Bibsys and NOSP are also imported automatically to DocFlow. In this case, the data derive from email messages that are parsed automatically.

Figure 3 Synchronization of incoming lending requests



### Integration of borrowing requests

Requests from local patrons are submitted to DocFlow via a Web form. This form can be used in standalone mode, but it is also integrated with several databases and discovery tools via the OpenURL-based SFX menu. The local requests deriving from the form often incur ILL requests.

Borrowing is the process of submitting ILL requests to external suppliers (typically other libraries) on behalf of patrons (Hilyer, 2006a). In the context of ILL, the word “borrowing” may refer to non-returnables (such as journal articles) and books – again a terminology that may be a bit confusing to non-librarians. The borrowing requests are placed in systems such as Libris, Subito, DOCLINE, DanBib, Bibsys and NOSP.

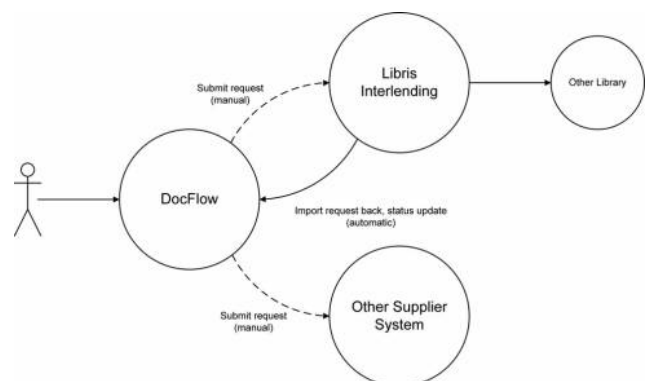
When a request is received by DocFlow, the holdings for the document requested are checked automatically in various supplier systems if there is an International Standard Serial Number (ISSN) or International Standard Book Number (ISBN). Otherwise, a search in a potential supplier system has to be performed by the librarian. DocFlow has quick links to several supplier systems where a search is generated automatically based on the bibliographic information available in DocFlow. Upon retrieval of a bibliographic record for the document requested by the patron, a borrowing request can be placed via the native interface of the supplier.

DocFlow supports automatic synchronization of borrowing requests with Libris via the Libris API (Figure 4).

However, the outgoing borrowing requests are not pushed into the Libris interlending system. Instead, they are entered via the native Libris interface and imported back to DocFlow afterwards. This is because the Libris interface is needed to tie the request to a bibliographic record in the union catalogue. The holdings information in the union catalogue makes it possible to generate a lender string consisting of Sigel codes (Swedish library symbols) for potential supplier libraries. The quick links in DocFlow simplify the process of placing requests. For Libris, there is a link to the union catalogue search interface and a link directly to the ILL form of the interlending module. The ILL form is pre-populated automatically with data from DocFlow.

The import of Libris borrowing requests is performed at regular intervals so as to allow monitoring of status changes of outstanding requests. The borrowing requests imported from Libris are linked to the initial patron requests in DocFlow via the Docflow order number. When a borrowing request from Libris is

Figure 4 Synchronization of outgoing borrowing requests



inged by DocFlow, the status of the corresponding DocFlow request is updated to “Order Placed”. If a response has been submitted in Libris by the supplier library, the status of the DocFlow request is updated to “Negative Response” (the request has not been fulfilled) or “May Reserve” (the book requested is out on loan, but it is possible to place a hold).

If a borrowing request is placed in a system other than Libris (such as Subito), this has to be recorded manually. In this case, the name of the supplier system and the order number of the order placed is entered via the DocFlow interface.

## Discussion

The ILL management process may involve several workflows, request flows, systems and document types. A library procuring software for the automation of ILL should consider carefully which workflows and request flows need to be automated. The present case study illustrates some points to consider.

ILL takes place at a local level (e.g. management in a local ILL management system) and at a regional level (e.g. in consortial borrowing networks, national interlending systems and global systems such as OCLC). At KIB, the local workflows handled in DocFlow are seamlessly integrated with the national request flows of the Libris system. The technical solution relies not only on the APIs of the Libris system but also on other approaches such as quick links. The integration keeps re-keying of information between DocFlow and Libris to a minimum.

Integration with regional interlending systems such as Libris may rely on ISO ILL or proprietary standards. The Libris API supports data import and submission of messages and status changes for requests in the interlending module. Although the API is not ISO ILL compliant, the statuses supported have some similarities to the standards supported by version 3 of the ISO ILL standard.

An approach with some similarities to the integration between DocFlow and Libris is described in Rodríguez-Gairín and Somoza-Fernández (2014). In this case, the local ILL management system GTBib-SOD was integrated with OCLC WorldShare via SOAP-based Web services offered by OCLC. An older case study discussing the considerations when integrating the Clio ILL management system with OCLC is presented in Natale, 1999. The ILLiad ILL management system is integrated with OCLC in a similar fashion (OCLC, 2002; Hilyer, 2006b, 2006a).

DocFlow supports the handling of incoming (lending) requests and outgoing (borrowing) requests. Not all ILL management systems support both. Due to the need to link the borrowing request to the originating request and monitor its progress in the remote system, system integration of borrowing requests may be somewhat more elaborate than that of lending requests.

Integration between the major systems in the ILL process is essential, as any manual synchronization between systems may be labor intensive and possibly error prone. In addition to the regional interlending system, systems such as the ILS are candidates of integration with the local ILL management system. Libraries procuring a system involved in any step of the ILL process should check carefully with potential vendors how exactly it may be integrated with any other systems involved. Also, the overall system architecture should be considered. For example, the ILS may be integrated either with the local ILL management system or the regional interlending system.

Docflow supports the handling of returnables and non-returnables. Not all ILL management systems support all document types. However, many steps in the ILL process (such as verification of requests and location of potential suppliers) are essentially the same for all document types and should preferably be handled in the same system.

The APIs offered by Libris allow smooth integration with local workflows involving exchange of document requests between Swedish libraries. For a medical library like KIB, a similar integration with Subito would be valuable. Still, there will always be supplier systems that cannot be perfectly integrated with the local ILL management system, either because of technical limitations or due to the fact that the request volumes are not high enough to justify the programming effort. The system architecture of the local ILL management system must allow for that (e.g. by allowing manual recording of borrowing requests submitted).

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