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Beyond the photocopy machine: document delivery in a hybrid library environment

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Abstract

Document delivery bridges the gap between where the customer is and where the document is. Libraries have to offer user-friendly access to hybrid collections, and design and implement document delivery mechanisms from paper originals to provide a seamless integration between delivery from electronic and paper articles. Apart from improved service, a document delivery service provider could benefit internally from rationalising and automating the logistics of the delivery process. This article analyses the document delivery process, starting by defining five requirements for document delivery. By looking at document delivery from both the customer's and the organisation's perspective, the real needs of the customer are defined. From a basic distinction between the "search and find" function and the "order and receive" functions, the internal logistics of document delivery are analysed. The DocUTrans document delivery concept and system as used in Delft show how its implementation improves the whole system. The analysis itself can be highly beneficial.

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Introduction

Document delivery is all about logistics. There is nothing new about that. But while most libraries and similar organisations have their stocks pretty well organised (the storage management part of the logistic physical distribution chain), things tend to get less structured when it comes to the distribution part of document delivery. If we perceive the document delivery process as a workflow, starting with the incoming order for a specific document and finishing by sending it off to the customer, it is rather surprising to notice that instead of the document delivery process being organised as a line that is as straight as possible, it sometimes takes the form of a "long and winding road".

Often we blame our customers as the cause of this. The variety in which they send us their requests, from hand-written to e-mail and in varying stages of bibliographical correctness, forces us to adapt and design and implement (sub)processes and even (sub)departments to manage the flow. Other reasons for the road becoming winding may originate in our wish to create differentiated, customised services to our customers, for instance electronic document delivery. There is nothing wrong with that, of course, but does it have to lead to unwanted side-effects?

When analysing document delivery organisations one sometimes gets the idea that every request is different and should be treated as such. The problem here is that it seems to be our natural tendency to focus on differences and not on similarities. And this, when taken too far, may lead to unnecessary subdivisions of our document delivery process and sometimes even of our organisations.

In the following text we take a closer look at the document delivery process. We start by defining five requirements for document delivery. From there we focus on our customers and on the workflow of the delivery process. We use the DocUTrans concept and system as a reference for (re)designing and implementing document delivery processes. Where applicable we share experiences from the Delft internal and external consultancy practice based on using and selling our DocUTrans system.

Getting things straight: five requirements for document delivery

- (1) The customer of document delivery should not have the bother of having to use specific tools (software, hardware, etc.) that are not already available in his existing professional environment. From this we derive our first requirement: *our document delivery products should be made available to our customer, without specific requirements on their side.*
- (2) Our document delivery customers will increasingly be members of the “global village”. This means that they will expect us to deliver anywhere, at any time, in any format. So: *document delivery methods must comply with the increasing mobility of our customers.*
- (3) Document delivery is solely about getting the document there. It is not about searching and finding information, nor is it about providing advanced information retrieval solutions. Document delivery starts after our customers have used our fancy catalogues, subject guides, databases, full-text retrieval systems etc. This gives us our third requirement: *document delivery must fit seamlessly to the “search and find” process.*
- (4) For our customers, document delivery should be a transparent service. Where the interaction between customers and “search and find” systems is high, there should be as little as possible (preferably no) interaction with document delivery systems. This means: *document delivery is about quality of service, not about systems.*
- (5) Last but not least, paper is going to be with us for a while. Although increasing amounts of scientific publications appear in electronic form, paper, and the necessity to deliver from paper holdings, will have to be dealt with by document delivery organisations for some years. Although there is no exact information about the number of copies of articles that are processed on a global scale, this must be immense. Processing copies from paper originals is for many libraries a major operation. If we assume that this number will not significantly decrease within the next five years, it seems more than worthwhile to improve the organisation of this process. From this we derive our last requirement: *there is a need for rationalisation.*

The customer's viewpoint

Who is the customer?

In a recent customer survey carried out by the British Library (British Library Document Supply Centre, 1999) it became clear that electronic document delivery did not have a high priority among respondents. Issues that were considered important were quality of service and related matters such as reliability, speed of delivery and costs. We will return to those later. With regard to the low score on electronic document delivery, it would be interesting to know what proportion of the respondents were potential end-users of document delivery services, who would actually benefit from it, and what proportion were intermediaries who did not themselves benefit from (or might even feel threatened by) electronic document delivery to the end-user.

The interesting questions here are, “Do we know what our customers want?” and, perhaps equally important, “Do we know who our customers are?” Our scholarly and industrial customers tend to become more and more mobile. Information and communication technology (ICT) already offers opportunities to create location-independent (virtual?) working spaces. And it is to be expected that current and future mobile telecommunication technology integrated with the Internet will act as a catalyst for this. Document delivery has to be able to reach these virtual offices, so we will have to design a document delivery process that will support this.

When Joseph Smith, the founder of what is now called the “Church of Jesus Christ of Latter Day Saints”, more often referred to as Mormons, received a book (document delivery?) in which the revelations of the prophet Mormon were written down, he was unable to decipher what was written. Only after miraculously finding a special pair of glasses was he able to understand the texts of the prophet. Although the special glasses were convenient for Joseph Smith, we do not want to force our customers to do the same. This holds especially for electronic document delivery services. Most of our customers already have an electronic working environment. Electronic document delivery should adapt to this and not make it necessary to use specific (and sometimes even proprietary) hardware and/or software.

Our customers are working within information environments of their own. That is where their information needs are born. One can envision such an environment as a company or university intranet, virtual information centre or, more basic, access to (union) catalogues. These environments, comprising the above-mentioned “search and find” systems, generate our customers’ document delivery requests. This is where our business starts. We can roughly divide these systems into two groups: those we can (and sometimes do) control, and those we cannot. Whether it is one or the other, given the third requirement, document delivery must fit seamlessly to the search and find process, we have to develop a solution. The key issues are system integration and interfacing.

From our customers’ perspective, there is with respect to document delivery only one relevant issue, and that is quality of service. Document delivery is (or should be) something that just has to be there. By building advanced union catalogues and knowledge domains or virtual information centres, libraries can demonstrate to their customers their ability to design and implement systems that are highly interactive, intuitive, user-friendly, etc. Document delivery, again from our customers’ viewpoint, is just about speed of delivery, quality of the copy delivered, flexibility in both delivery method, format and location – and, of course, costs. To provide quality of service, we have to turn our view inside, analysing the way document delivery is organised.

Analysing the process

When a closer look is taken at the internals of document delivery, it becomes clear that the whole process could be divided into three parts:

- (1) processing incoming requests;
- (2) physical handling of the document (retrieving from the stacks, copying or scanning);
- (3) sending the document to the customer.

Requests for document delivery appear in many forms. When we started the DocUTrans project in Delft by analysing our own request processing we counted 17 different formats in which requests were

offered to us, ranging from handwritten notes to printed lists from ILL systems. It is important, however, to focus not on the differences between the request formats but on the similarity between them. It appears that there are actually just two basic types of format: those that are (or can easily be transformed into) a machine-readable format, and those that are not (we discuss those below).

The rationale is obvious: (potential) machine-readable formats can be processed further without additional manual intervention. This becomes even clearer when we consider the next logical step in the processing of an incoming request: the decision whether we can or cannot fulfil the request. A machine-readable request can easily be automatically checked against the holding database of the delivery organisation, and of course the same holds for the checking of customer and billing data.

It is of course possible that incoming requests are “clean” – that is to say, such requests can always be fulfilled because they originate from the system that keeps the information on the stock holdings. In such cases, providing the customer data is also correct, the above-mentioned checks can be omitted, and we proceed to the next phase.

Our next step takes us to the stacks where the documents are located. What we need now is a call slip (for retrieving the document from the shelves). Ideally we would like to accomplish two things here: to have the call slip printed as near to the physical location of the document as possible and, especially in the cases of larger bookstocks, have the call slips printed in a sorted order that is consistent with the arrangement of the stock.

Having requests in a machine-readable form makes matters easier, as the location marks on the holding record can be used to route the call slips to a printer in the designated stock location. The same holding record could be used to sort the call slips before printing them in the required order. All this of course aims to minimise manual handling of the slips.

After the document is retrieved from the shelves the reproduction process starts. Traditionally this job is performed on high-volume copying machines. Apart from the inability of photocopy machines to produce something different from hard copy output, the working conditions are not good.

Photocopies are made with the document face down, forcing the operator to repeatedly turn over often weighty volumes. This work, given the size of the average copier, can only be done standing up, creating a far from ideal ergonomic environment. The continuous emission of ozone is yet another threat to a healthy operating environment.

So would it not be ideal to perform the above jobs sitting down, without having to turn the volumes, in an ozone-free environment and be able to produce not only hard copies but also electronic copies of the document? The obvious answer here of course is scanning. The use of so-called “top-scanning” devices provides all of the above-mentioned products and more. Because the output of a scanning device is a file, not a paper copy, this allows us to route this file (based on our customers’ wishes) to a (central) bulk printer or, and, even more interestingly, to a FTP or e-mail delivery system in predefined format.

The key term in the above description is “workflow management”, or perhaps even better, process automation. This notion led to the re-engineering of the organisation of our own document delivery system, which we started in mid-1996 and which resulted in the implementation of our DocUTrans system. This has been operational since January 1997.

Re-engineering the document delivery process: the building of DocUTrans

The criteria for the re-engineering process were derived from the five requirements for document delivery mentioned above. The first four of them are concerned with offering our customers a high quality, flexible and adaptive document delivery service. The last deals with the internal logistics of the process while taking care of the above issues.

These led to the following objectives:

- (1) The use of top-scanning devices.
- (2) The design and implementation of a workflow (process control) system providing:
 - standardisation of the core functions of the document delivery process;
 - minimal necessity for manual intervention.
- (3) Optimal flexibility with respect to the various inputs and outputs of the system by designing a set of well defined

interfaces to the environment of the document delivery process, e.g.:

- request systems;
- invoice systems;
- delivery systems (post, Fax, FTP, e-mail).

- (4) Optimal commitment from the staff who were to operate the system.
- (5) Implementation of quality assurance by introducing ISO 9002:1994 for the document delivery process.

A main issue was the “make or buy” decision. The Library prefers to buy solutions rather than building them itself. A market scan showed that at that time there were no solutions available on the market that could fulfil our needs. There was of course RLG’s Ariel, which can best be described as a stand-alone, low-volume, proprietary document delivery workstation; but this, apart from the labour-intensive handling it involved, could not match the volumes we were aiming to process – about 1,000 items daily, with an average size of nine pages each. On the other hand, commercial workflow packages did not offer the solutions we needed with respect to the bibliographical environment we work in. So after due deliberation we decided to build the system ourselves.

In view of the many uncertainties that were expected on the way, we decided on an incremental approach, using Rapid Application Development and Time-box management techniques in combination with a CASE (computer aided software engineering) tool for software development.

The project went through seven consecutive phases, the output of each being the input for the next phase, with go/no-go decisions, based on predefined criteria, being taken between the phases.

Staff participation and quality assurance

From day one, the future operators of the system were participating in the design of the system. In the first phase of the project, for instance, we installed the top-scanning devices connected to an image printer, so emulating a photocopier while making our scan operators familiar with their future working environment. As a result we were

provided with valuable feedback to enhance the configuration of the scanning devices.

On the other hand, we had serious discussions about keeping the core of the document delivery process “lean and mean”, that is to say not implementing the various (existing) deviations in our document delivery process, but keeping our focus on the “straight line” that our document delivery process should become.

The introduction of quality assurance by means of ISO 9002 provided further staff commitment and reduced barriers between departments which, although working for the same product, had not previously done this in close co-operation. One of the more interesting spin-offs of this was the creation of a Process Control Unit, responsible for monitoring the document delivery process, including a customer helpdesk. This unit is manned in rotation by staff from both the Request and the Delivery departments, so creating a feeling of joint responsibility.

All this led to the successful implementation of the DocUTrans system in January 1997.

Interest from outside

Although we often presented papers on our DocUTrans project, we were surprised when other libraries expressed interest in buying the system for their own document delivery operation. This led to yet another serious discussion: were we prepared to act as a solution provider for document delivery systems? In the end we decided we were. And this provided us with quite a different challenge.

Assessing document delivery

As should have become clear from the previous account, DocUTrans is not a system one can simply buy and implement; it was the result of our own document delivery re-engineering process, and to implement DocUTrans successfully an organisation has to be willing to analyse and often restructure its working processes. To create this type of awareness in organisations that expressed interest in using DocUTrans, we developed a three-step approach.

First, a so-called feasibility study is carried out. This takes two to three days, depending

on the size and complexity of the organisation.

During this study, which is done by senior consultants who combine extensive knowledge of both library organisation and system integration, we conduct a scan of the current working processes. The outcome of this review is a Project Control Document (PCD), which compares our findings with the optimised document delivery processes as we have implemented them in and around DocUTrans. In all cases that we have examined so far, considerable improvements could be proposed with respect both to the quality of the product (speed, flexibility, controllability) and to the process (efficiency, working environment).

The results of the feasibility study also provide the input for the next step, the actual re-engineering of document delivery. We support this process, which deals largely with organisational matters, on a consultancy basis. During this phase also the (physical) implementation of DocUTrans is prepared. If so desired by the customer, the final step is the implementation of DocUTrans at his or her organisation.

Some observations

During the feasibility study and the subsequent re-engineering consultancy process we have the advantage of looking with new eyes at working processes which have been in place for a long time and most of which have often developed organically. There are four observations on practices that we encounter almost everywhere.

The first may be called the “parallel processing approach”. In almost all organisations we examined (including our own when we started with DocUTrans), we see the organisation of the document delivery process following the request form or type. The processing of a specific request type is broken up into tasks or departments. Sometimes it is a designated person’s task to handle (for instance) all e-mail requests or rush orders. In other cases the organisation structure is built around different types of request. For instance, a specific department may deal with the rush service or a specific ILL request system. This can even lead to the retrieving and copying of the documents being done within this specific organisational

unit. This results in a number of parallel organisational units performing roughly the same tasks, and does not offer benefits of scale, possibility of monitoring the process as a whole, or provision of a quality of service level as a document delivery organisation instead of multiple document delivery departments.

We try to help such organisations to focus on the generics of the process and not on the differences. Ideally the document delivery process should be organised in the form of a double-ended funnel. On the input side, all requests are funnelled into the generic part of the document delivery process (checking holdings, printing call slips, retrieving and scanning the documents). After this, the processed requests “fan out”, delivering copies in a format and location as desired by the customer. The small part of the funnel is the candidate for process automation, which leads us to our second observation.

A good indicator of the efficiency of the document delivery process is the number of trays we encounter when, as a part of our assessment, we follow the route a request takes through the delivery organisation. Trays act as buffers and should be used when two processes of different speed meet one another. If trays are used for this purpose, this is fine. But sometimes, if we question the reason for the existence of a specific tray, it becomes unclear what processes it really does connect and if they are indeed of different speeds. Sometimes a tray is directly connected to another tray; the value added by moving a request from one tray to another is simply that of its being handled by an operator. These trays should of course be eliminated. The benefit of process automation is the possibility of minimising the manual interaction with the delivery process. In our DocUTrans solution there are only three moments where there is interaction with the process: the retrieving of the document (after the call slip has been printed with the designated location); the scanning of the document, preceded by reading in the barcode that is printed on the call slip, so identifying the request; and finally the exception management and process monitoring performed by the process control team.

Another example of the scope for improvement from a process automation perspective is when the organisation we visit is already using scanning devices. In such cases

organisations are predominantly using RLG's Ariel. In the interviews preceding the analysis of the flow of a request, we make a prediction of the location of the chair of the operator at the Ariel station. From a process automation perspective the interaction between the operator and the scanning station should be limited to the actual scanning. So the operator's chair should be located behind the scanning device. As already pointed out, after scanning the barcode printed on the call slip, all the DocUTrans operator has to do is turn the pages and push the scan button. All information with respect to delivery method, customer address, billing address etc. is held on the DocUTrans server. So in the case of DocUTrans the operator's chair is located behind the scanner. In the case of Ariel, however, the number of actions required from the scanning operator at the connected PC far exceeds the actual scanning; all information relevant for the request processing has to be input on the Ariel workstation, and that is where the operator understandably places his or her chair. Although Ariel can be a fitting solution for very low-volume document delivery situations, it is not suited as a building block for a highly automated delivery process.

Our last observation concerns the overall monitoring of the process and the provision of quality assurance. Most organisations care about quality control in their document delivery process, but often it is done on an *ad hoc* basis. Sometimes it is a task given to a managerial assistant. In other cases, especially in organisations that tend to structure their processes in parallel columns, there is duplication and procedures are not uniform throughout the whole organisation.

Centralising process control, which is made easier by using the DocUTrans method and implementing a quality assurance system such as ISO, helps to remedy these deficiencies.

To conclude

DocUTrans has made our document delivery life easier. By making the process more efficient we are able to redirect our attention to other fast evolving developments relating to the future of the digital (virtual) library. Not only that, but by using DocUTrans we are able to adapt to our customers, who become increasingly flexible and expect us to grow

with them. We are able to serve them in ways they prefer. Using our own experience we are able to assist other libraries which want to rationalise their delivery systems. As well as Delft, libraries whose systems have been analysed include those of the Universities of Utrecht, Wageningen and Rotterdam in The Netherlands, the British Library Document Supply Centre, the Norwegian University of Science and Technology in Trondheim and the Eidgenössische Technische Hochschule Zürich. DocUTrans is now operational in Delft, Zürich and Utrecht, while implementation in Trondheim is under way.

Analysis does not always lead to the delivery of DocUTrans as a system. However,

although it is impossible to use DocUTrans without changing a document delivery system, it is easily possible for libraries to “DocUTrance” their systems without implementing the system itself. So the question for document delivery organisations in the twenty-first century could well be “have you been DocUTranced?”

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