

Electronic business processes in book production – Applicability of JDF/PrintTalk and Papinet/XBITS

Hannele Antikainen, Asta Bäck

VTT Information Technology
Tekniikantie 4 B
P.O.Box 12041
FIN-02044 VTT
Finland

Email: firstname.familyname@vtt.fi

Keywords: Finnish book industry, electronic procurement, JDF/PrintTalk, Papinet/XBITS

1. Introduction

Book publishing processes need good communication between the publisher and the printer. Some books find their way quickly from the idea to the published book, but more often than not, book publishing is a project with considerable length, even up to some years. During the process, the parties need to keep each other up-to-date of the timetable and product details in order to make sure that the book production can be carried out efficiently and without errors.

The communication between the parties is typically carried out in conventional ways - e-mail, fax, mail and phone - and after receiving information through these channels, the data is manually entered into the recipient's computer systems. These kinds of processes take time and are error prone. The errors can be avoided, if the communication takes place between computer systems. Electronic data interchange also makes the processes much quicker to react to changes, and improves their overall efficiency. However, to introduce electronic data interchange between computers, electronic processes and common vocabularies supporting these processes need to be established.

Several vocabularies have been proposed to support electronic data exchange between processes and system, also within the graphic arts industry. The most interesting vocabulary in relation to print production is JDF (Job Definition Format) and its extension: PrintTalk. JDF defines the structure of the printed product, and PrintTalk is used to complement it to define the business transactions. Another relevant vocabulary is Papinet/XBITS, which is a US based initiative, developed on the paper industry's Papinet. It is currently being extended to meet the requirements of the US book industry.

The objective of the project was to analyse the current book production processes in Finland to see the potential for improving the efficiency of the whole production chain with the help of electronic data interchange. The objective was also to propose the vocabularies needed to adopt electronic business processes.

2. Research methods and materials

When developing business processes and to introduce new electronic ways to operate between partners, two things are of prime importance. First, to understand, why these processes are being carried out and how they add value, and second, to find out, how to utilise electronic commerce and communication in an optimal way.

Business process modelling is the tool to tackle these challenges. We chose to utilise UN/CEFACT Unified Modelling Methodology (UMM) for describing the current processes. The information for modelling was collected by interviewing publishers and printers. Gummerus Oy, Kustannusosakeyhtiö Tammi, WSOY, Yliopistopaino were interviewed in the role of a publisher, and Gummerus Oy, Otavan Kirjapaino Oy, WS Bookwell Oy, Yliopistopaino in the role of a printer.

The interviews were complemented with examples of current business documents, which include the necessary data content of business transactions. Our analysis covered request for quote (RFQ), quote, purchase order (PO), order confirmation (OC) and note on transferring shipping addresses from the publisher to the printer.

Available versions of JDF and Papinet/XBITS vocabularies were analysed and their expressive capabilities were compared with the requirements of the chosen Finnish business processes. This analysis covered both the business process and data content.

We also built a software application to encourage the further development of electronic processes between publishers and printers. This demonstration also tested implementing JDF – mapping data collected via an HTML form to the JDF structure.

3. Results

3.1 Process models

UMM is a modelling method utilised by ebXML initiative (Anon, 2000). It shows a way of how to proceed from the top level to the actual processes. The UMM uses the following hierarchical levels: Business reference model, Business area, Process area and Business processes.

Business reference model defines the industry. Business areas are used to divide each industry into sectors. Each business area has several process areas, which consist of the actual business processes. In general, we can state that process areas are usually important value adding functions in the industry. If and when electronic business processes are introduced, the process area as a whole remains, but the actual business processes within the process area may change, and even be eliminated.

In our case, the UMM Business Reference Model is "Book publishing and printing". It can further be divided into two main business areas: "Book publishing" and "Book production (printing and binding)". There are several players within book publishing and printing, and an overview picture was made to chart their main role and information requirements. (Fig. 1)

The UMM method includes a set of tables that describe the different levels of the model (Anon, 2001). The UMM methodology provides a set of tables that can be used to collect and report the processes. Table 1 shows an example of such a process area model. Altogether, nine process area tables covering the transaction between book publishers and book printers were produced.

The classification of the processes was added to describe the characteristics of each of the business processes. The classes were: processes between persons, processes requiring expertise, query/response process, transaction process, information transmission process (information to be stored in a data system), payment process, workflow process, internal process, and material (including digital material) transmission process. Transaction processes, query/response processes as well as information transmission processes have the highest potential for electronic implementation.

This wide choice of process types shows that these processes have a wide array of operations that deal with production knowledge, making business deals and preparing and transmitting digital files and even ready made books. Other important characteristic features within book processes relating to data exchange between the publisher and the printer are:

- PO is made before all important information is known, e.g. material, number of pages and copies, schedule etc.
- Shipping addresses are delivered separately from PO.
- For printers, receiving original files is an important checkpoint, because it gives a possibility to check original files against the PO.

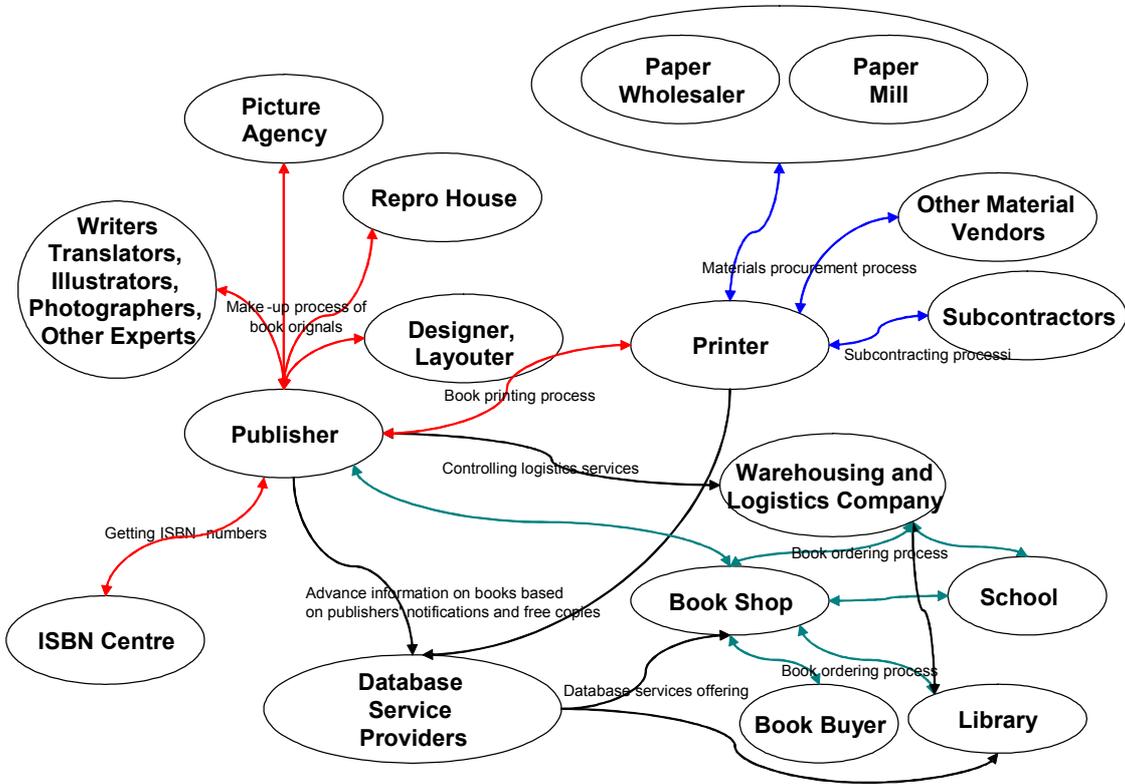


Figure 1. The players within book publishing and printing in Finland, and the top level processes between these players.

Table 1. An example of a process model table.

Business Area: Book publishing

Process Area: Managing book production (publisher)

The goal of the process area: To ensure that the production has the right files for production and also otherwise correct and up to date information on schedule and book structure.

Important input: Original files for dust jacket, cover, decorations and block, working instructions, shipping instructions including shipping addresses

Important output: Correct books at correct delivery addresses

Owner of the process: Publisher

Business process	Resources	Classification	Input	Output	Comments
Sending original files to the printer	Publisher's contact person	Content file			
Approving the proofs	Publisher's contact person, author	Content file, Work flow	Proofs or press sheets	New, corrected original file, corrected proof, approved press sheet	Normally proofs, press sheets are used in quality colour books. The number of proofs is declining.
Communicating changes in the book structure	Editor	Transaction	Changes in product plan	Updated purchase order information	The printer may respond by sending a new order confirmation or even a new quote.
Confirming the number of copies	Editor	Transaction	The feeling of the editor	Number of copies	Number of copies is usually confirmed shortly before starting the production
Sending delivery addresses to the printer	Marketing	Transaction	Addresses	Book delivery	The addresses are sent even very late up to the moment nearly until when they are ready to be shipped from the printers.
Controlling the progress of production	Print buyer, editor	Query/ response	Query	Information on the state of production	The deadline for production is important information for marketing and distribution channels.
Receiving and approving the invoice	Print buyer, editor	Transaction	Invoice, finished book	Approved invoice, printer gets paid	The books delivered and registered at the book warehouse. The job is ready.
Making a complaint	Print buyer, editor	Transaction	Finished book, production not on schedule	Complaint	

3.2 Vocabularies

The electronic business processes need vocabularies for data exchange. The options are to utilise an existing vocabulary, to adopt and modify an existing one, or to make a new vocabulary. Starting from scratch is usually not recommended, because it requires a lot of work, and it obviously means that there is not any kind of existing software support for it. Existing vocabularies may support different ways to modify them, all with their pros and cons.

Of the existing vocabularies, JDF version 1.1 A (Anon, 2002) along with PrintTalk version 1.1 A (Anon, 2003) and Papinet/XBITS were analysed and mapped against the Finnish requirements for book structure. The result was a detailed gap analysis that explains what is missing from them from the Finnish book industry's point of view. The use cases of these messages were analysed in a similar way. Table 2 introduces the business transactions or messages covered by Papinet/XBITS and PrintTalk. JDF version 1.2 was published in May 2004 (Anon, 2004-a).

The main problem with JDF is that it lacks the support for book related information, such as author and ISBN-number and also more complex book structures. This is understandable from JDF's historical background with a strong focus on the actual print production. PrintTalk seems to have only few practical implementations, none of which are in the book industry.

Papinet/XBITS is being developed in the US. It supports the common practices in the American book industry. So far (spring 2004) Papinet/XBITS has finished messages on Book Specification (Anon, 2004-b), Delivery Message (Anon, 2004-c), Inventory Disposition Instructions (Anon, 2004-d), Order Confirmation (Anon, 2004-e), Order Status (Anon, 2004-f), Purchase Order (Anon, 2004-g) and Shipping Instructions (Anon, 2004-h). However, it is a very new vocabulary, and some relevant messages, such as RFQ, are still missing from its set of messages. The first implementations of Papinet/XBITS are expected in early 2004.

The differences between the Finnish and American books industries are evident in the order of the developed messages. In America, the publisher often organises the whole production process from buying the paper, organising the production of the different components and having them put together into complete books. There, the publishers find it very important to get various types of production data.

In Finland, the production is typically bought from one company who takes care of the whole production. Therefore, from the publisher's point of view the most important thing is the information flow between the publisher and the production unit prior to the production.

Table 2. Business transactions covered by XBITS and PrintTalk.

Message	Conventional Process	XBITS	PrintTalk
Request for Quote (RFQ)	eMail, fax, mail, phone	Papinet message *)	Yes
RFQ Response or Quote	eMail, fax, mail, phone	Papinet message *)	Yes
Purchase Order (PO)	eMail, fax, mail	Yes	Yes
Order Confirmation	eMail, fax, mail, phone	Yes	Yes
Book Specifications	Communicated within messages	Yes *), is used to define book specifications within other messages (RFQ, RFQ Response, PO, Order Confirmation)	JDF is used within PrintTalk messages to define book structure
Cancellation	eMail, fax, mail, phone, negotiation	Yes, but there is no separate Cancellation Message. Cancellation is expressed by setting message status Cancellation (applied within RFQ, RFQ Response, PO, Order Confirmation, Shipping Instructions)	Yes
Refusal	eMail, fax, mail, phone, letting a message expire	Yes, but there is no separate Refusal Message. Refusal is expressed by setting message status Reject (applied within RFQ, RFQ Response, PO, Order Confirmation, Shipping Instructions). Also by letting a message expire means refusal.	Yes Also by letting a message expire means refusal.
Order Status	Phone, email	Yes	Yes
Proof Approval Request	eMail, fax, mail, phone	No	Yes
Proof Approval Response	eMail, fax, mail, phone	No	Yes
Shipping Instructions	Yes, especially for shipping addresses	Yes	No separate message, Shipping Instructions are included in Purchase Order
Delivery Message	Yes, printed on paper	Yes	No
Invoice	Mail	Papinet message *)	Yes
Complaint	eMail, fax, mail, phone	Papinet message *)	No
Complaint Response	eMail, fax, mail, phone	Papinet message *)	No
Inventory Disposition Instructions	Not commonly used eMail, phone	Yes	No

*) a corresponding Papinet message for paper, pulp and recovered paper industry is available.

3.3 Software demonstration

During the project, a software application that enables exchanging RFQs and quotes between book publishers and book printers was built. By means of the software and its WWW user interface, the user can - in the role of a book publisher - send RFQs to printers. The user chooses between a hard cover and perfect bound book, and gives other book structure specifications including format and desired book materials. The software application transforms the defined book structure into JDF. In the role of a book printer, the user can open the RFQ and complement it into a quote. Similarly, the quote is transformed into JDF and sent back to the publisher. The software demonstration was implemented using Java servlet technology.

BookXML - Basic Information - Microsoft Internet Explorer
Address: http://customdp.vtt.fi/bookxml/GetBasicInformationScreen.event

Basic information [start page](#) | [finish](#)

[basic information](#) | [block](#) | [hard covers](#) | [dust jacket](#) | [delivery](#) | [price](#)

indicates publisher usually fills | indicates printer usually fills | both parties CAN fill

Required fields are marked - Pub -, -Print- or -Both- .

Book's name	Isäni Hermanni	- Pub -
Author (comma separated if more than one)	Kalle Päätalo	- opt -
ISBN	951-20-6407-3	- Pub -
RFQ expires	10 October 2003	- Pub -
Quote expires	[day] [month] [year]	- Print -
Print run	40000 number of copies	- Pub -
Format (w*h) (block)	135 * 205 mm	- Pub -
Page count	608 pages in block	- Pub -
Spine thickness	mm	- Print -
Volume of one book	cm ³	- opt -

BookXML - Hard covers - Microsoft Internet Explorer
Address: http://customdp.vtt.fi/bookxml/GetHardCoversScreen.event

Hard covers [start page](#) | [finish](#)

[basic information](#) | [block](#) | [hard covers](#) | [dust jacket](#) | [delivery](#) | [price](#)

indicates publisher usually fills | indicates printer usually fills | both parties CAN fill

Required fields are marked - Pub -, -Print- or -Both- .

Specifications of cover material	Other → Geltex	- Pub -
Material details		- opt -
Cover material colour	musta	- Pub -
Thickness of cover board	2.0 mm	- Print -

Decorations

Debossing Embossing None - Pub -

Foil stamping Yes No - Pub -

Specifications of foil material	puolikiltävä folio	- Pub -
Colour	kulta	- Pub -

Original files (for decorations): PDF

Figure 2. Examples on the user interface of the software demonstration. Above, basic information of the book such as the name of the book, ISBN number and the format is given. The picture below shows how the specifications of hard covers can be defined using the software.

4. Conclusions and discussion

In order to make the book production chain more efficient, it is important to find ways to make it possible for the parties to communicate about the job and send, receive and manage the relevant content files efficiently. The point when the files arrive into print production is the critical one.

The process has become more streamlined with electronic originals and proofs. What is missing is the transfer of product and production information. This requires that management information systems are used by both parties.

JDF aims at including all product and production information into the JDF description of a print job, and this would seem to be the ideal way. This is also a very ambitious goal, which requires JDF capabilities from all programs and production steps that are used to design and make the product. It also has the biggest potential, if we can combine the digital content and business information together.

The Papinet/XBITS approach focuses on the information interchange at a level that covers only product information and it does not offer compatibility with the production systems. On the other hand, it focuses on the information interchange between the book publishers and book printers including the use cases for the messages. The XBITS counterpart in JDF approach, the PrintTalk, has not been developed specially for the book industry.

The key requirement in developing a vocabulary is that a wide community can accept it. Even though much of book publishing and production is carried out within one country, there is also import and export, and the same production systems are used in many countries. This motivates using and developing vocabularies at international level, even though at short range, it might be the quickest way to develop a national solution, which strictly meets the criteria of the application. On a longer term this is often not a viable solution. Utilising existing vocabularies, it is possible to take advantage of existing material and knowledge that has already been put into them.

The reality is that we will have to learn to live with several vocabularies, or at least with several versions of some vocabulary. The different organisations should put emphasis on ensuring the interoperability of the different vocabularies. Good data vocabularies with explanations of the meaning of the different terms and concepts are needed to make mapping between the different vocabularies possible.

Acknowledgements

The project was made possible by the grant from Graafisen Tekniikan Tutkimussäätiö (Graphic Arts Technology Research Foundation) and financing by the participating companies Flowman Oy, Gummerus Oy, Kustannusosakeyhtiö Tammi, Otavan Kirjapaino Oy, Prosys PMS Oy, WM-data, WS Bookwell Oy, WSOY, Yliopistopaino.

In addition to the authors of this paper, Giorgos Pachoulis and Magnus Melin at VTT participated in the project.

Literature references

Anon, 2000. UNCEFACT/TMWG/N097. The UN/CEFACT Unified Modelling Methodology. An Overview. 28th March 2000. www.unece.org/cefact/docum/download/00bp030.doc

Anon, 2001. Business Process Analysis Worksheets & Guidelines v1.0. Business Process Team 10 May 2001. www.ebxml.org/specs/bpWS.pdf

Anon, 2002. JDF Specification Version 1.1 Revision A, CIP4 organisation 5 September 2002. www.cip4.org

Anon, 2003. PrintTalk Version 1.1 A. PrintTalk organisation 27 January 2003. www.printtalk.org/implementation1-1a.pdf

Anon, 2004-a. JDF Specification Version 1.2, CIP4 organisation 9 May 2004. www.cip4.org

Anon, 2004-b. BookSpecification Documentation. Papinet Standard version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/BookSpecificationV2R20.pdf

Anon, 2004-c. DeliveryMessageBook Documentation. Papinet Standard version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/DeliveryMessageBookV2R20.pdf

Anon, 2004-d. InventoryDispositionInstructions Documentation. Papinet Standard Version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/InventoryDispositionInstructionsV2R20.pdf

Anon, 2004-e. OrderConfirmation Documentation Book Manufacturing. Papinet Standard Version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/OrderConfirmationBookV2R20.pdf

Anon, 2004-f. Book OrderStatus Documentation. Papinet Standard Version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/OrderStatusBookV2R20.pdf

Anon, 2004-g. Book PurchaseOrder Documentation. Papinet Standard Version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/PurchaseOrderBookV2R20.pdf

Anon, 2004-h. ShippingInstructions Documentation. Papinet Standard Version 2.20. Papinet/XBITS January 2004. www.papinet.org/V2R20/200401/documents/ShippingInstructionsV2R20.pdf