Moda-ML: Building a collaborative sectoral framework based on ebXML

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Abstract. Inter-company data interchange within a specific industrial sector is necessarily based on standard document formats, structures, and transmission protocols. In this perspective, the MODA-ML project has developed an interoperability architecture for the Textile/Clothing sector based on XML technology; in particular ebXML has been adopted as the reference specification in defining and exchanging business documents.

1 Introduction

Nowadays not only the large enterprises, but also the small- and medium-enterprises are moving towards ebusiness; nevertheless only few of them manage to effectively use ICT tools within their production processes.

In order to achieve seamless inter-company communication through B2B integration what is needed is a common and widely accepted set of specifications for collaboration. XML and SOAP surely represent two of the emerging standards to achieve data interoperability; but we also need a way to unambiguously model and share between partners the semantic aspects of each document exchanges (which process generates the data exchange, what is the meaning of each data item, etc).

The content of this paper is based on the experience in the development of a sectoral framework for the Textile Clothing sector, MODA-ML (Middleware tOols and Documents to enhAnce the Textile/Clothing supply chain through xML) [6][2] that exploits XML technologies for the definition and exchange of business documents.

2 The sectoral framework

During the past decade a lot of research initiatives targeted to achieve a better interoperability among different partners in a business supply chain. A review of the state of art about integration middleware for enterprise business processes is outlined

in [3], together with some open research issues. The most known initiatives in developing interoperability architectures for electronic commerce are Biztalk [1], RosettaNet [7] and ebXML [4], proposed by UN/CEFACT and OASIS. Many of these frameworks are based on XML technologies for data exchange and take into account and co-operate with standardisation bodies like the W3C (that also promote SOAP, UDDI and WSDL), CEN/ISSS and UN/CEFACT.

Based on the ebXML guidelines, the MODA-ML project provides a vertical framework to enhance interoperability in the Textile/Clothing sector and contributes in building a European Standard for the sector. The project started in July 2001 and ended in April 2003, gathering a number of Italian and French research institutes and leading Italian Textile/Clothing enterprises. In order to produce a successful solution we considered:

- the heterogeneity of the Textile/Clothing sector, that is mainly composed of a very large set of small and medium enterprises, with different roles in the supply chain, levels in technological competence, economic resources and human skills.
- the flexibility and responsiveness required by the Textile/Clothing market.
- the number of standards defined by standardisation bodies.

One of the main choices for the MODA-ML project was to employ a peer-to-peer architecture: we want each firm to communicate directly with its partners in the supply chain without using a central system or any form of service provider. Besides, we decided to create a set of well-specific documents tailored for T/C sector, exploiting XML-Schema validation mechanisms; differently from the EDI style, we avoid too general-purpose document definitions. In the following we outline the mechanism adopted to define the business document schemas and the tools implemented to exchange and validate the document instances.

2.1 The document factory

XML is the emerging standard for message exchange [5] because of its beneficial characteristics such as human readability, flexibility and content structuring. The core of the MODA-ML framework consists of a set of XML business components (the MODA-ML dictionary) out of which different types of document templates can be built, each of them with different structures. This architecture reflects the ebXML approach in defining documents starting from a basic set of Core Components. Besides, these XML components and the subsequent document type definitions come out from the know-how arisen by our previous EDIFACT/EDITEX [9] expertise. Such components represent a common set of structures underlying the message exchange between companies of the same supply chain.

The set of formalised MODA-ML messages is composed of 14 documents mainly concerning the Textile Supplier-Clothing Manufacturer ring of the supply chain. Some components of these documents are specialized for particular needs, but most components are shared by all the documents. Each component of the dictionary represents in fact a well-defined concept that is used within many messages. This organization of the dictionary makes it possible to perform the necessary distinction between the syntactical model, the semantic model and the transport model of the messages being exchanged.

The dictionary is implemented in a database collecting all information about the components. Furthermore, the database contains a list of all our document schemas: for each of them the root element and all the linked components are specified. Starting from the implicit definition stored in the Dictionary, a simple application can automatically build user documentation and XML Schemas for each document type.

Thus in our architecture the dictionary represents the core of the management of every aspect related to the MODA-ML document types, schemas and instances. We call this approach *XML document factory* (Figure 1), because it allows the creation of document templates starting from same dictionary.

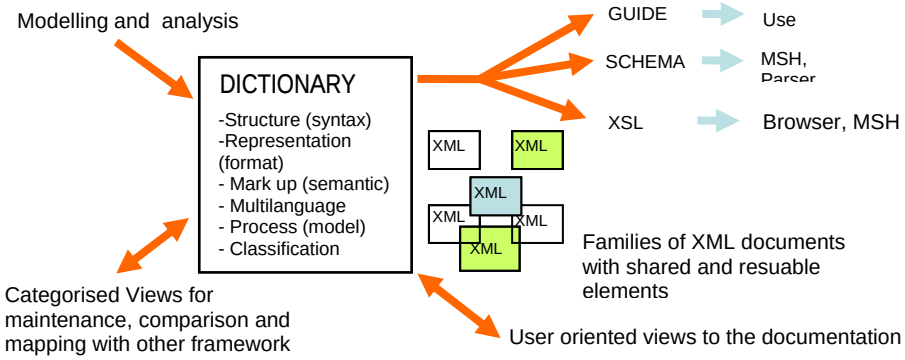

Figure 1. The document factory architecture

2.2 The message switching system

In order to provide a (demonstrative, ready to use, free but effective) mechanism for the exchange of MODA-ML messages, we have implemented a message-switching system that can be adopted by both small enterprises with lean technological infrastructures and large companies with sophisticated ICT know-how.

The message switching system defines a transport protocol based on the ebXML messaging service specifications: every message contains a MODA-ML document wrapped in a SOAP envelope; the message is then transmitted as the body or as an attachment in a standard SMTP e-mail message.

The main component of the “message switching system” is the Message Service Handler (MSH), that acts as an email client: it takes care to validate MODA-ML documents and to send and receive them over the Internet using SMTP as its transport protocol. Furthermore, it provides error-handling facilities for a number of situations that may arise in real life.

To guarantee confidentiality, authentication, integrity and non-repudiation, the MSH supports two security standards, XML Signature and XML Encryption, applied following the ebXML security specifications. The use of XML Signature and XML Encryption gives greater advantages like persistent security, great flexibility of use, independence from the communication architecture and compatibility with ebXML on digital signatures and encryption, achieving interoperability with other ebXML-compliant applications.

3 Conclusions

The MODA-ML project aims to facilitate the integration of ICT systems in large, small and medium enterprises in the T/C sector; to this purpose it involved some industrial pilot users (five leading firms) and has demonstrated a good capacity to attract new potential partners: 3 consortia (110 firms) in the industrial textile districts of Biella and Prato and also four technology providers are going to MODA-ML. Presently they support further developments to extend the supply chain coverage and to improve the usability and flexibility of the framework.

But the most important result obtained by the MODA-ML is that its results have been absorbed in the final document of the CEN/ISSS TEXSPIN Workshop. Promoted by Euratex (European association of national industry trading association of the T/C) and supported by CEN/ISSS, the standardisation initiative TEXSPIN aimed "to provide a framework for the (B2B) integration of the European Textile/Clothing/Distribution chain" [8]. The final CWA of this initiative was published in autumn 2003.

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