Content Standardization Efforts for B2B E-Commerce Interoperability in the Textile/Clothing Sector

Costin Badica, Dumitru Burdescu, Mihai Mocanu, Stefan Udristoiu, Marius Brezovan
University of Craiova, Romania
c.badica@hotmail.com, burdescu@topedge.com, stefan@edulib.ro, mocanu@topedge.com, brezovan@aeic.ro

Mike Roberts
MRA Consultants Ltd, UK
mike@macroconsultants.co.uk

Gabriel Vladut
IPA SA CIFATT, Romania
office@ipacv.ro

Lois Carter
Huddersfield Textile Training, UK
lois.carter@textile-training.com

Abstract

The objective of the EUREKA SUM project is to develop new e-commerce software and business practices to enable manufacturers to sell make-to-order products to the end customer without the need of a retailer. A research activity has been carried out in the first project stage to investigate the efforts that are active or have been done in the field of e-commerce content standardization with a focus on the application in the textile/clothing sector. This research has revealed the existence of a number of initiatives and projects at the European and international levels to standardize the exchange of data in the textile/clothing sector and we believe that they are of interest to a larger audience than the project consortium. The paper briefly summarizes these results and draws some conclusions regarding their implications on the further development of SUM software.

1. Introduction

One of the bottlenecks that seriously hampered e-commerce is the lack of standards for content description [1]. Consequently, the increases in popularity of the Web and of the XML meta-markup language have caused the spread of
interest of various Web communities for setting up content representation standards. The hype is that these standards will finally enable an easier access to the information in Web communities of the B2C and B2B e-commerce systems [2].

The wide expansion and high diversity of the Web created the need for the establishment of a small set of semantic primitives with a fixed meaning along various communities. This takes into account both the work and results of the ontology engineering field and the content standardization efforts in e-commerce [2].

We mention that the seminal point for our investigation into e-commerce content standards related to the development of SUM (see the next section for an overview of the Eureka SUM project, [3]) was the work done in the Ontoweb project, in particular by the Special Interest Group on Content Standards [4]. Some project deliverables produced by this group that have been made publicly available contain very useful information for our work [5], [6].

According to [5], standards can be classified in formatting standards, representation standards and content standards, depending on the formatting method, the representation method or the contents itself. Formatting standards take into account the means of information encoding. Examples are the various binary formats and the ASCII formats like plain text and XML. Representation standards consider the representation language used. An example is the RDF(S) standard for describing Web resources at semantic level [7].

In this work we are focusing on XML-based content standards for e-commerce that we considered that are relevant for the development of the SUM system. Therefore, according to the terminology introduced in [5], we have in mind e-business process description standards and product description standards.

In our research we considered both horizontal and vertical standards. The term horizontal is referring to standards applicable in multiple sectors or that have inter-sector implications. The term vertical is referring to standards applicable to a particular economic sector only.

We must also regard the standards considered in the light of the classification based on the attributes introduced in [5]. There are two main attributes: content type and semantic depth and three secondary attributes: meta and upper level content, business content and focus. According to the content type there are four kinds of standards: artifact-centric, process and activity-centric, agent-centric and general. According to the semantic depth, from the lowest to the highest level we have: dictionaries (vocabularies), taxonomies, thesauri and reference models. The meta and upper level content is a Boolean attribute that, when true, indicates if the standard addresses meta-content issues. The business content is a Boolean attribute that, when true, indicates if the standard encapsulates business knowledge. The focus attribute names the particular economic sector addressed by the standard [5].

The other sources for our analysis, mainly for the vertical standards in the textile/clothing sector, were the Web pages of various projects and initiatives in this area and the standardization bodies that support them.
The paper is structured as follows. Section 2 contains an overview of the EUREKA SUM project. Section 3 describes some e-business process standards that are relevant for the project. Section 4 describes the product description standards that have been investigated so far. Section 5 discusses some vertical standardization initiatives at the European level for textile/clothing sector. Section 6 concludes the paper and points to future work.

2. An overview of the SUM project

SUM is an Anglo-Romanian project funded under the EUREKA programme. The objective of the project is to develop an e-commerce Supermarket System that uses the potential of the global marketplace to replicate the batching process of a retailer to convert small customer orders into large manufacturing orders necessary for make-to-order products.

The strategic business objectives of the software are: to improve the profitability of manufacturing companies, to improve the stability of manufacturing industry, to improve manufacturers responsiveness in fashion change, to reduce the overall lead time of supply chains, to reduce the seasonal variations that put a strain on the supply chain and to improve the business practices of the manufacturers.

An important requirement that has been set for the SUM software is the need for B2B integration. The software will contain a component that must be able to handle customer orders and must communicate with existing marketplace and/or manufacturer applications through standard interfaces. In particular, we are interested in standards for exchanging the following information: customer order, production order, supplier order, product data, bill of materials, supplier data, cost data (both estimated and actual) and quality data.

Two industry specific versions of the software will be developed: one for the textile sector and one for the furniture sector. In this paper we are focusing on the requirements for textile standard interfaces only. Nevertheless, many of the aspects addressed in the paper are common across industries.

A prototype implementation of the SUM software including a Web-based GUI and the core modules is under development.

3. Process standards

Initiatives for standardizing B2B transactions have been manifested long before the wide spread of the Internet and the Web. During the last three or four years, however, they are focusing on defining XML-based standards that address the following three issues: the representation of the intra- and inter-organizational business processes, standardizing the communication protocols between
businesses and standardizing the messages and documents exchanged in B2B transactions.

In [5], process description standards are divided in two classes: general process standards and e-business process standards. We considered that only the second class is relevant for the development of SUM. [5] classifies further e-business process standards in three subclasses: standards for electronic transactions, e-business frameworks for electronic transactions and Web services.

### 3.1 Electronic transactions – EDI

EDI is often considered as the ancestor of contemporary e-commerce. In addition to its historical importance, EDI still has a major influence on how the actual electronic transactions are being carried out.

Informally, EDI is meant to replace the paper-based document exchange in business communication with its electronic equivalent. A more careful definition of EDI is ‘the exchange of documents in standardized electronic form, between organizations, in an automated manner, directly from a computer application in one organization to an application in another’ [8].

EDI is used in practice for more than three decades. Initially EDI standards were developed both in US and Europe on an ad-hoc basis. Due to the high costs of their implementation, real standardization initiatives emerged. Their result was the development at the beginning of ‘70s of the ANSI X.12 group of EDI standards in US supported by ANSI and the birth of UN/EDIFACT in 1987 as an ISO standard. Now the UN/EDIFACT initiative is supported both by UN/CEFACT, which was established in 1996, and by eBES, the e-business board of European Standardization. Even if ANSI X.12 and UN/CEFACT are horizontal standards in the sense they claim to achieve interoperability between different business sectors, [5] claims that interoperability between them is questionable because they use different formats and semantic considerations. Nevertheless, ANSI and UN/CEFACT have established a programme to harmonize their EDI standards under the umbrella of the ebXML framework.

Note that in 1990 was set up EDITEX, an EDI initiative based on EDIFACT that targets the application of EDI in the European Textile Clothing Sector [9].

Another important trend is the migration to XMLEDI, which is expected to solve the major EDI implementation problems and also to bring EDI to the Web world [9].

### 3.2 E-business frameworks – ebXML

As opposed to EDI, which is focused on standardizing single transactions, ebXML proposes a general framework to standardize e-business processes with the goal to achieve the interoperability, security and consistent use of business information [10].
ebXML builds on the existing experiences on EDI syntax and semantics, on the recent initiatives for translating EDI to XML, on techniques for business process modeling and on protocols for reaching agreements between trading partners. There is also a European initiative that complements ebXML which is supported by the eBES workshop of the CEN/ISSS [11] (see section 5 for an overview of the CEN workshop concept).

3.3 Web services

Web services reflect the new hype for developing Web applications from reusable Web software components.

According to [12], Stencil Group defines Web services as software components loosely coupled, reusable, which semantically encapsulate a discrete functionality and are distributed and accessible by programming over the standard Internet protocols.

[5] shows that a Web service describes a specific business functionality exposed by a company, usually via an Internet connection, for providing to other companies or applications a means to use the service.

In the current stage we restricted our attention only to Web services standards that are supported by the Web Consortium, i.e. to:

1. Simple Object Access Protocol – SOAP, which represents the level of XML messages for exchanging, structured and typed information between software components in a distributed environment based on Web services. The standard has the status of a W3C recommendation.

2. Web Services Description Language – WSDL, which represents a description of Web services using an abstract model of what, the service offers. Its current status is W3C working draft.

4. Product standards

The harmonization of product catalogue description is one of the main issues that should be addressed by the B2B e-commerce integration [13]. The Ontoweb SIG on Content Standards has raised an e-commerce product classification challenge that asks for finding a clever way to map between two different product descriptions and this problem has been shown to be far from trivial [14].

According to [5], product description standards are classified in two main classes: global standards and regional standards. We shall consider in this section an example of a global standard, i.e. a standard that addresses the whole domain of products. For a description of a regional standard for the textile/clothing sector, see the next section.

From the class of global standards for product description we have picked up the Universal Standard Products and Services Classification – UNSPSC, supported by United Nations [15], as being representative for SUM.
UNSPSC uses a five level classification system. Each level is identified via a numeric code. The five levels are defined as follows: segment, family, class, commodity and business function. For example, the textile/clothing products are found in segments 11 (Mineral and Textile and Inedible Plant and Animal Material s) and 33 (Apparel and Luggage and Personal care Products).

In [14] it is shown that the major obstacles in using UNSPSC are: it is rather shallow, not very intuitive, not descriptive at the attribute level and mainly developed in the US. In order to overcome these drawbacks there are initiatives either to enhance UNSPSC with attributes, as Universal Content Extended Classification [16] does, or to develop new standards from scratch, as ecl@ss [17] does.

5. Textile/clothing standards

Taking into account the business sectors addressed by SUM, we have investigated some vertical standardization initiatives of content in the textile sector at the European level that were publicly available. The major source for this research was the Textile Supply Chain Integrated Network – TEX-SPIN workshop of the European Committee for Standardization / Information Society Standardization System – CEN/ISSS [18].

CEN/ISSS supports the formal European Standardization process by developing European Standards (EN) through consensus under the authority of its member bodies [19].

The CEN workshop is a new approach for standardization introduced by CEN that is intended to bridge the gap between industrial consortia that produce de facto standards with limited participation of interested parties and the formal European Standardization process. The main activity of a CEN workshop is the development and publication of a CEN Workshop Agreement – CWA. The CWA is a technical agreement developed by a CEN workshop, which reflects the consensus of identified individuals and organizations responsible for its contents. The CWA therefore represents a lower level of consensus and transparency than that represented by the EN [19].

The TEX-SPIN workshop is an initiative of the European Apparel and Textile Organization – EURATEX involving other national industry associations and several national research centers as well, and aiming to provide the textile/clothing sector with an open pre-normative platform for EDI based on XML documents. The main objectives of the workshop are upgrading the EDITEX framework, developing XML/EDI pilot applications and developing an inventory of standards specifically addressing the e-business sector of the textile/clothing and distribution industries [18].

Two important contributors to the TEX-SPIN workshop are the projects Moda-ML and eTeXML. Moda-ML is a project based in Italy and funded by EU IST programme, while eTeXML is a project based in France and nationally funded.
In what follows we give an overview of these projects outlining their main contributions to the TEX-SPIN workshop with a focus on their parts, which are relevant for SUM.

5.1 An overview of the eTexML project

eTexML is a French project nationally funded, coordinated by the Institut Français du Textiles et de l’Habillement – IFTH. The project was initiated in order to set up a set of EDI tools based on XML to allow the manufacturers and retailers to implement a reactive delivery strategy [20].

According to [20], the set of EDI tools comprise the following three components:

1. A dictionary of descriptive information or technical specifications for the garment articles, called DICALIS.
2. A set of XML messages for the downstream part of the textile/clothing/distribution supply chain. The messages describe the information exchanged between the garments manufacturers and the various distribution actors, like retailers and supermarkets.
3. A demonstrative software component to illustrate practically how the XML-based exchange of information is carried out.

A significant component of DICALIS, that we consider relevant to SUM, as well as representing an important contribution to TEX-SPIN, is the development of a Product Classification Code, also known as Thesaurus Code. According to the terminology in [5], this is a regional standard for product description, specially addressing the garments sector. It is artifact-centric, has semantic depth of level 1 (taxonomy), has no meta-content, contains business content and its focus is the domain of product catalogues in the garments sector.

The requirements for the Thesaurus code were set such that the resulting classification scheme to enable retailers and manufacturers to detect fashion trends and to allow the conversion of consumers’ sales data into fashion trend reports [21]. The actors of eTexML developed two versions of the Thesaurus code: a full version and a restricted version. In what follows we give a brief description of the full version only.

The full Thesaurus code describes a four level taxonomy. Therefore a product description code has four parts: product target, model, model description and additional information. The product target has four attributes: user’s type (e.g. man, woman, boy, girl, baby), user’s morphology (e.g. large sizes, basic sizes, small sizes), use of product (e.g. sport wear, work wear) and style of product (e.g. fashion, basic). The model has two attributes: group of [product (e.g. shirt) and product type (e.g. city shirt with long sleeves). The model description contains information that describes the model like components, fabric, color, or pattern. The additional information could be sale information like quantity, size, price, and a.o. [21].
Additionally, eTeXML proposed to upgrade EDITEX by adding two new messages (product data and production control) and upgrading two existing ones (order and dispatch advice) [9].

More information about eTeXML together with the deliverables available for public download can be found on the Web page of TEX-SPIN [18].

5.2 An overview of the Moda-ML project

Moda-ML is a European project based in Italy that runs within the IST framework. The project objective is to facilitate the exchange of technical and managerial information between the companies of a supply chain in the textile/clothing sector. The project is focused on the upstream of the textile/clothing chain, namely on the relation between the textile providers and the clothing manufacturers.

According to [22], the output of the Moda-ML project is two fold:

1. Definition of XML document classes together with associated dictionary of terms for representing the documents exchanged in the textile/clothing sector.
   There are general-purpose documents like order, dispatch advice or invoice and specific documents for the data flow between fabric manufacturers, garment producers and their sub-contractors.

2. Demonstrative software tools for sending, receiving, monitoring and validating the data exchanged.


More information about the Moda-ML project together with the deliverables available for public download can be found on its Web page at [23].

6. Conclusions

This research revealed a number of conclusions that are briefly summarized here:

1. The development of the SUM software should benefit from the existing European and international standardization proposals and initiatives. In particular, attention should be paid to the European workshop TEX-SPIN and to EDITEX, because they are specially targeted to the textile/clothing sector.

2. Devising a flexible internal representation for product information, in order to support the make-to-order concept is of great importance. We appreciate that this insight into product standards will play a major role with respect to this issue.
3. As regarding the horizontal standardization, it appears that SOAP and ebXML will be of major importance for SUM.
4. The problem of applying the existing expertise to SUM is far from being straightforward. The design of messages that are to be exchanged between SUM components should be carefully done and it is a topic of future work in the project.

7. References

3. http://www.mraconsultants.co.uk/sum.htm
7. http://www.w3.org/RDF/
17. http://www.eclas.de