

Towards an european data exchange system for the textile supply chain: MODA-ML

(www.moda-ml.org)

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Framework and scope

Becoming more flexible and responsive to market is a strategic issue for the European Textile-Clothing Industry in the global competition, and the telematic technology can play a fundamental role in it.

The MODA-ML Project follows this philosophy and its aim is improving the communication and information transfer between the enterprises of the Textile-Clothing chain with the ultimate goal of restoring global competitiveness with costs and efforts accessible even to smallest of them.

Today is possible to imagine a WEB-based inter-enterprise communication system which uses XML documents and middleware tools to handle those messages at all levels of "ICT capacity" from very complex and integrated ERP to simple desktop-like applications.

The definition of a common "language" for business data, to be employed in the communication and easily included in any IT solution is a corollary.

The project aims also to suggest the definition of a standard for the sector at European level and, on this purpose, has established relationships with other initiatives and will participate a CEN/ISSS (European Committee for Standardisation) workshop named Tex-Spin. Furthermore the project has an activity of focus group and creation of awareness and consensus that involves single industries and industry trading associations.

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Technology overview

Today, Company Information Systems (CIS) have almost anywhere developed to a point where all the essential information for the company management are handled, stored and retrieved as digital data.

As a consequence, the efficiency of the supply-chain can be improved if the flow of such data/documents can be made easier and cheaper; but these flows are today hampered in their inter-enterprise movement by the fact that CIS are incompatible in semantic, data structure and application architecture.

To make it easier means, above all, to have the business data/documents created by the CIS of an enterprise read and understood by the CIS of any other enterprise without any need of ad-hoc translation code or of manual data re-entry.

The best facilitator for it, in our opinion, is the definition of a "common language" in which to express the information subject to interchange, so that the enterprises of a given Industry chain need a single interface and no other added value services.

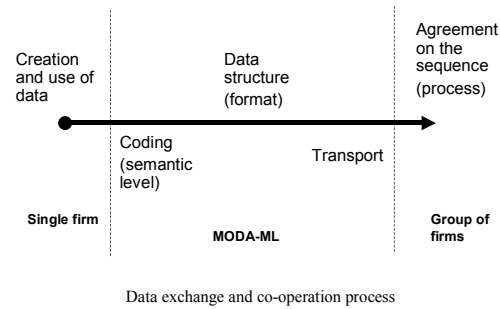
XML (Extended Markup Language) is the Recommendation of W3C (World Wide Web Consortium) on how to create this type of languages, in a way that allows the full exploitation of the Internet technology.

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As we all know, the "common language" issue was not born with the Internet and solutions for data interchange (EDI) among independent CIS by using a standard language have been studied and developed since the '80s of the past Century.

All these solutions (EDIFACT in particular) were valid from a technical point of view and very brilliant from a semantic point of view; however they met with practical limits that prevented their diffusion in the market.

As a matter of fact the best solution (EDIFACT) proved to be an acceptable investment only for big enterprises and/or huge amount of data interchanged.

An attempt to overcome these difficulties has been searched through the introduction of a third party; an example are structures like clearing centers, based on centralised structures that receive, via WEB or other channels, inputs from not-EDI-capable companies and transform them into EDIFACT messages for the EDI-capable partners; often the feedback is sent on dynamic WEB pages.

XML seems to meet both the requirements of scalability and independence from third parties, and this appears to best fit the case of the Textile-Clothing Industry, which is mainly composed of small and medium enterprises and, in many countries, of family-sized retailers, and therefore the research for more compatible EDI solutions is now looking at the XML world, while keeping all the value created by the former application of EDIFACT to such Industry (EDITEX).

The plus of XML is certainly to provide a way to overcome the limits that have hampered the diffusion of EDIFACT in the Textile-Clothing Industry, mainly: the insufficient flexibility of the standard messages, the poor "readability" of the data content (human understanding of the meaning of transmitted data) and the relevant cost of message integration into the CIS.

On the contrary, XML presents developers and users with:

- more flexible document classes, based on objects re-usable at any level of "granularity"
- easily understandable semantic, based on "markers" that can become user readable
- freeware tools for the basic handling of the electronic documents.

The minus of XML is that it does not define any ready-to-use standard language (i.e. standard names of "markers") but only the rules to build one (or many) standard language.

So, many Groups concerned with EDI or E-commerce have engaged in the building of such languages via XML, both general-purpose (horizontal) and sector-specific (vertical).

The majority of them seems to have drawn from the EDIFACT semantic, each one however using its own specific principles to re-write the EDIFACT Directories into the Mark-up Language, and so the technological progress embedded in XML is potentially to break down the "unification of language" reached by EDIFACT bringing us back to the times of the former semantic caos that EDIFACT had overcome.

To re-build and diffuse a new common language for data interchange in the Textile-Clothing chain at all levels is the technical essence of MODA-ML.

Aims of MODA-ML

1. Definition of a set of type of XML documents and related dictionary of terms:

A set of documents derived from the set of EDITEX documents, that is an implementation of the general EDIFACT document specifications (like purchase order, order response, dispatch advise, etc.) integrated with some documents more specific for the T/C supply chain (like quality certificate or buyers' option).

The documents are not simply a one-to-one translation from the EDITEX syntax to an XML syntax. Starting from a common dictionary of terms and codes the documents aim to better exploit the XML features of **human readability, flexibility and content structuring**.

2. Creation of simple software modules, of public domain, that implement and demonstrate an architecture for the middleware to manage the documents.

After the development, they are tested in real transactions of the industrial partner of the project; they aim to facilitate the integration with the internal company information systems and to face the issues of transport, security and confidentiality of the data flow.

Thank to these tools, the small and medium enterprises are enabled to receive, send and browse XML documents, simply approaching a data base installed even on a Personal Computer (ODBC data bases, like MS-Access) and connected to the e-mail of Internet.

The larger and more skilled companies will be able to **manage directly the documents** with their own tools (or through a part of the MODA-ML software that is free and 'open source') because the format is public and easily readable.

Results

At the end, the Project wants to develop a **global tool** for the European Textile-Clothing Industry, by which higher inter-operability among the partners of any supply-chain can be attained.

This tool has three components:

- the **Vocabulary** of the words that compose the "common language" to be used in the data interchange
- the **Repository** of the XML document models
- a public **document exchange Protocol** (based on SOAP) with a demonstrative **Software** to manage the handling and transmission of the document instances, specifically aimed at facilitating the SMEs in the transport and integration in the in-house systems.

The Vocabulary shows the public definition of each semantic unit or aggregate, i.e. its meaning and its type of computer representation, and therefore:

- the identification tag
example: *<msgnumber>*
- the description
example: *id number assigned to the document by the issuer*
- the format, the maximum (minimum, fixed) length, the range of permitted values, the code list, the rules to abide, etc...
example: *string, max lenght = 25*

The document models or templates specify which data, in which sequence (hierarchy) and with which cardinality make up a typical standard interchange functional set (e.g.: Order, Despatch Advice, Invoice, ...).

The following example refers to the Purchase order of fabric.

fabricPurchaseOrder

@ POType (standard | blanket | calloff) [required]

header (Header) 1-1

msgnumber 1-1

msgdate 1-1

...

body (Body) 1-1

item (Item) 1-N

@ nrif [optional]

lineN 1-1

texProdCod (TexCod) 1-2

@ codIssuer (supplier|customer|ean) [required]

art 1-1

pattern 0-1

color 0-1

add 0-1

selvedge (Selvedge) 0-1

slvText 1-1

slvCol 0-1

treatments (Treatments) 0-1

surfTreat 0-1

finishCyc 0-1

oneLot 0-1

mtrMark 0-1

qty 1-2

@ um (mtr|yrd|pz) [required]

price 0-1

@ um (mtr|yrd|pz) [optional]

percentDisc 0-1

trdParty (Nad) 0-1

@ role (consignee) [required]

...(continue)

Within MODA-ML, all these templates are described using the “XML Schema” Recommendation issued by W3C specifically for use in EDI.

A very important plus of the XML Schema is that it allows you to formulate all the data validation rules in a standard computer readable form.

In other words, all the instructions needed by the computer to check the correctness of the electronic documents imported/exported can be read from the Schema itself by any XML-compliant freeware. This reduces a lot the effort to validate the incoming and outgoing documents that, previously, required the development of completely *ad hoc* tools.

For each functional set an XML Schema and an XSLT Transformation are published, the latter to be used where it is required to turn any document instance (xml file) into a html page (readable with a standard browser).

The whole set of MODA-ML Schemas and Stylesheets is supported by the MODA-ML Vocabulary published on the Web.

It is interesting to observe that this approach facilitates the creation of families of documents that are based on the same vocabulary and have small variations in their structure (an '*XML Document factory*' could be the appropriate metaphore).

From the same website the companies will be able to download the free MODA-ML software prototype and will find some test facilities.

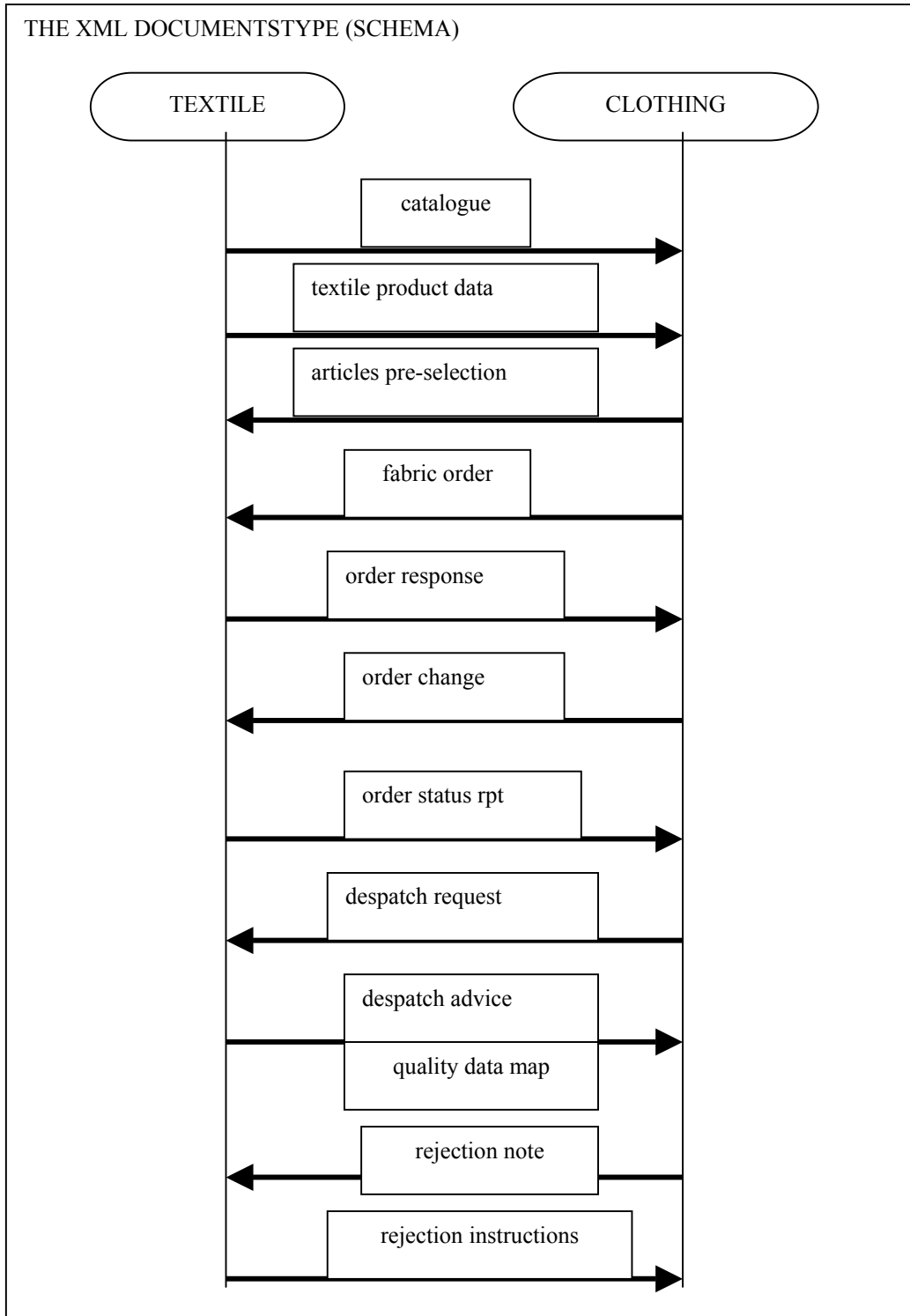
In this way, Textile-Clothing companies of all technology profiles:

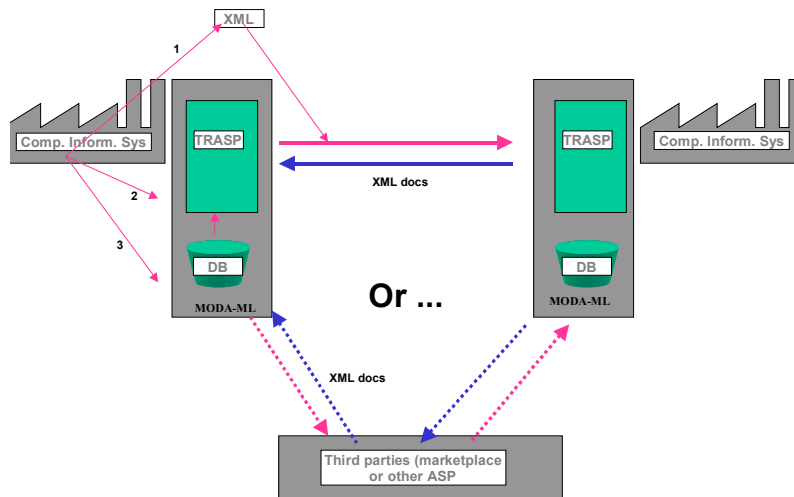
A- companies with Information Systems that can provide automatic processing of received documents

B- companies with Information Systems that need the manual input of received documents data

C- companies that only have “Office-type” Applications running on a desktop
 can inter-operate smoothly over the Net and setup an effective business communication system.

MODA-ML has delivered to the Textile and Clothing companies the following **functional set** as XML documents:





The data from the company information systems can flow through three ways:

- 1) sending directly XML docs
- 2) writing XML docs and then using the Messaging system
- 3) accessing the Integration system

Furthermore, they can be addressed directly to the partner or to a third party system

The demonstrative software and its system architecture

The MODA-ML software station, offered as freeware tool, provides the company with all the functionalities needed to operate in full autonomy as part of the Web-integrated Supply Chain.

It is important to observe that the demonstrative software is realised with the aim to demonstrate how the XML exchange service can be realised (its source will be freely available), but it is not necessary to exchange documents following the MODA-ML public protocol.

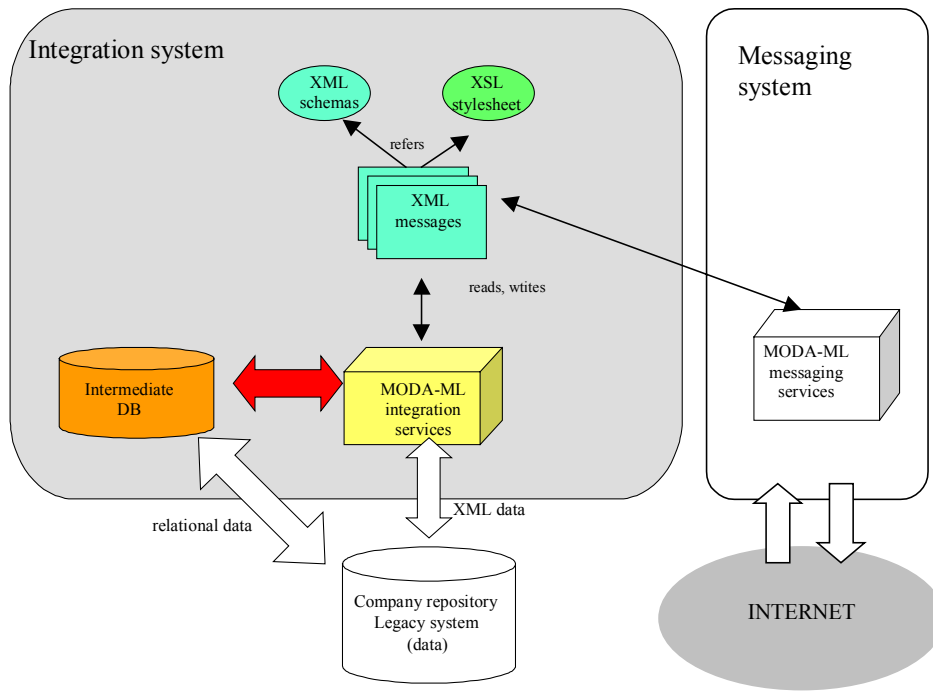
The Software is made of two sub-systems, easily integrable with any company system:

1. **Integration system**, which interfaces the CIS of the companies and ensures the processing of the incoming messages
2. **Messaging system**, which manages the interchange of messages over the Internet, calling an SMTP-based transport layer

The integration system:

- provides standard data entry interfaces for message creation and editing (intended for companies which haven't a business document processing system);
- provides a relational repository (named "intermediate database") to store all sent or received messages (we preferred this solution rather than using an XML repository because, presently, it is a more reliable technology and does not make more difficult the technology transfer process). The repository can be interfaced both exchanging XML data (by using standard XML API) and exchanging relational data (by using call level interfaces like ODBC)⁵;
- provides services to extract messages in XML format which are already stored in the intermediate database, and to store new messages received in XML format;
- provides services to pack (and unpack) XML messages in a flexible transport protocol, over the Internet, based on SOAP (the use of SOAP protocol has been decided because it is compatible with the ebXML messaging service specification and satisfies the need for business partners to exchange structured data over the Web independently of each other's underlying information system platform and structure and by using various transport protocols like HTTP, SMTP, FTP, so passing through firewalls);
- validates XML messages by using the corresponding XML schemas;
- provides standard XML messages transformation to HTML pages, by using XSL.

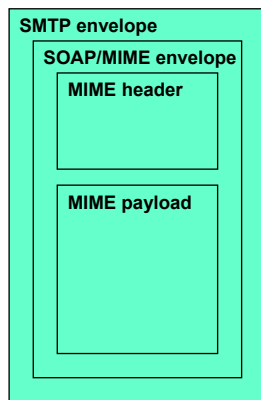
⁵ the first choice is recommended; nevertheless, the system supports direct relational connection to the intermediate database for those companies which are not on familiar terms with the XML technology.



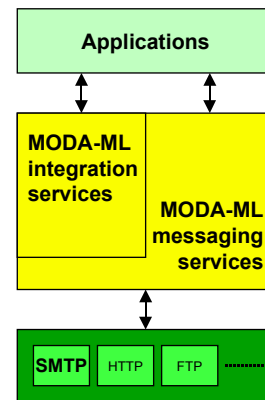
Activities are performed to add a multichannel interchange feature to the system: a message will be interchanged by using different channels. For example, an XML order will be sent via email or via fax or both. A company profile will define the preferred channels and the interchange practices of the involved users.

The messaging system:

- sends/receives messages in an e-mail like way
- provides security, acknowledgement and error handling facilities.



The message structure



The messaging and integration services architecture

The actors of the project

The industrial partners of the project are Fratelli Corneliani SpA (garment producer), Fratelli Piacenza, Vitale Barberis Canonico, Ing. Loro Piana e Reda (Weavers); these firms are active actors in the project and are involved, since the beginning, in the requirement analysis and in the validation of the results.

The technological partners are research institutes, as ENEA (coordinator), Politecnico di Milano and the French institute IFTH (Institut Francais Textile Habillement), consultants and ICT firms as Gruppo SOI and Domina of Biella.

The **focus groups** and the **newsletter** of the project are addressed to the T/C firms and to the technology and solution providers, with the aim to inform and collect feedback and comments to improve the generalizability of the project results (you can subscribe in <http://www.moda-ml.org>).

The project started on July 2001, will end on December 2002, a first release of results, XML documents and software, was delivered on November 2001 and a second one is planned for May 2002.

Conclusions

The project offers to the T/C firms and to the technology suppliers a proposal of a neutral format for the data to be exchanged with the aim to avoid the growth of a sort of 'Babel Tower' of proprietary and not interoperable formats and languages; the advantages of this proposal are clearly interesting for both the categories.

XML (and the related technologies like SOAP) appears to well fit the needs to create a common framework for the interchange of data between independent systems and matches the needs to facilitate the access of small and medium sized enterprises with poor ICT skills.

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