Project IST-FP6-026476 SEAMLESS
"Small Enterprises Accessing the Electronic Market of the Enlarged Europe by a Smart Service Infrastructure"

STREP – Information Society Technologies (IST)

Deliverable D2.4

TEX Sector Ontology

Workpackage WP2 – Knowledge and Languages
Task T2.4 – TEX sector specific knowledge

Abstract

This document presents the results of the work carried out in workpackage WP2 "Knowledge and Languages" and, specifically, in task T2.4 "TEX sector specific knowledge". It describes the global ontology of the textile sector (TEX GLOB), that is, data structure, concepts and terms that are considered necessary and sufficient to enable communication and collaboration between companies belonging to the textile sector.

The document describes the sources from which the TEX GLOB has been derived, by extension of the SEAMLESS core ontology, including some textile ontologies developed in previous projects. Then it presents the TEX GLOB data structure as UML class diagram, and its mapping with the homologous B&C GLOB of the building and construction sector. Finally, the document introduces the translation process that, stating from the TEX GLOB vocabulary written in English, led to generate the corresponding common ontologies (COMMs) in different local languages (Romanian, Slovakian, Spanish).

Since the mentioned GLOB and COMM ontologies are made of thousands concepts and terms they are not included into this document but provided as annexes.

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1 Executive Summary

This document presents the results of the work carried out in workpackage WP2 “Knowledge and Languages” and, specifically, in task T2.4 “TEX sector specific knowledge”. It describes the global ontology of the textile sector (TEX GLOB), that is, data structures, concepts and terms that are considered necessary and sufficient to enable communication and collaboration between companies both belonging to the textile sector.

The idea of global ontology (GLOB) was introduced since the beginning of the SEAMLESS project and detailed in deliverables D2.1 and D2.2 where the ontology editor, mapper and translator are described and technically documented. Basically, a global ontology is intended as the domain knowledge for a certain sector (sectoral global ontology) or as the knowledge for inter-sector collaboration (generic global ontology).

In the frame of this project two sectoral global ontologies (TEX GLOB and B&C GLOB) and a generic global ontology (GEN GLOB) are defined and respectively documented in this D2.4, in D2.3 and in the extra deliverable D2.b. In order to assure they share a minimum set of concepts for semantic roaming between GLOBs they all are build by extension starting from a core ontology (CORE) documented in turn in the extra deliverable D2.a.

In analogy with the other global ontologies, the TEX GLOB is constituted of three fundamental components, namely the data model, the taxonomy and the vocabulary. the data model is defined by extension of the CORE by taking into account the findings from previous RDT projects in the textile field, in particular the TEXWEAVE project. The TEX taxonomy has been derived in turn from results achieved in previous projects, especially the BUSCATEX project. Finally, the TEX vocabulary is the union of the taxonomy terms and of those terms that have been introduced to characterise closed concepts and options in the TEX data model.

After having defined the TEX GLOB a new phase started with the objective to derive from it the foreseen common ontologies (COMMs) for the textile-oriented SEAMLESS nodes, respectively in Romania, Slovakia and Spain. The work was carried out by the appointed mediators, namely ATC ROM, PRC SCCI and AITEX, with a strong interaction among them so as to clarify certain concepts and definitions and reach an homogeneous result. The work is completed it time to be used in the current pilot preparation phase as, devised by task T5.1.

This document is subdivided into three main chapters and seven annexes:

- Work methodology. The chapter recalls the state-of-the-art and the main standards in the intended field, then analyses in some detail the TEX WEAVE data model and the BUSCATEX taxonomy as main sources of information for the definition of the TEX GLOB. Finally, the global ontology construction process is briefly described.
- The TEX GLOB. The chapter presents the main result of task T2.4, that is, the textile global ontology and its components. The details of the TEX GLOB data model are reported in Annex A to this document, those of the TEX GLOB taxonomy in Annex B, and those of the TEX GLOB vocabulary in Annex C. Finally, the mapping file between TEX and B&C data models is reported in Annex D.
- The derived TEX COMMs. The chapter introduces the devised common ontologies of the textile sector that are needed by the textile mediators of the SEAMLESS project, namely ATC ROM (Romania), PRC SCCI (Slovakia) and AITEX (Spain). Their vocabularies translated into the respective languages are reported, respectively, in Annex E, Annex F and Annex G to this document.

This document is concluded by some final remarks on the work to carry out in the next period in order to refine, is necessary, the textile GLOB and COMMs and train mediator operators on their use to annotate the local ontologies of the involved user companies.

The document is public. The intended audience includes the following categories of possible readers:

- Mediator partners in the SEAMLESS consortium. Deliverables D2.3 and D2.4, together with the extra deliverables D2.a and D2.b, constitute the basis (and a wide and rich variety of cases) for generating at best the operational common ontologies that each mediator must adopt.
- Possible followers. The full success of the SEAMLESS project will be achieved when a critical mass of users organised by many mediators will use the network and its services to collaborate across boundaries and sectors. Then, this document is addressed to those organisations that, for their nature and mission, are potential candidates to behave as mediators.
- The other projects of the DE cluster. The mentioned deliverable describing global ontologies are a very important and useful achievement the SEAMLESS project is pleased to make available to the other projects of the DE cluster. The value of this knowledge sharing is in the direction of establishing better conditions for mutual understanding of concepts that, in case of this deliverable, are specifically addressed to textile operators.
- Academia and research institutions. The SEAMLESS global ontologies are sets of organized concepts that can be useful to researchers in the knowledge management and mapping fields. By their analysis it is possible that hints can come to the SEAMLESS project for improving the global ontologies and then obtaining better versions for practical usage.

2 Work methodology

This chapter recalls the state-of-the-art and the main standards in the textile field, then analyses in some detail the TEX WEAVE data model and the BUSCATEX taxonomy as main sources of information for the definition of the TEX GLOB. Finally, the global ontology construction process is briefly described.

2.1 State-of-the-art

Ontologies are crucial if we want to communicate different actors in a sector or a cross-sectoral scenario, and also the use of standards & interoperability, is a field of great importance in the industrial world in general, and in this specific case, in the textile sector. The topic grows in importance, if the implied actors are Small and Medium Enterprises, in advanced, SMEs. There are some advances made in other sectors, but very little in textile, as it can be concluded after this State of the Art. Nowadays, the textile sector is not in its best situation, because of the "free" importation of articles coming from China and East countries, and the companies need help in many aspects. Having a standard for interoperability and a good textile ontology in the textile sector, would help in order to produce goods and services quickly, at lower cost, while maintaining higher levels of quality and customization.

An exhaustive study of the current state of the art in the textile sector is presented from two points of view: the **technological** and the **standards**, with the objective of clarifying the current state of the specifications and standards addressed to the electronic commerce – in the broadest meaning-, taking into account both its technological level and its relative state of application in the industry.

2.1.1 Technology

Different technologies have been analysed in order to know its extension and importance.

2.1.1.1 Ontology

"E*xplicit specification of a conceptualism"*. The ontology is used for specifications in an explicit way of a system of concepts (belonging to a domain) and the relations among them. Although the use of the ontologies is not new in the knowledge field, the theme received a major attention when people began to realize that the information in the Website and the information used in the business processes, could not be used in a proper way unless there would be an agreement in the terminology used.

There are different technologies for expressing the ontology:

-*RDF* [1]: Developed by the World-Wide Web Consortium (W3C) and based in Web technologies. RDF is oriented to different application areas, such as resources descriptions, electronic commerce and collaborative services, among others.

-*DAML+OIL* [2]: This is a simple language used for expressing definitions, classifications and more complex characteristics.

-*OWL (Ontology Web Language)* [3]: It is designed by the ontology web development group of the W3C, and they use DAML+OIL as a basis. The main objective is to develop a language that can be used in applications that need understanding the content of the information. OWL offers a major legibility of the Web content, and gives an added vocabulary for the descriptions of the different terms.

The technology used to represent the Textile Ontology is OWL, and the SEAMLESS tools developed are able to import and export from and to OWL.

2.1.1.2 Business Process

The Business Process technologies are the methodologies used for the description of the business processes. The aim of modeling the business is to describe each business process, specifying the data, activities (or tasks), roles (or agents) and business rules.

There are different technologies for expressing the business process:

- *SADT (IDEF0)*: *Integration Definition for Function Modeling*. These models consist of a sequence of hierarchical diagrams with texts and crossed-references between both, represented by rectangles or boxes and arrows.

- *EbBPSS* [4]: *ebXML Business Process Specification Schema*. It provides a standard framework, so that the business systems can be configured and in this way, they can support the execution of business collaborations such as trade relations.

- *BPEL4WS* [5]: *Business Process Execution Language for Web Services*. It defines a notation for specifying business processes based on the use of Web Services. Using this notation, processes can be described in two ways: as the real behaviour of a participant during the execution of a business process, or as a business protocol, through the description of the processes that specify the behaviour of exchanging messages coming from each implied actor, without revealing the internal behaviour of each of them.

- *BPML* [6]: *Business Process Modeling Language*. It offers an abstract model for defining collaboration processes and trade transactions. The definition of these processes and transactions is based on the concept of a finite states machine.

- *Not structured*: This point is not referring to one concrete standard, but it has been included because many of the standards that are working nowadays (specially these quite mature) define the process models following no methodology, but they are based on text explanations of the business processes, in such a way that it is only useful for the human and they are not described in a way that the applications could profit directly it.

2.1.1.3 Conceptual data model

A conceptual data model is a representation (usually graphic) that represents the different elements intervening in a problem, and describes them through their attributes, functionalities and relations.

There are different technologies for expressing the conceptual data model:

- *UML* [7]: *Unified Modeling Language* is a visual modeling used for specifying, visualizing, building and documenting software systems.

- *ISO STEP* [8]: ISO-10303, is also called STEP: *Standard for the Exchange of Product data model*, is an international standard for the interchange of product data, which has been developed under the ISO support. It provides a complete description, no ambiguous and usable by the applications of the physical and functional characteristics of a product.

- *ISO Plib*: This initiative of standardization was launched in 1990. Its objectives are developing a representation interpretable by applications of the different data forming part of a product, in such a way that this information can be interchanged between suppliers and users.

- *Schema / DTD*: A DTD or XML Schema is a document that defines the different elements that can appear in a XML document. It defines also the relation between them, their attributes and the different values that they can adopt. It is a kind of grammar of the document. The documents, that fit to a DTD or Schema, are classified as valid. The validity concept has nothing to do with the one of “being well constructed, formed”. A well formed document simply respect the structure and syntaxes defined by the XML specification. A “well-formed” document, can be also “valid” if it performs the rules of a DTD or Schema determined.

2.1.1.4 Physical data model

The physical data model is referring to the way of storing the information (format). There are different technologies for expressing the physical data model:

- *XML* [9]: *Extensible Mark-up Language*. It is a recommendation of the World Wide Web Consortium for the building of data that can not be managed directly using the basic set of elements defined in HTML. XML is broadly accepted at these moments as a generic method for the interchange of information between applications through Internet. Particularly, it is vastly seen as the best solution for interchanging trade datas. XML defines how to declare and to use the logical and physical components in a XML document, defining the concept of “type of document” through the use of the DTD/Schema.

- *ASCII*: It is referred to the transmission of information in a plain format, with a bit of organization. It is used by standards such as EDI.

- *Step Part 28*: The 28th part of STEP (ISO 10303-28) define a set of XML elements for the representation both of Schemas Express and of the data included.

The XML technology is used for the documents of the Data Model in the SEAMLESS.

2.1.1.5 Interchange protocols

Interchange protocols specify how to transmit the information from one place to another. Formly, a protocol is a set of rules, that establish how the computers must communicate through the networks, minimizing transmission errors. They transmit the information fragmented, in order to not collapse the network services.

There are different technologies for expressing the interchange protocols:

- *oFTP*: Odette File Transfer Protocol, is a high level protocol applied to send EDI messages, and at the same time it is based on the physical transmission of messages through the interchange protocols X.25.

- *FTP [10]*: The main objectivea of the *File Transfer Protocol* are to promote the sharing of files (between applications and/or data), to protect the users of the different versions of a file existing in different places where the information is stored, to transfer the data in an efficient way. FTP was designed mainly for being used between applications.

- *SMTP*: *Simple Mail Transfer Protocol* is the protocol that implies what is known as “e-mail”. The main objective of SMTP is to deliver the messages in the users’ mailboxes.

- *S/MIME*: *Secure MIME* are some specifications that work based on SMTP/MIME and that provide the e-mail with the characteristics of digital signature and data encryption, through using digital certifications.

- *HTTP/HTTPS* [11]: It is the most used TCP/IP protocol, because it is the protocol that supports WWW. HTTP is a protocol with the lightness and the speed needed to support collaborative information systems distributed. HTTPS was developed for adding security to HTTP.

- *SOAP*: SOAP is a simple protocol based on XML for interchanging structured information through Internet.

- *CORBA*: CORBA is an open Standard for the distributed computation.

- *COM/DCOM*: Distributed Component Object Model of Microsoft, allows to call the remote objects in the high part of the mechanism DCE RPC and that interact with the COM services executing at this moment.

- *RMI*: The Remote Method Invocation allows to create distributed Java applications, in which the methods of remote Java objects, can be invocated from a Java Virtual Machine, possibly installed in a different computer.

In the SEAMLESS Project it is used Internet and http/https, s/Mime to access and exchange information

2.1.1.6 Functional Interoperability

It is understood as interoperable technologies the set of technologies that integrate a reference framework where different functions exist, such as registries, physical data models, interchange protocols, etc.

- *Web Services*: Web Services is a recent technology, that promises the interoperability between heterogeneous and distributed work frameworks.

2.1.2 Standards

2.1.2.1 B2B Frameworks

B2B Horizontal Frameworks

- *EDIFACT*: EDI for Administration Commerce and Trade is an EDI standard of the Technical Committee 154 of ISO accepted in 1987, and developed from two standards EDI already existing: the JEDI from United States and the standard from the ONU, used in Europe. As any standard EDI, UN/EDIFACT consists of the definition of the electronic business independently of the technology and the used machine.

- *EDI/XML*: It is a generic name referring to different initiatives trending on to facilitate the exploitation of EDI solutions based on XML standard. The objective is to provide an improving method for allowing the EDI messages' users integrate their processes in an easier and available solution, bringing near the liberty and low costs of Internet technology to the users. These initiatives have been exceeded by other advances much more complete in their approach, such as ebXML.

- *Biz Talk*: It is leadered by Microsoft. Its approach to the interoperability is independent of the platform and the technology with a proprietary approach. It provides specifications for the design and development of solutions based on XML messages for the communication between applications and organizations.

- *ebXML*: The formal definition of ebXML is: "A single set of internationally agreed upon technical specifications that consists of common XML semantics and related document structures to facilitate global trade". ebXML is a coherent set of standards for services, products and methods in the area of e-business.

- *RosettaNet*: It is a non profit association that represents different high-technology industrial companies and other companies such as American Express, Microsoft, Netscape and IBM.

- *OAGIS*: It is a strategy promoted by the Open Applications Group, that is a group focused on the good practices and processes based on XML for the e-business and the integration of applications.

- *VICS CPFR ®:* The *Collaborative Planning, Forecasting and Replenishment* [12] is a process model that considers the necessary steps for the management of the collaborative planning between companies.

- *ARTS:* The *Association for Retail Technology Standards* is the association for technology Standard in the retailer commerce.

- Uniform Code Council – UCCNet GCIP. UCCNet is a non profit organisation that develops standards for identification codes, structure for data transport and e-commerce for different industries.

B2B Sectorial Frameworks

- *Odette*: It is an organization of the automotive sector in Europe. Its standards were originally focused on the communication in the e-business. They defined the OFTP.

- funStep eBusiness: FunStep is a Standard for the data exchange of furniture product data.

2.1.2.2 Data Models

Horizontal Data Models

- *UBL*: Is a set of standard formats for e-business common documents, such as invoices, orders and order responses.

- *xCBL*: *XML Common Business Library* is a set of blocks to build XML documents and a framework for the XML documents creation.

Vertical Data Models

- *funStep AP236*: It is an application of the STEP Standard in the furniture sector.

- *IFC*: *Industry Foundation Classes*. It is a standard promoted by the building and construction industry.

- *AP225*: It is a protocol of STEP application, titled: "*Building elements using explicit shape representation*".

- *AP214*: It is the Core Data for Automotive Mechanical Design and Processes (a protocol of STEP application).

- *FINEC*: Footwear Industry Electronic Commerce is an standardisation workshop.

2.2 Textile sectoral standards

2.2.1 European Union

-*Tex-Spin/Moda-ML/eTexml*: Tex-Spin (*Textile Supply Chain Integrated Network*) It is a CEN/isss standardisation workshop, hold by the MODA-ML project, financed by CE and a national project in France: eTeXML. The MODA-ML standard proposal is focused on the messages exchange between fabrics suppliers and clothing producers. The proposal includes a process model and a list of XML documents, and also their guide of use. The technical scope follows the XML/EDI philosophy. The Tex-Spin has valorated the set of XML documents based on EDITEX and has made an analysis of requirements for future improvements of the implementation guide. It recommends a low technological level for the data transport (SMTP, FTP) and uses XSLT.

- *TEXWEAVE* [13]: It is the last CEN/isss workshop in textile, whose main aims are to provide the textile and clothing sector with a framework for interoperability based on standardized electronic document exchange based on XML schemas and Internet, and to foster the framework's adoption in the real business communities.

The TEXWEAVE scope is the subcontracting processes: upstream of the textile value chain, and it is the standard chosen to be used as the Data Model in the SEAMLESS Project.

2.2.2 United States

-*FASLINC*: The Fabric and Supplier Linkage Council was created for adapting the EDI X12 standards to the specific needs of the textile companies and their suppliers.

-TALC/SAFLINC: Textile Apparel Linkage Council & the Sundries and Findings Linkage Council developed e-business standards for the garment industry.

-Retail commerce: There are many standards for the retail commerce, more or less adapted to the textile sector. For example UCS (Uniform Communication Standards), WINS (Warehouse Information Network Standard), …

-*DAMA*: Demand Activated Manufacturing Architecture. Its objective is the definition of an information architecture that lets the coordination of the whole textile value chain and pursues to shorten times of delivering to the final consumer.

-*Interchange products data in the production area*: There are different standards in this area, such as: ASTM.dxf, DXF/AAMA, AAMA/ARC, APDES, etc.

2.2.3 Asia

-*TeXML*: It is a proposal of standard managed by TEBSS Corporation (Organization for Textile E-business Standard Solution) in Corea, supports ebXML specification.

-*TIRA*: Japan Small and Medium Enterprise Corporation-Textile industry- develops sets of messages since 2001, inside the JIPDEC framework.

-*MATIC*: It is a project where 9 different organizations cooperate in order to improve the tehnology in different sectors including textile.

After this State of the Art, AITEX reached some conclusions about which technologies and standards were good to use for building the textile ontology and the textile data model. In that sense, OWL was chosen for building the textile ontology through one national project called BUSCATEX and regarding the Data Model, AITEX joined up the European Group of Standardisation in the Textile Sector, and AITEX was involved in the TEXWEAVE initiative, a CEN/isss Workshop, and this model has been taken as a base for SEAMLESS.

In the following sections they will be analysed in detail.

2.3 The TEXWEAVE data model

The TEXWEAVE Data Model is one of the main sources for building the TEX GLOB. The Textile Data Model to be used in the SEAMLESS Project, is generated from the TEXWEAVE Data Model, because it is a "living" initiative for data standardisation in Europe and it is supported by the CEN/isss and two textile mediators of the SEAMLESS Project are also involved and in touch with this initiative: AITEX and ATC ROM. After carrying the State of the Art presented before, the option of joining us to the European Standardisation Initiative was the best because it is the only one that has activities nowadays, and it fulfils our requirements about the technology used and so on, they are using XML documents, schemas and DTDs and we have tested some documents with some companies in order to test if this standard fulfilled the Home Textile sub-sector requirements. Furthermore, nowadays, there are some companies using it. But the TEXWEAVE Data Model is too huge and complex, it consists of 27 commercial documents, and in the SEAMLESS project we will use only 4 from these.

TEXWEAVE is a CEN/ISSS [14] standardisation Workshop, promoted by EURATEX (The European Textile Association): "Standardisation and interoperability in the Textile Supply Chain Integrated Networks". TEXWEAVE is an integral part of an ambitious strategic project to make the textile distribution chain more innovative, flexible, customer oriented and dynamically interoperating.

TEXWEAVE stands for Standardisation and Interoperability in the Textile Supply Chain Integrated Networks and has the ultimate objective to provide the Textile/Clothing sector with a framework for interoperability based on standardised electronic document exchange based on XML Schemas and Internet and to foster its adoption in the real business communities.

The Textile and Clothing sector is characterized by a tendency to create sub-sectoral communities based on industrial districts or product typology. A number of local e-Business "dialects" born for internal use inside these communities have been applied to proper e-Business platforms (Marketplaces, ASP, etc.) all around Europe. If this is unavoidable, a higher-level standard business semantic to make these e-Businesses "islands" interoperable is an urgent need felt by almost everybody operating in the market.

WS/TEXWEAVE has the objective to provide the Textile/Clothing sector with a framework for interoperability based on standardised electronic document exchange based on XML Schemas and Internet and to foster its adoption in the real business communities.

WS/TEXWEAVE has been built upon the results of the **WS/TEX-SPIN** and other pilot projects (**Moda-ML,eTexML, VISIT eChain, WWS Profil, TextileBusiness**), which were concluded in previous years (TEX-SPIN results are collected in CEN/ISSS CWA 14948, March 2004).

WS/TEXWEAVE has extended and consolidated the technological results of TEX-SPIN and has supported the creation of critical mass for their widespread adoption by industry. This objective is pursued adding more flexibility and capacity to deal with business communities and giving more emphasis to the sharing of common dictionaries and business models.

Detailed Workshop activities:

1. Extension of the process coverage to new businesses, beyond the results of TEX-SPIN, thanks to an improved framework of business scenarios, an enlarged XML Dictionary and new templates of XML documents. The final specifications have been published as CWA (CEN Workshop Agreement) 15557:2006 "Scenarios and XML templates for B2B in the textile clothing manufacturing and retail" [15]

2. New standardisation supports that simplify the maintenance and dissemination of the XML (for example online documentation and dictionary)

3. Identification of cross-sectoral standardisation scenarios and business models.

4. Disseminate and create awareness across the business community and the stakeholders in the T/C sector (public events, web site, help desk and training)

5. Establish TEXWEAVE pilots through an adaptation and integration of already existing products and platforms.

The scope covered in the TEXWEAVE initiative is mainly the upper part of the textile value chain regarding to subcontracting processes with suppliers etc. It can be shown in this picture 1.:

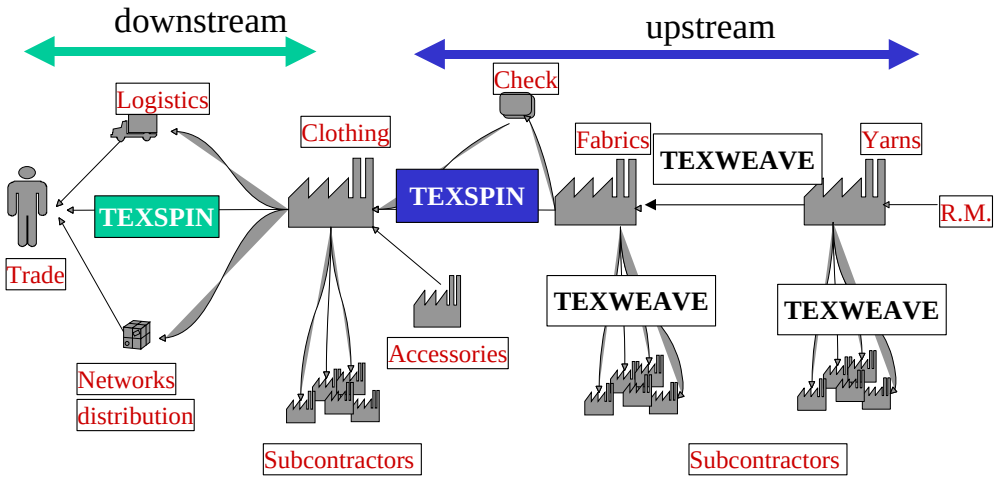

Fig.1: Scope of the TEXWEAVE initiative

Due to administrative problems caused by changes in the European Commission contractual rules for standardization the tasks 2, 3, 4 and 5 were not completely accomplished but task 1 was completed and produced the CWA 15557:2006 and all the XML schemas and related documentation that has been published on the web site of the project.

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Table 1: TEXWEAVE members

The complete set of messages to support the new Collaboration Scenarios (TEXWEAVE) is shown in the table below.

Message Short Name	**Message Full Name**	**Message Description**	**From … To …**
YARNDyeOrder	Yarn-dyeing order	Dyeing commission order for a yarn	From: Yarn Producer To: Dying Sub-contractor
WARPOrder	Warping order	Warping commission order	From: Fabric Producer To: Fabric Subcontractor
TEXWEAVEOrder	Weaving order	Weaving commission order	From: Fabric Producer To: Fabric Subcontractor
TEXDyFinOrder	Textiles Dying-Finishing Order	Dyeing-finishing commission order of a fabric to a Subcontractor (contains the parameters and the sequence of the operations to be performed)	From: Fabric Producer To: Dying Sub-contractor
TEXPrintOrder	Textiles Printing Order	Printing commission order of a fabric	From: Fabric Producer To: Print shop
YARNDesAdvise	Yarn Despatch Advice	Despatch Advise sent by a Yarn Supplier	From: Fabric Producer To: Fabric Subcontractor
TEXDesAdvise	Textiles despatch advice	Advice for despatch of fabric sent by the Supplier.	From: Fabric Producer To: Apparel Producer or Fabric Controller
TEXDesRequest	Textiles despatch request	Request for despatch of fabric (allows to specificy destination and delivery date)	From: Apparel Producer To: Fabric Producer
TEXInvoice	Textiles invoice	Invoice used to debit fabric supplies and accessory or miscellaneous services	From: Fabric Producer To: Apparel Producer

TEXCatalog	Textiles catalogue	Trade document containing the prices and the technical properties of the textiles articles offered by the manufacturer.	From: Fabric Producer To: Apparel Producer
TEXCollection	Textiles collection	Document used by the Apparel Producer to inform the Fabric Producer about the articles of his interest or expected supply and foreseen volumes of production (no details on colours and variants)	From: Apparel Producer To: Fabric Producer
TEXDarnOrder	Darning Order	Order sent by the Fabric Producerr to the Darn Subcontactor to request the darning services (reports the list of the darning operations and related information for each)	From: Fabric Producer To: Darn Subcontractor
TEXDarnReturn	Darning Order Return	Work report sent by the Darning Subcontactor to the Fabric Producer to notify the execution of the darning services	From: Darn Subcontractor To: Fabric Producer
TEXKitDesAdvice	Garment kit despatch advice	Despatch advise of a garment kit sent by an Apparel Producer or by a Logistic Operator or Fabric Producer on his behalf to a Apparel Subcontractor	From: Fabric controller To: Apparel Producer or to Apparel Subcontractor
TEXKitDesRequest	Garment kit despatch request	Despatch request of a garment kit sent by an Apparel Producer to a Logistic Operator or Fabric Producer	From: Apparel Producer To: Fabric controller
TEXOrdChange	Textiles order change	Order Change sent to the Fabric Producer (allows to change destination, quantity, delivery date)	From: Apparel Producer To: Fabric Producer
TEXOrder	Textiles purchase order	Purchase order to the Fabric Producer	From: Apparel Producer To: Fabric Producer
TEXOrdResponse	Textiles order response	Order Response sent by the Fabric Producer	From: Fabric Producer To: Apparel Producer

		(enables changes to the order).	To: Apparel Producer
TEXOrdStatus	Textiles order status report	Report of the Order status of fabric (informs about the foreseen delivery date)	From: Fabric Producer To: Apparel Producer
TEXQualityRpt	Textiles quality report	Quality report of the fabric piece (contains defects or non-conformances of the pieces, eventually the related bonuses)	From: Fabric controller To: Fabric Producer or to Apparel Producer
TEXRecAdvise	Textiles receiving advice	Receiving Advise of the goods received upon purchase or for commissioned works	From: Fabric Subcontractor To: Fabric Producer
TEXSheet	Textiles sheet	Fabric technical sheet	From: Fabric Producer To: Fabric Subcontractor
TEXWorkInv	Textiles in work inventory report	Inventory report of textiles in Work	From: Fabric Subcontractor To: Fabric Producer
YARNOrder	Yarn Order	order issued by a Fabric or Knittwear Producer to purchase a yarn product	From: Fabric Producer To: Yarn Producer
YARNOrdStatus	Yarn Order Status	Order Status Report sent by the Yarn Producer or by the Yarn Subcontractor to his Client	From: Yarn Producer To: Fabric Producer
YARNTwistOrder	Yarn Twisting Order	Twisting commission Order for a yarn	From: Yarn Producer To: Yarn Subcontractor
YARNWorkInv	Yarn Work Inventory	Yarn in Work Inventory report	From: Yarn Subcontractor To: Yarn Producer

Table2: TEXWEAVE Data Model Messages

2.4 The BUSCATEX taxonomy

2.4.1 The BUSCATEX project

The taxonomy to be used in the SEAMLESS project comes from some previous works done by AITEX in the BUSCATEX Project, SMADETEX Project and SEWNEW Project, from these three previous projects we had a very huge and complete taxonomy consisting of a big tree where different branches can be followed to arrive to the same product, depending on which is your criteria of selection or searching. We

knew that this taxonomy was too big for SEAMLESS and we have simplified it following the SEAMLESS scope.

BUSCATEX is a sector-specialised search engine. It has the following main characteristics:

- Specialised sectoral index.
- Dynamically updated.
- Based on specialised taxonomies and semantics.
- eCatalogue specified for products and services.
- WebServices accessible.
- Multilingual support.
- Intelligent corrector for searched terms.

In the Fig.2 it is shown a simple picture describing the BUSCATEX Search Engine performance.

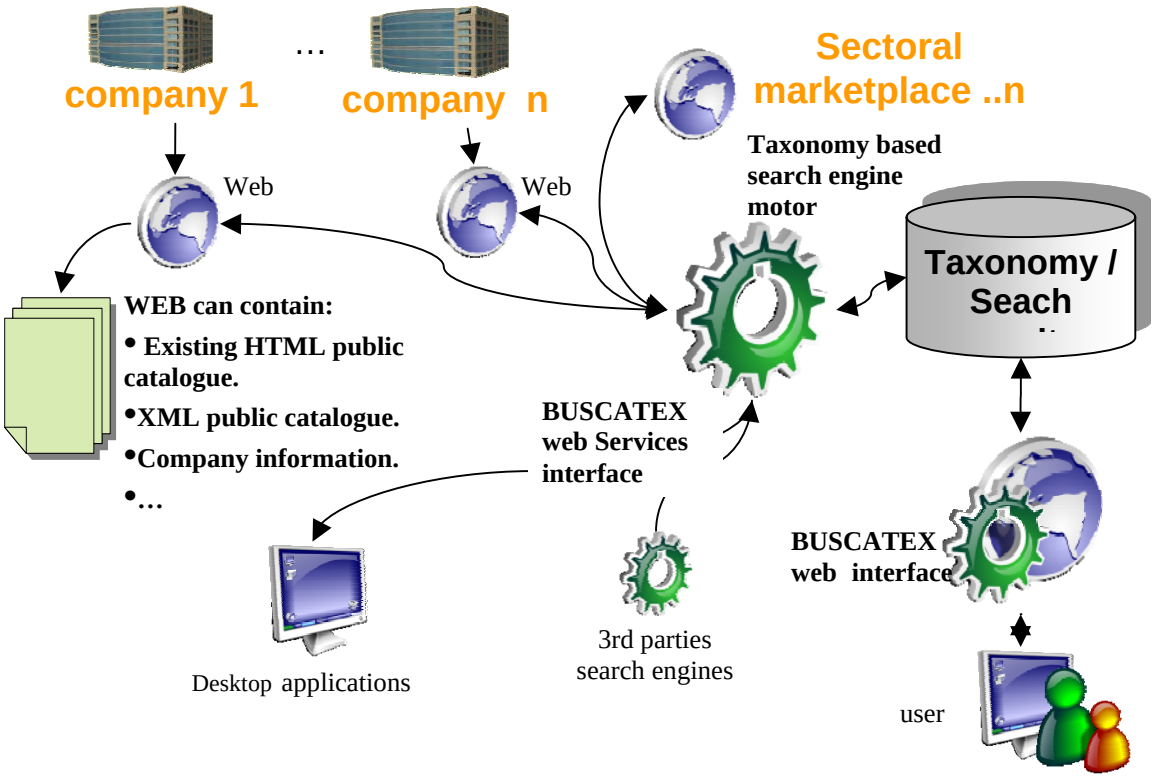


Fig.2: BUSCATEX Search Engine

2.4.2 The SMADETEX project

This project is one of the sources of information used to build the TEXTILE ONTOLOGY, because although the project is focused mainly on textile defects, there is an important part of textile technology with definitions and explanations of the main textile products and textile processes.

Multimedia System for the analysis and prevention of defects in the textile products. (SMADETEX). LEONARDO DA VINCI. P/02/B/F/PP-125519.(2003-2005).

The main goal of this project is to create a multimedia and multilingual system for helping in the resolution of problems related to the common defects that textile products may have.

The aims of this project in which has been developed a multilingual multimedia system where the most habitual textile defects are related to the textile process they may occur, are the following ones:

1. Try to increase the knowledge about factors capable of provoke defects in textile fabrics at different stages of the textile productive process.
2. Increase the workers ability, encouraging formation during their life.
3. Increase the workers polyvalence to do different tasks from those they usually do, and so increase productivity.
4. Try to overcome the problems that happen between different stages of the textile productive process.
5. Promote the products quality improvements and increase the enterprises competitiveness.
6. Become formation more enjoyable through the use of unconventional methods.

The project structure is the following:

- Selection of the main defects of each phase of the textile production process.
- Characterization of every selected defect (name, kind, reason, etc).
- Elaboration of a Guide of Textile Technology describing each phase of the process of textile production.
- Establishing links between each process of the different textile sub-sectors, and the defects they may have.
- Preparation of a CD-ROM to support the training activities.
- Viability tests of the multimedia training tool.

CITEVE has coordinated this project, in which AITEX and other institutes and associations from Greece, Hungary and Portugal take part. The life span of this project is 24 months.

The competitiveness of the textile and clothing companies can only be assured by an increase of the productivity. One of the main factors that influence the productivity of the companies is related with the occurrence of industrial defects, involving important non-quality costs. Although the goal of zero defects is impossible to reach, if all the involved people in the textile industry, starting with teachers and professors, machine manufacturers, company managers, until the shop floor worker are fully aware of this problem, there will be a significant reduction of the number of defects.

The problem of the defects in the textile products is clearly a problem of European dimension, therefore in the global market where we live it is frequent that a fabric is produced in a certain country and confectioned in another country. If the article has a defect, there will be a conflict of interests between companies of different countries. Therefore, a tool that standardizes the nomenclature of the defects, including its definition, possible causes, advises forms for the repairing, clarifies the appearance of the defect and indicates the form of analysis of the defect in laboratory, can be a tool that all the European companies would like to have and make use.

It is in this context that came up the idea to develop this training tool. It will be conceived in an user friendly multimedia format, including as far as possible drawings, photographs or videos representing each defect. As it deals with all the textile-clothing-distribution chain, **this training tool will include appropriate links related to terms and definitions**. For example, when in the scope of the definition of a defect, its causes, etc., the name of a device, process, product, etc., is included, the word will be underlined, which means that the user of the tool will be able to better understand and/or to deepen more its knowledge on the subject inherent to each situation.

This project consists basically of the elaboration of a multilingual CD-ROM to support the resolution of the problems related with the defects that can appear in the textile products. Thus, it is intended to characterize the defects originated in different phases of the textile process, in the following form:

Name - More frequent designation of the defect and other designations which are also used. As it is known, the terminology used to assign some defects varies between regions, countries, area of textile

process and even among neighbouring manufacturing units of the same sector, fact that makes difficult the agreement between the different interveners of the process, whenever a problem appears and it is needed to clarify its origin and eventually to clarify its cause. The designation of the defect will be as far as possible followed by an illustrative photograph of the defect.

Definition- It consists of the technical description of the defect.

Repairing - It consists of the sorting of the defects according to its importance, including information about possible repairing.

Methodologies for analysis of the defects in a laboratory - It consists of the enumeration of methodologies and techniques that are necessary to execute in a laboratory to determine the cause/origin of each particular defect.

It is expected that, with this tool especially devoted to the auto-training, a large impact in the knowledge of the defects and its causes but over all in the prevention of defects can be obtained.

From this work, we have used the definitions that were also in the selected taxonomy for the SEAMLESS project, the defects work has not been incorporated to the SEAMLESS Textile Ontology, but the definitions of the Textile technology, with the main products and processes.

2.4.3 The SEWNEW project

SEWNEW, Multimedia Advanced Training for Sewing New Textile Materials., P/03/B/F/PP-159014

This project is one of the sources of information used to build the TEXTILE ONTOLOGY, mainly it has been used from here the concepts and definitions about the clothing industry.

The Training tool SEWNEW allows the training (and the auto-training) at any place and at any time (including at home) and will make possible the familiarization with computers, making easier the work with machines with microprocessors and with the necessary specific machines for the clothing production that uses technical textiles, namely the sports and leisure clothing, "medical clothing", personal protective clothing. The project objective is to develop an interactive training tool for clothing workers, or persons that intend to work in the clothing industry (dressmakers, quality controllers, commercials, ...) in a CD-ROM version.

The tool will consist in an interactive manual (with videos, drawings, plugging to the Internet to interest sites) with two main modules, each one of them with sequential levels of access; it only will be possible to access to level 2 after having the approval in level 1. The first module will contain information for the transmission of basic sewing knowledge, namely equipment and methods of sewing. It will include subjects such as:

Needles: constitution, features, types, and so on;

Yarns: features (composition, count, resistance, etc.); applications, and so on;

Types of points: main types of point, its features, and so on;

Types of machines: lockstitch machines, chain stitch machine, .. (including the special machines for the sewing of the technical and smart textiles);

Stitch types: lockstitch (301), single thread chain stitch, and so on;

Accessories: presser foot, mirrors, guides, and so on;

Maintenance: when and where to put oil, to change the needle, and so on;

To prepare the machine to the work: choice of the adequate parameters to sew;

Hygiene and Security in the Work: the choose of the right chair, the adequate height of the table machine, and so on.

At the end of each subject, the user only can access to the following topic (in principle more complex) after the realisation of a test with approval.

The second module will have essentially exercises to "details" assembly (collars, pockets, special operations made in the sports and leisure clothing, "medical clothing", personal protective clothing and

others), also with different access levels in function of the complexity, for application of the knowledge obtained in the first module. For example, a detail of a part will be presented, and the user will have to separate into its elements, identifying each one of the operations that is necessary to do, in which machine, the type of used stitch, and others.

The main tasks of the project are:

1- Requirements evaluation and subjects validation; inquiry to SME managers and workers to validate the subjects to include and identify other possible subjects; evaluation of results; selection of 2 SMEs to collaborate in the SEWNEW conception, elaboration and testing.

2- Relevant documentation production; definition of the different subjects to be included in each module; research on training available material; self testing production; trainer and trainee manuals production.

3- Global definition of CD-ROM; feed the CD-ROM with the entire material selected and produced in task 2.

4- Experimental application; CD-Rom test - experimental training action in both SMEs; Quality and efficiency evaluation of SEWNEW system (inquiry the company workers for evaluation of the tool performance and impact on their professional activity); Results evaluation in each country; adjustments and corrections.

5- Disseminations of results trough companies, industrial associations and professional schools.

The reasons that are behind this project are related with the fact that along ten years of working with the industrial companies, it was possible to observe the majority of the defects analysed by CITEVE technical department are related with an incorrect choice of equipments and accessories (for instances needles or for a bad machine adjustment).

2.5 TEX GLOB construction process

The **TEX GLOB** is a textile ontology having three parts:

- Textile Taxonomy
- Textile Vocabulary
- Textile Data Model

The TEX GLOB contents are in English, and from the TEX GLOB are derived the different COMMs in their national languages, at this stage we have:

- The Spanish COMM
- The Romanian COMM
- The Slovakian COMM
- The Italian COMM (possibly, reduced)

and in a next future we can have several TEX GLOBs and more COMMs.

The TEX GLOB construction process has consisted of gathering the useful information from the previous sources, doing the adequate simplification and discussing and deciding with the rest of the projects members, mainly those involved in the task 2.4, which tools were profitable which not and so on.

At the beginning we thought if we could use the BUSCATEX tool for managing the TEX GLOB, but after different meetings and discussions these were some of the conclusions and agreements reached:

1. The BUSCATEX tool shows only the taxonomy, not the data model, while the SEAMLESS Editor can manage data model + taxonomy + vocabulary.

2. The ontology Mapper and Translator work on the outcome from the Editor.

3. The same Editor must be used also for the B&C and the Generic ontologies.

4. COMM derivation is supported and kept consistent by a specific function of the Editor.

5. LOCL mapping is also based on the ontology model assured by the Editor.

6. Creation of the Textile GLOB: The GLOB must be created by the Ontology Editor developed in task T2.1.

7. A mechanism of importing/exporting OWL has been implemented in the SEAMLESS Editor in order to easily make profitable the work already done in textile and in B&C.

8. The SEAMLESS editor is also capable of importing/exporting XSD in order to import the Data Model and also can generate Excel files, that has been used by the textile mediators to translate their COMMS.

9. Once the first initial data load is done, the SEAMLESS Editor can be used to improve or complete the TEX GLOB with for example the CORE, the vocabulary, and of course the terms definitions.

10. Derivation of COMMs. Once the data model concepts and the taxonomy concepts are all described, the construction of the COMMs can start at each of the textile mediators. Every mediator uses the Ontology Editor to go through the GLOB and selects the concepts/terms to adopt: each of these concepts/terms is described in the local language.

The steps followed to build the TEX GLOB are the following:

Step 1. Definition of the contents of the Textile GLOB ontology for the SEAMLESS project, meaning the taxonomy detail (terms and definitions), the data model objects and attributes (including the skeleton attributes reported in the deliverable D2.1.2, and named the CORE) and the textile vocabulary.

Step 2. To translate completely the BUSCATEX taxonomy from Spanish to English.

Step 3. To simplify the taxonomy, following the SEAMLESS scope.

Step 4. To define the terms of the simplified taxonomy (SEAMLESS taxonomy).

Step 5. To add the vocabulary (gender and age of user) and their definitions.

Step 6. To simplify the Data Model.

Step 7. To add the data model (including the CORE) and their definitions.

The steps followed to build the Spanish TEX COMM (and they are exportable also for the other COMMs) are the following:

Step 1. To derive the Spanish Textile COMM (with Spanish descriptions) from the English Textile GLOB by using the SEAMLESS Editor.

Step 2. To translate the taxonomy and their definitions to Spanish.

Step 3. To translate the vocabulary to Spanish.

Step 4. To translate the complete data model to Spanish, including the core and the commercial documents.

Step 5. Coordinate the analogous derivation activity of the other textile mediators.

3 The textile global ontology

The chapter presents the main result of task T2.4, that is, the textile global ontology and its components. The details of the TEX GLOB data model are reported in Annex A to this document, those of the TEX GLOB taxonomy in Annex B, and those of the TEX GLOB vocabulary in Annex C. Finally, the mapping file between TEX and B&C data models is reported in Annex D.

3.1 TEX GLOB data model

As it has been described above, the TEXWEAVE data model is quite large and complex. After consulting it with textile companies and textile experts and after some analysis work, following the SEAMLESS scope (collaboration habits, etc.), AITEX decided to propose a simplified model for the SEAMLESS users. So the TEXWEAVE data model has been simplified following these two criteria:

- The scope and scenario of the SEAMLESS project
- Taking into account the simple needs of the target companies, who will be involved in the pilot during the next months.

The TEXWEAVE data model has 27 different messages, that can be seen in the Table 2. “TEXWEAVE Data Model Messages”, from these 27 documents, in the SEAMLESS project for building the Data Model, four of them have been chosen:

- Despatch Advice
- Order
- OrderStatus
- Invoice

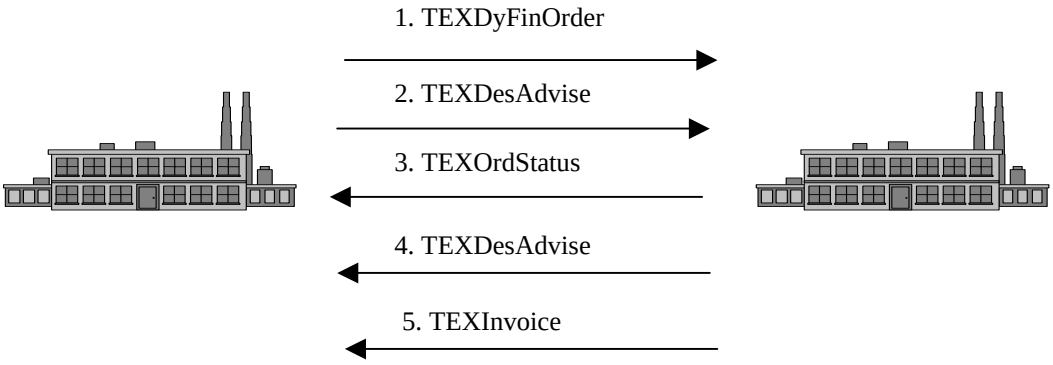
In the Table3 we show the documents from TEXWEAVE chosen and their descriptions:

Message Short Name	**Message Full Name**	**Message Description**	**From … To …**
TEXDyFinOrder	Textiles Dying-Finishing Order	Dyeing-finishing commission order of a fabric to a Subcontractor (contains the parameters and the sequence of the operations to be performed)	From: Fabric Producer To: Dying Sub-contractor
TEXDesAdvise	Textiles despatch advice	Advice for despatch of fabric sent by the Supplier.	From: Fabric Producer To: Apparel Producer or Fabric Controller
TEXInvoice	Textiles invoice	Invoice used to debit fabric supplies and accessory or miscellaneous services	From: Fabric Producer To: Apparel Producer
TEXOrdStatus	Textiles order status report	Report of the Order status of fabric (informs about the foreseen delivery date)	From: Fabric Producer To: Apparel Producer

Table3: SEAMLESS Data Model Documents

These four documents are each of them quite big, so we are going to use only **the mandatory fields** of the documents. With the mandatory fields of these four documents we have enough to implement the SEAMLESS pilots in the next months, and when the pilots begin to grow and the companies need more information to exchange, the additional fields will be included and also can be included more documents from the TEXWEAVE Data Model.

For the SEAMLESS scope and their target companies has been chosen these four documents because they are a complete cycle in a normal business relation between two textile companies and they fulfil the needs of the target companies.



In the TEXWEAVE Data Model exist different textile purchase order, as can be seen in the Table 4. We consider it too complicated to the textile companies, we have took the most complete one that is the TEXDyFinOrder, that contemplates everything and it is good for ordering subcontracting processes and other kind of business relations.

Message Short Name	**Message Full Name**	**Message Description**	**From … To …**
TEXWEAVEOrder	Weaving order	Weaving commission order	From: Fabric Producer To: Fabric Subcontractor
TEXDyFinOrder	Textiles Dying-Finishing Order	Dyeing-finishing commission order of a fabric to a Subcontractor (contains the parameters and the sequence of the operations to be performed)	From: Fabric Producer To: Dying Sub-contractor
TEXPrintOrder	Textiles Printing Order	Printing commission order of a fabric	From: Fabric Producer To: Print shop
TEXDarnOrder	Darning Order	Order sent by the Fabric Producerr to the Darn Subcontactor to request the darning services (reports the list of the darning operations and related information for each)	From: Fabric Producer To: Darn Subcontractor
TEXOrder	Textiles purchase order	Purchase order to the Fabric Producer	From: Apparel Producer To: Fabric Producer

These 5 documents have been analysed and also tested with some textile companies and we have decided to use as the Textile Order in the SEAMLESS Data Model the document: TEXDyFinOrder because it is more specific for subcontracting processes and fits very well also in a more general order...It means that this document is more complete than for example the TEXOrder, in that sense, we can use the TEXDyFinOrder for a more generic and simple textile purchase order or for subcontracting other processes that are simpler as for example the printing process or the darning process. The dying and finishing process needs more parameters and more specifications in order to be properly subcontracted, for that reason is chosen this document and it will be enough for more simple orders.

The order status is very important in the subcontracting processes, mainly in the dying, printing and finishing processes, because these processes are a bottle neck in the textile value chain and to know the real state of the order can modify some other processes and to avoid people phoning everyday to the subcontractor in order to know which is the state of the order. For that reason this document has been chosen as one of the most important and demanded for the companies.

The complete TEX GLOB data model is reported here below according to the UML class diagram syntax, its xml version can be seen in **Annex A** to this document.

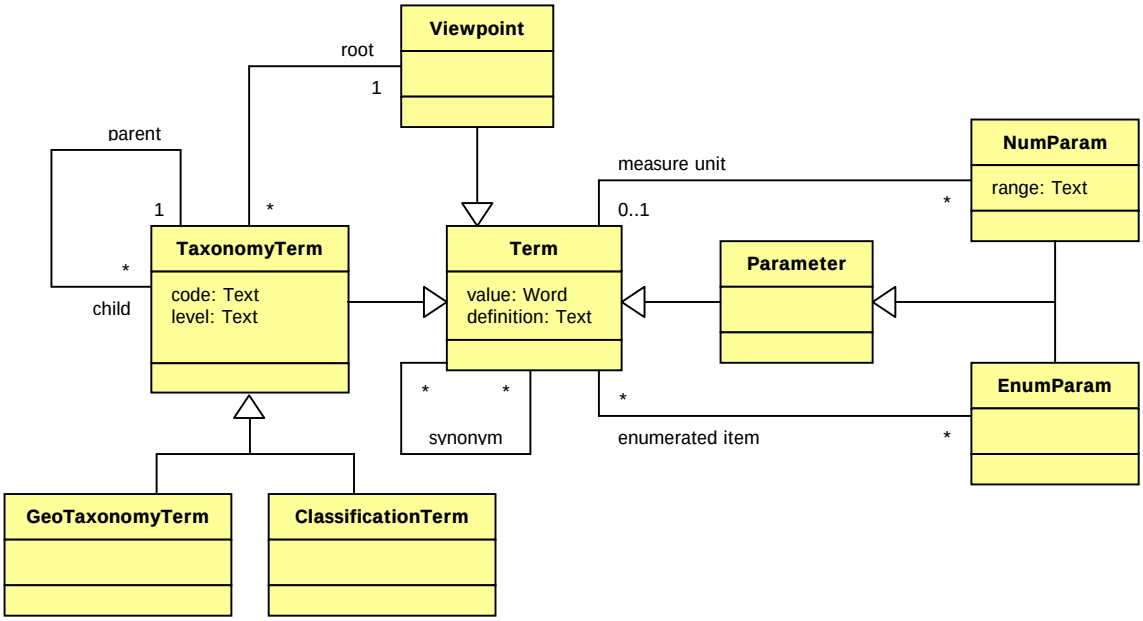
In the analogy with the CORE ontology the TEX GLOB data model is split into some parts to represent, respectively, the vocabulary and taxonomy concepts and the main data types generated by the user companies, namely company profiles, products/services, and business documents.

The first part is unchanged and taken as it is from the CORE and simply duplicated here. The other parts are defined by importing the homologous CORE parts and then extending them with the addition of attributes and classes.

3.1.1 Vocabulary and taxonomy

Every GLOB includes a vocabulary and a taxonomy. The vocabulary contains all the terms available within the ontology while the taxonomy is a subset of the vocabulary terms properly arranged into a hierarchical (tree) structure.

The CORE defines the relative data structure in order to assure that it is adopted by all the SEAMLESS ontologies, to behave as container of the terms that will populate it. This data structure is adopted by the TEX GLOB as it is, and simply duplicated here.



TEX GLOB: vocabulary and taxonomy class diagram

Term class. A single term of the vocabulary:

- *value:* Term value (e.g. cylinder, fluid power, earth moving).
- *definition:* Term definition providing a way for recognising it among other homonymous terms.
- *synonym:* Relation between two terms with analogous meaning (if any).

ViewPoint class. A term to indicate one of the taxonomy partitions (e.g. process, product, service, etc.):

- *root:* The ViewPoint behaves as root of a taxonomy partition.

TaxonomyTerm class. A term within a taxonomy structure:

- *code:* Code associated to the term in the taxonomy (if any).
- *level:* Dotted notation (e.g. 1.2.4) representing the term level within the taxonomy.
- *parent:* The parent node of a taxonomy term. It is another TaxonomyTerm or a ViewPoint.
- *child:* Child node under a parent TaxonomyTerm.

GeoTaxonomyTerm class. A term within the geographic taxonomy partition.

ClassificationTerm class. A term used to classify company activity as well as its products/services.

Parameter class. A term representing a property to parameterise products (e.g. size, motion, etc.).

EnumParam class. A parameter described by a discrete set of options (e.g. motion, powered, etc):

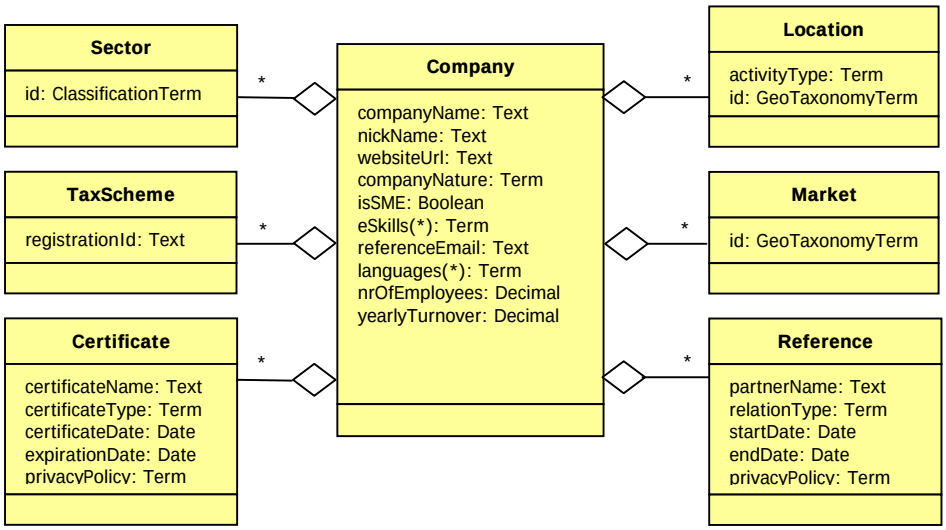
- *enumeration item:* Term representing one of the enumerated options.

NumParam class. A parameter described by a numeric value (e.g. size, power, etc.):

- *range:* Free text representing the value domain of the numerical parameter.
- *measure unit:* Optional term defining the measure unit for that numeric parameter.

3.1.2 Company profile extension

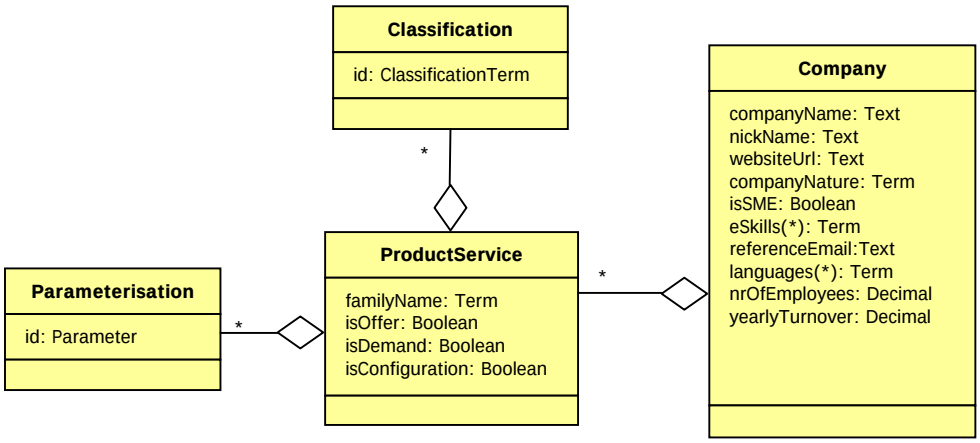
The concepts (classes, attributes, relations) inherited from the CORE are represented in colour while the extensions are represented in white. In this case the CORE and TEX GLOB are equal



TEX GLOB: company profile extension

3.1.3 Product/service

The CORE and TEX GLOB are the same also in this section



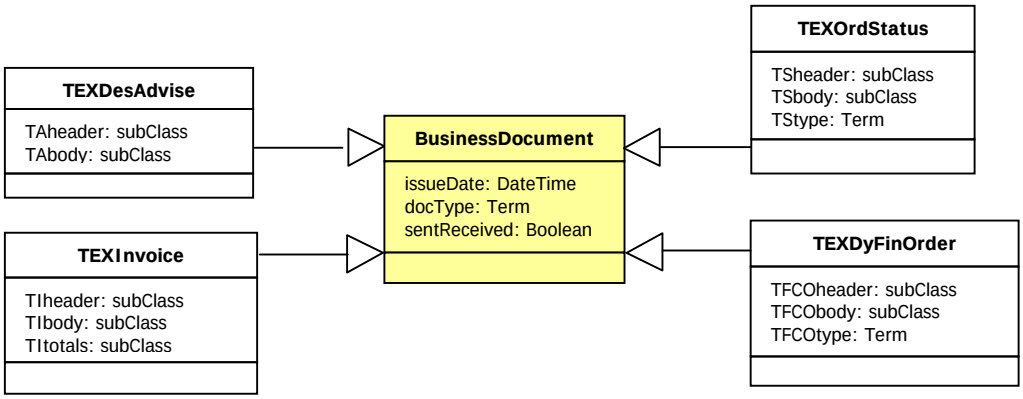
TEX GLOB: product/service

3.1.4 Business document extension

The concepts (classes, attributes, relations) inherited from the CORE are represents colour while the extensions are represented in white.

NOTE: The added concepts refer to the subClass type that is not detailed in this section. The reason is that it is directly taken from the TEXWEAVE data model and its details are reported in the xml presentation of the B&C data model of Annex A-

Here a general schema, showing which new classes inherits from the concept of “BusinessDocument”, follows:



TEX GLOB: Business document scenario

TEXDesAdvise class. Advise of despatching of fabric.

- *TAheader*: header of the TEXTILES (YARN) DESPATCH ADVISE.
- *TAbody*: body of the document TEXTILES DESPATCH ADVISE.

TEXInvoice class. Dyeing - finishing commission order of a fabric.

- *TIheader*: header of the document TEXTILES INVOICE.
- *TIbody*: body of the document TEXTILES INVOICE.
- *TItotals*: details of the monetary and quantity totals of the Invoice.

TEXOrdStatus class. Invoice of the Fabric Producer.

- *TSheader*: header of the TEXTILES (YARN) ORDER STATUS REPORT.
- *TSbody*: line item of the message TEXTILES ORDER STATUS REPORT.
- *TStype*: type code type of Order status report.

TEXDyFinOrder class. Order Status report sent by the Fabric Producer to its Client.

- *TFCOheader*: header of the document TEXTILE DYEING - FINISHING ORDER.
- *TFCObody*: body of the document TEXTILES DYEING - FINISHING ORDER.
- *TFCOtype*: type of "Textile Dyeing-Finishing commission order".

3.2 TEX GLOB taxonomy

From the previous projects BUSCATEX, SMADETEX and SEWNEW, a big taxonomy has been developed. The SEAMLESS project will use a more simplified one, but was not easy to reach this solution because on the one hand it is better not simplify the taxonomy because when a company is searching for a term and doesn't find it, the company trends to think that the tool is not good, or not make them profit and then they decide not to use it any more, this is very dangerous. For that reason it is good to maintain a rich taxonomy.

Nevertheless thinking about the SEAMLESS scope, the decision took was to remove some branches of the complete taxonomy that were useless for the SEAMLESS users but those branches selected will be used without simplification.

In the Fig. 3 the complete taxonomy can be observed:

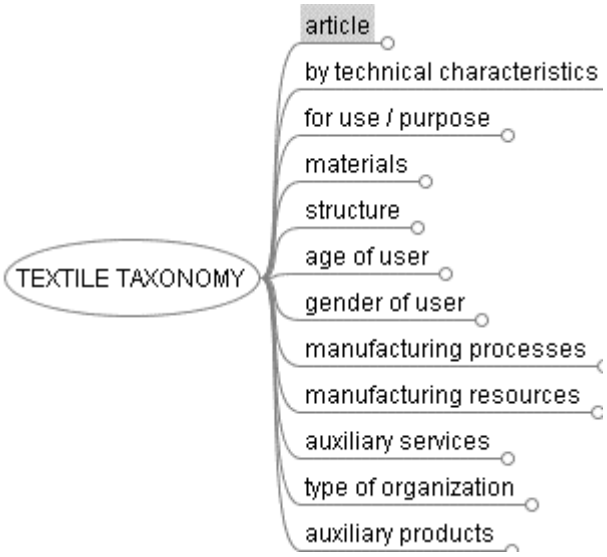


Fig. 3. Main branches of the complete taxonomy

But we decided to simplify it in order to be used in the SEAMLESS project, following the needs of the companies that are going to participate in the pilots and focusing on the SEAMLESS scope It was not useful to have such a big taxonomy and to manage it in order to be used only a 20% of its terms. For that reason were contemplated at the beginning only four branches from the big taxonomy:

- Article
- Use & Purpose
- Gender of user
- Age of user

For the SEAMLESS scope the textile machines branch, the technical characteristics, the materials, the structure, the processes, the resources, the auxiliary services and the auxiliary products will not be considered, at least at this stage.

Finally after some tests and discussions the **SEAMLESS taxonomy** is formed of this two branches

- **Article**
- **Use & purpose**

And the branches

- Gender of user
- Age of user

are considered as the vocabulary in the SEAMLESS TEX GLOB.

In the SEAMLESS taxonomy the complete article taxonomy and the use or purpose that is going to be the final destination of the product have been contemplated because this can influence in the manufacturing processes an in the technical requirements to accomplish and so on.

The entire TEX GLOB taxonomy is reported in **Annex B** to this document.

3.3 TEX GLOB vocabulary

In the original taxonomy there were different branches and relations between their terms, indicating, father, son, synonym, antonym etc. These kind of relation is not maintained in the SEAMLESS project, and instead of that, a big and extended vocabulary is used.

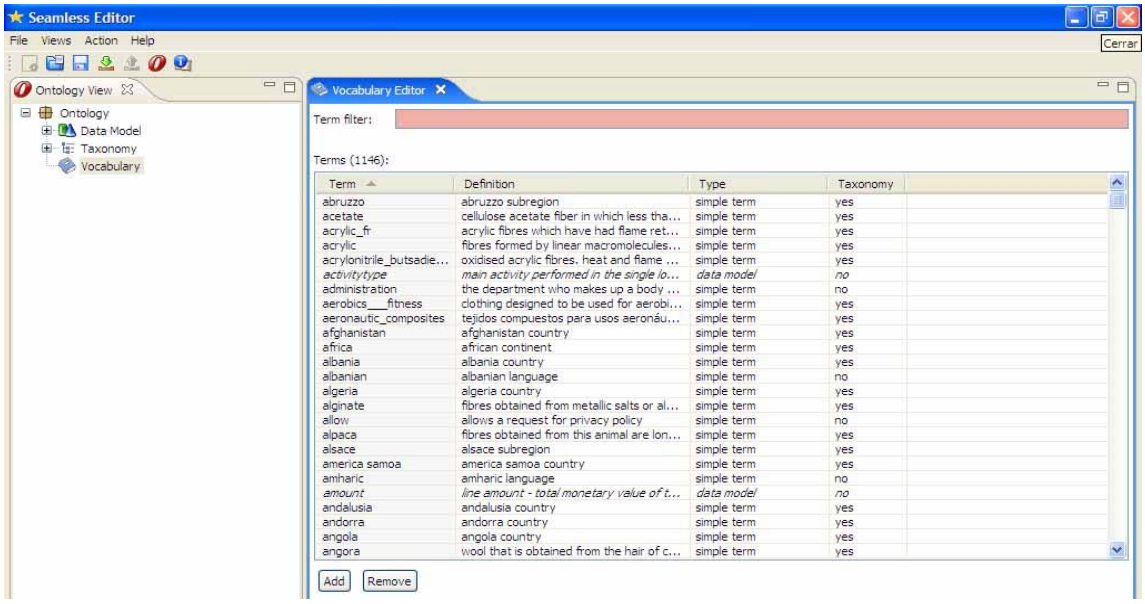


Fig.7: TEX GLOB vocabulary

The TEX GLOB vocabulary is formed of:

- The definitions of the taxonomy terms.
- The terms and definitions of the branches gender of user and age of user.
- The terms and definitions coming from the CORE ontology.

The TEX GLOB vocabulary is a powerful tool where all the used terms, can be found with their explanation and it is indicated if the term belongs to the taxonomy or to the data model. In Fig. 7 we can see a portion of the TEX GLOB vocabulary.

Different searchers can be made as it is shown in Fig. 8, where the term **fabric** is searched:

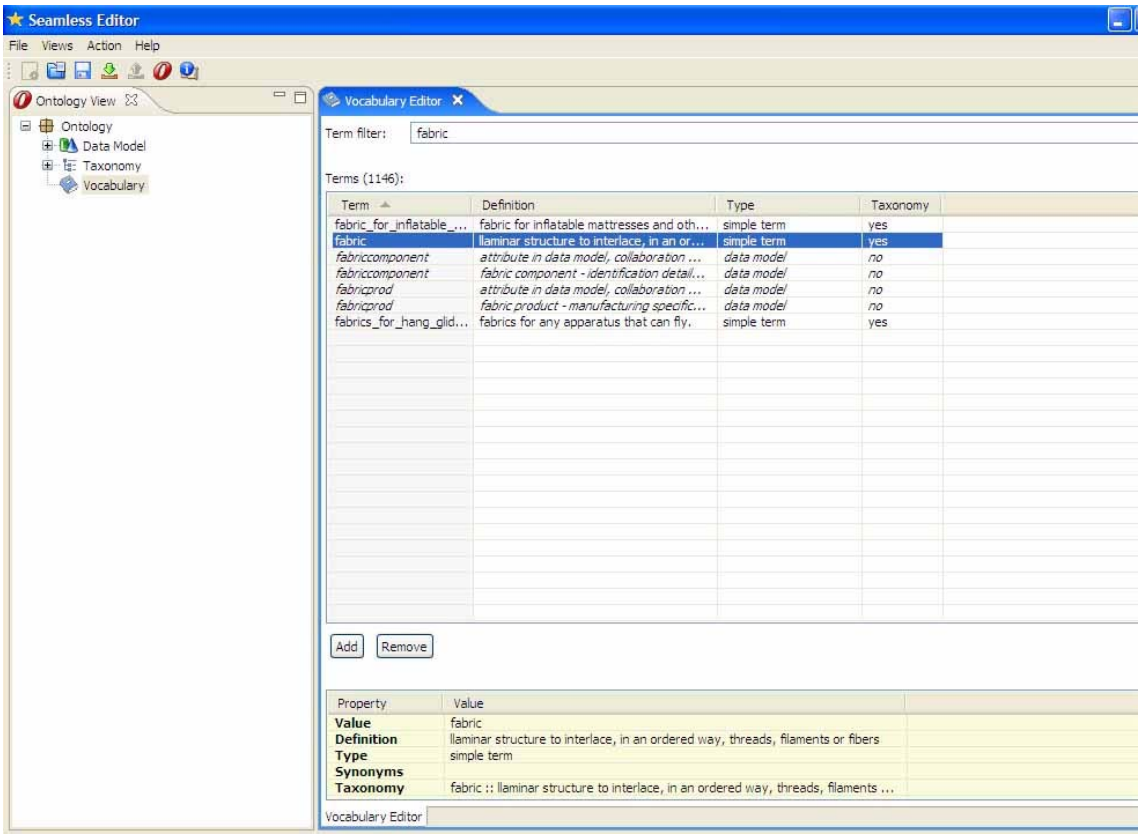


Fig. 8: Search of “fabric” in the TEX GLOB vocabulary

The TEX GLOB vocabulary terms and definitions (in English) are reported in **Annex C** to this document.

3.4 TEX → B&C mapping

The TEX GLOB shares with the other GLOBs a minimum number of concepts and terms constituting the so-called CORE (core ontology). Of course the overlapping between two global ontologies can be wider than that, and this facilitates the communication between companies belonging to different sectors. To this purpose the global ontologies must be mutually mapped with special attention for their data models and related vocabulary terms.

The two sectoral global ontologies developed in the frame of the SEAMLESS project are this textile TEX GLOB and the homologous B&C GLOB for the building and construction sector. Another global ontology, the so-called generic GEN GLOB, has been defined to cope with the needs of mediators that associate companies belonging to different sectors. The data model, and related vocabulary terms, chosen for the B&C GLOB is the same of the GEN GLOB, while they differ for the respective taxonomies.

The mapping file generated by the ontology Editor and Mapper to move from the TEX GLOB to the B&C GLOB, and then suited also for the GEN GLOB, is reported in **Annex D** to this document. The reverse mapping file, from B&C to TEX, is documented in deliverable D2.3.

4 The derived common ontologies

This chapter introduces the devised common ontologies of the textile sector that are needed by the textile mediators of the SEAMLESS project, namely ATC ROM (Romania), PRC SCCI (Slovakia) and AITEX (Spain). Their vocabularies translated into the respective languages are reported, respectively, in Annex E, Annex F and Annex G to this document.

4.1 TEX COMM derivation process

As anticipated at the end of Chapter 2, the derivation process of the common ontologies of the textile mediators has been performed according to the following rough steps:

- The TEX GLOB vocabulary, including terms and definitions of the textile taxonomy plus the terms introduced by the adopted data model, was released when it could be considered substantially (say, 90%) definite.
- The Spanish COMM was then derived by AITEX by translating the TEX GLOB vocabulary terms and definitions into Spanish.
- The English version of the TEX GLOB vocabulary was sent to the textile mediators in form of xls file together with the parallel translation into Spanish, to be taken as example of the expected COMM derivation result.
- The textile mediators (ATC ROM in Romania and PRC SCCI in Slovakia) performed their respective translations and returned their complete xls files.
- Problems met during the translation process, e.g. unclear terms or definitions, were overcome by intense interactions between AITEX and the other textile mediators. The result was a reasonably correct definition of the respective COMM vocabularies.
- The resulting GLOB and COMM vocabularies were set to U MODENA that took in charge their batch introduction into the ontology Editor as last step before they are made available to mediators for further enrichments.

4.2 Romanian TEX COMM

The complete Romanian vocabulary of textile terms and definitions is reported in **Annex E** to this document.

4.3 Slovakian TEX COMM

The complete Slovakian vocabulary of textile terms and definitions is reported in **Annex F** to this document.

4.4 Spanish TEX COMM

The complete Spanish vocabulary of textile terms and definitions is reported in **Annex G** to this document.

5 Final remarks

The textile ontology definition activity performed as task T2.4 led to two important achievements that are fundamental for the prosecution of the SEAMLESS project:

- Generation of the TEX GLOB as basis for the definition of the domain knowledge needed to collaborate in the textile sector, and its mapping onto the B&C GLOB so as to establish the conditions for semantic roaming with the building and construction sector and with generic (non-sectoral) environments.
- Derivation of three TEX COMMs (Romanian, Slovakian and Spanish) as condition to support multi-lingual communication between companies of the textile sector located in different European regions.

The resulting TEX GLOB is simplified with respect to the taxonomy an data model sources since it is explicitly conceived as the minimal knowledge base needed to enable simple communication and collaboration activities. Also, a simplified version of the TEX GLOB is certainly more suited to start the COMM derivation process by the involved mediators. However, the experience gained so far can easily help in extending it whenever such an improvement will be considered necessary e.g. after the devised pilot experiments.

In turn, the TEX COMMs can be still taken as work in progress since it is expected that they could be enriched during the pilot preparation phase (just started and to be concluded by the end of this year). In fact, the best task mediators can carry out is tailoring the respective TEX COMMs on the collaboration needs of the companies that are going to be involved in the pilots. Then it is possible that concepts and terms already translated will be ignored by pilots and other terms will be added to cope with real world needs of the participating companies.

In conclusion, the TEX GLOB and the other ontologies are not huge static pictures of all the knowledge that is available in their sectors, rather they are living bodies that tend to grow with the number of user companies and anyway converge to a limited, really useful collaboration semantics.

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