Ontology Support in E-commerce between businesses (B2B)

Electronic Commerce in the B2B area is not a new phenomena. For earlier attempts of system integration between different systems, we can look back at the 70s where enterprises tried to connect their ERP's through EDI connections. This rather cumbersome and expensive technique remained confined to major players and took the form of a 1 to 1 relationship. The major bottlenecks appeared to be around standardization issues; one system could not 'understand' the Purchase Order, the Bill of Materials, or the Invoice of the other system. Therefore, this 1 to 1 relationship was often less sophisticated. To avoid the expensive and time consuming technical and consensual projects, a producer would provide a major buying company with a desktop with access to their system. The buyer could directly order from this system, track the order, and flag the producer when inventory appeared to become insufficient.

The backbone of the internet is changing this situation in two crucial manners. Firstly, the internet is widely available and relatively cheap, allowing not only small and medium size companies to participate, but also enabling the enormous growth of on-line information and commercial transactions for the final customers. Secondly, the internet allows the development of 1 to n relationships, such as the shop on-line or an Extranet, and n to m relationships, such as an E procurement Marketplace. However, taken the fact that language standards were already a huge barrier in an 1 to 1 relationship, one can just imagine the Tower of Babel situation that arises when implementing 1 to n or n to m relationships.

This is where ontologies come in. Ontologies can either provide a means to define a common standard, or function as an intermediate open layer that enables translation into each type of individual standard of those involved in an e-commerce platform.

The needs for standards in B2B e-commerce arise at different levels.

First, there is the level of product identification. An important task of an E marketplace - a task of which the effort involved has often been overlooked - is to provide a common catalog for buyers and sellers. Their exist several initiatives to categorize products, such as the UN/SPSC, ecl@ss, or more industry specific standards like Rosettanet that is focused on the IT industry. However, these categorizations are often not detailed enough to actually identify a product - and for example to distinguish it from the same product in another color. Furthermore, often the full domain of offerings are not -yet- available through these initiatives. Ontologies can provide support to grow and enhance these classifications.

One level higher, there are the business documents that contain these product identifications. Again, these documents are often not organized in the same manner. For a vendor of coffee beans, for example, the highest category will be the types of beans. For the buyer, the category will likely be a different tree of products, such as beans vendor, packaging vendor etceteras. Another issue is the language and currency difference. Ontology tools are able to map these different standards (semi) automatically - depending on the variety of elements.
Initiatives that exist in the area of document standardization are for example UN and VICS workgroups. But even when these initiatives will succeed in a full range of business documents agreements, there will still remain the need for ontology mappings, as not each enterprise will be willing or able to adapt the standard provided by the marketplace. An example is a horizontal oriented vendor who needs to take part in different vertical marketplaces. He would not be able to accept all different standards without having a mapping service that reduces the different formats of business documents that he has to provide.

Still one level higher is the way the in which marketplace organizes the different document flows. In order for marketplaces to exchange between each other, which is clearly the next step in e commerce maturance, their meta-structure for example their catalog representation will have to be compatible.

Currently, XML is becoming an universally accepted standard. XML is however, still to weak to describe business processes and exchanged products. Therefore, marketplaces often develop their own "XML dialect", such as cXML, ebXML, yXML. In order to realize an automated translation in these different dialects, an ontology is needed. Another possibility is to avoid these translation needs from scratch and utilize a higher level ontology language, such as OIL.

The described standardization and mapping issues are at the moment the bottlenecks and for E marketplaces, but in the future the focus will shift to other ontology needs. These are the ontology applications that are already utilized in the knowledge management and B2C areas, such as natural language interfaces that enables the buyer to find his products in the manner he prefers to describe them, or intelligent agents, that enable product shopping, comparison, and bidding on behalf of the buyer. Although this is future music for the marketplaces, currently struggling with realizing their promises, soon the same customer services will need to be offered as for a final customer.