EBXML - TOWARDS A GLOBAL ELECTRONIC MARKET

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Abstract:
Among the many Internet-based technologies emerging during the last years, XML was the only one able to change the face of distributed computing, e-commerce and web services, forever and in a radical manner. EbXML (Electronic Business using eXtensible Markup Language) is a modular suite of specifications that enables enterprises of any size and in any geographical location to conduct business over the Internet. Using ebXML, companies have a standard way of exchanging business messages, conduct trading relationships, communicate data in common terms and define and register business processes. This literature review and action research follows the evolution of ebXML and its objective is to assess the impact of this technology on electronic business world since its first version was proposed as a standard by OASIS, as well as the consequences of implementing and using ebXML as a core component of enterprise business intelligence. The research included the review of the most cited and quoted works in the field, the most widely used development tools, as well as quizzes and direct interviews with developers and users of ebXML-based services. The author has almost ten years of interest in this field, and also some previous results (papers and Ph.D. dissertation).

Key words: *EbXML, e-commerce, e-business, XML, EDI, Web Services*

JEL classification: *M15*

INTRODUCTION

The *Electronic Business using eXtensible Markup Language*, widely known as *ebXML* encloses a family of *XML*-based standards aimed to provide an infrastructure for the use of e-business information at a global level and in a fair and convenient manner by all the parties of an e-business transaction. As the official documentation for this project initiative reveals, the making of *ebXML* is based on three fundamental concepts:

- *EbXML* is designed to provide a data communication infrastructure;
- *EbXML* is designed to provide a semantic framework for business level interoperability;
- *EbXML* is designed to provide a means for the companies to find each other in the virtual business environment, to accept business partnerships and to do business together [Nickull & Eisenberg, 2001].

From a technical point of view, *ebXML* is a framework, a set of specifications allowing the virtual enterprises to use the *Internet* network and particularly the *Extended Markup Language* (or *XML*) as a business collaboration support technology [Trastour *et al.*, 2002]. The *ebXML* framework includes a number of modular components in order to provide support for each element (or function) of a complete business solution:

- The business processes definition, as well as business process-associated activities and roles definition;
- The design and deployment of the potential business partners profiles by means of a public library;
- The design of an articulate business information storage routine for an organization;

- The supply of an efficient search engine for virtual business partners discovery;
- The definition of a commercial protocols standard, used as a base for partners agreements;
- The supply of an automated e-commerce and e-business documents design and filling system;
- The supply of a messaging system able to provide a fast and safe transmission of the electronic documents to all the involved parties.

EbXML represents an open and interoperable standard, designed to be implemented by an organization without inflicting huge expenses (which means its use is not limited to the very large companies only). Built and promoted by a consortium whose head members are *OASIS* and *UN/CEFACT*, *ebXML* grants companies and organizations the access to electronic business; no matter what size they are or what geographical area they reside in. A company is allowed access to information within its own industry branch, as well as trans-industrial information access [Leukel *et al.*, 2004].

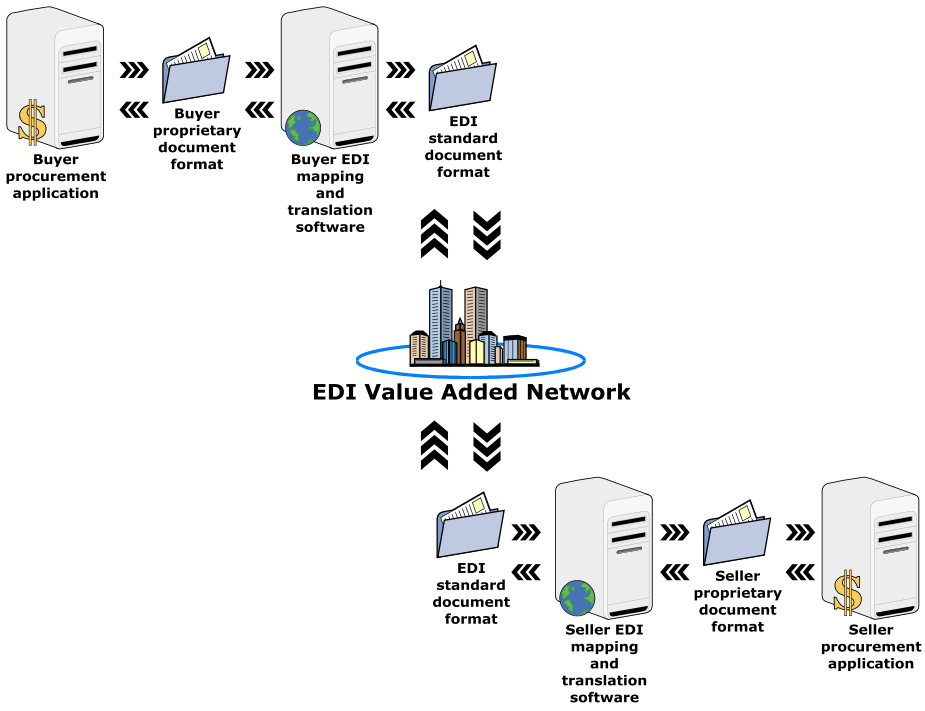
1. The *E-Business* Era and the Evolution Of *ebXML*

Since the mid '70s, the electronic commerce and electronic business (or *e-commerce* and *e-business*) approach emerged as a result of hard-copy document abolition efforts in the business area. The solution implied interconnection of information systems for free data circulation [Luttighuis & Biemans, 2005]. The concept became widely known as *Electronic Document Interchange*, or *EDI*. The strong points of the *EDI* approach are still valid today, particularly the speed of communication and error suppression, because the manual data input is not repeated through the many information systems involved. According to a set of annual surveys performed for almost two decades, only 5% of the companies able to take benefit of *EDI* are really using it. Among 10.000 top companies worldwide (the Fortune 1000 companies in 10 countries), more than 98 percent are using *EDI*. However, at a global level, the amount of companies using *EDI* places below 5 percent [Weitzel *et al.*, 2004]. In other words, millions of small and mid-sized companies are happy to use hard-copy printed and faxed documents instead of their digital counterparts. In our opinion, the main cause of this situation are the large scale costs implied by the design and implementation of an own *EDI* system. The *EDI* technology involves an important costs decrease, but only after a period of time which most of the small and mid-sized companies cannot afford to wait. *Figure 1* depicts the general schema of the *EDI* operation principles.

In order to reduce implementation costs for an *EDI* system and render its adoption and implementation a non-exclusive and standardized process, the unanimous consent on each *EDI* message type data format is required. This consent implies the emergence of an accessible and low-priced standard *EDI* application designed for the small and mid-sized enterprises. The events in the last two decades led to the conclusion that achieving such an objective is far more difficult that it seems and some think that this will never happen, mainly due to the proprietary formats of most of the *EDI* applications today. As a consequence, one question arises: What do developers need to stop designing particular *EDI* implementation-dedicated software and start building generic applications, able to adapt to any business context (meaning to any company and its business partners)? Recent studies [Kazamiakin *et al.*, 2005] prove that the main request of the developers is not an IT-specific issue, but the crystal-clear and computable description of the business process itself. Therefore, in order to achieve a business objective, the experts will not design the requests starting from the own database schema any more, but will have to identify the necessary collaborations, as well as the business partners able to provide them. The potential collaborations have to

be clearly documented in the business process description and the adjoining informational models. *EbXML* is one of the latest efforts made in this field. The *United Nations Centre for Trade Facilitation and Electronic Business* (*UN/CEFACT*) was the first large-scale organization foreseeing the potential of this approach and trying to provide an electronic document and data exchange solution feasible for millions of small and mid-sized companies [Geyer, 2001]. *UN/CEFACT* intended to merge its own business process design experience with the *XML* field experience of another organization, called The *Organization for Advancement of Structured Information Standards* (*OASIS*). The *ebXML* project provided for the new-born consortium an opportunity to combine the gained business process semantic experience (the data exchanged with the business partners during a transaction) with the results of recent efforts to design a coherent methodology in the field of business processes description [Geyer, 2001].

Figure 1 - The *EDI Modus Operandi*



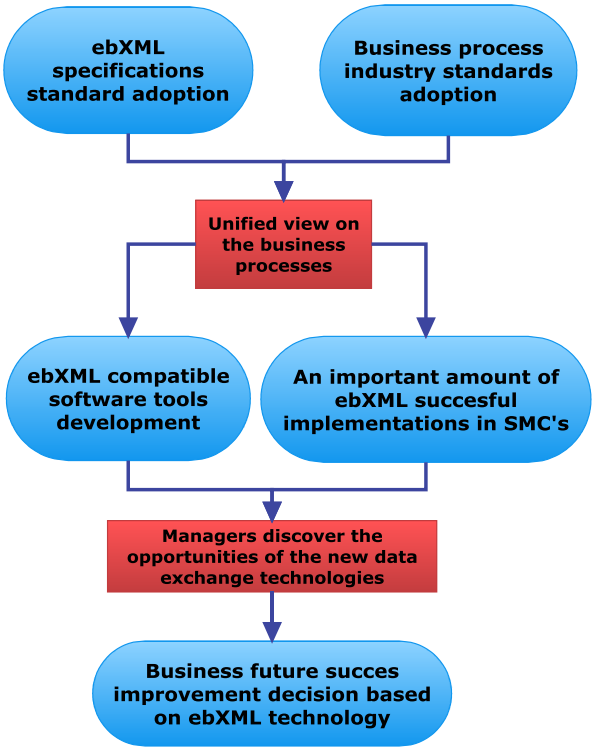
The prominent business process orientation of *ebXML* provides a virtually larger number of business opportunities for the companies, an easier and lower-priced data exchange, as well as a larger range of virtual business partners to choose from. Unlike all the past standards founded by closed groups of companies, and solely trying to respond to their founders' own business interests and goals, ebXML was a sign of global consent of all the geographical areas and all the industries, taking into account both the vendor and the seller point of view in an electronic business process. Once the first set of ebXML specifications was adopted (as a result of the final meetings in Austria, 2001), it is likely that software developers will supply more and stronger *ebXML*-enabled software products. Some surveys and reviews of the actual *ebXML*-aware software products are available on-line [Webber, 2004]. An important support for the future development of *ebXML* is expected to come from the main industries professional bodies which are able to develop and adopt industry-specific business standards. The common, unified vision of a particular business process is a significant support for the development of highly compatible software applications for that process. The ideal future evolution of the *ebXML* standards set is outlined in *Figure 2*.

2. *EbXML*, Web Services and *EDI* – Which is the Survivor?

Business to business (*B2B*) protocol specifications are aimed at the applications integration through an economic entity or organization, as well as trans-organizational industry level integration. The *ebXML* standard has to compete nowadays with a solid conglomerate of technologies, including:

- *Simple Object Access Protocol* (*SOAP*) – an *XML* and *HTTP*-based access protocol, intended to facilitate the message exchange within a network. *SOAP* is the foundation of the Web services protocol stack, providing a framework for the message exchange, as well as the construction of superior abstraction levels.
- *Web Services Description Language* (*WSDL*) – an *XML*-based language providing a Web services description model. The model looks upon Web services as the final nodes of a network.
- *Universal Description, Discovery and Integration* (*UDDI*) – a platform-independent, *XML*-based registry enclosing Internet-centered businesses identification data and allowing for the companies to find each other and orchestrate their business services to perform complex business processes.
- *Business Process Execution Language* (*BPEL*) – a business process behavior specification language, based on Web services.

Figure 2 - The *ebXML* Future Development Schema



As we formerly stated, the idea of business documents exchange among management information systems is far from being a novelty. The first *Electronic Document Interchange* (or *EDI*) systems are more than 40 years old. Even if *UN/CEFACT* designed an own *EDI* standard in the early nineties [IFLA, 1993], business to business e-commerce is still regarded as difficult to gain access to, and still has a very limited area of use (although, everywhere is used, its efficiency is beyond any doubt). The widespread opinion still is that *EDI* represents an extravagance only to the world's largest multinational organizations have access to.

The development of the Internet, along with the quasi-unanimous adoption of the *XML* standard strongly developed electronic commerce. As much as technical issues are surpassed, it is more and more obvious that the core component of the e-business process consists in what the partners say and the way they say it (the way they transmit their messages). Both Web services and the *ebXML* standard are based on the *Service Oriented Architecture* (*SOA*), which provides a set of business process creation and employ, regarding the business processes by the means of the services provided. *SOA* also defines the required IT architecture that applications need for data exchange and business processes involvement [Erl, 2008]. The *SOA* architecture is based on the weakly coupled applications paradigm, on applications dynamic interfacing, and also on interoperability, with a clear intention to provide a new generation of business applications, called services. The emerging services are fundamentally intended to the business to business (*B2B*) electronic commerce, even though they are not limited to this area. At the time, *ebXML* was also developed to facilitate business to business electronic commerce. The two aforementioned approaches are not very compatible. The strong point of *ebXML* is its rock-solid conceptual foundation. The strong point of Web services resides in the large number of assistance tools available and the amazing dynamic of the field, superior by far to the dynamic of the *ebXML* area [Luth, 2002]. Consequently, the users are put in the unpleasant position to opt for long-term steady development with *ebXML*, or else, for the rapid and inexpensive implementation of weakly coupled collaborative applications by the means of Web services.

The success of any emerging technology always depends on the existence and quality of the supporting software tools and applications, and e-commerce makes no exception to this rule. Currently *EDI* (by the means of *UN/EDIFACT* and *EDI-X12* standards) is the most often implemented technology in the area [Westarp *et al.*, 2003]. *EDI* technology was never significantly superior to its direct competitors and, despite all the implementation issues and risks arisen, despite being inferior to most part of its competition, had a tremendous success. The most important advantage a technology can provide is the diminution of the acquisition, use and maintenance cost, as a basis for the development of various competitive advantages. It is likely that one of the two concurrent technologies (*ebXML* and Web services) takes the lead in the *B2B* sector of e-business. Even if in some cases the financial and non-financial resources for the adoption of a new e-business technology are already allocated, most of the companies choose to delay their investment to the moment the winner is announced, and one of the two competing technologies is adopted by the vast majority of the players in the field. This wait usually slows the pace of the new technologies' development and increases the strength of the old, widely accepted technologies, even if they are inferior, or even obsolete. As a reaction to this behavior, the standardization bodies try to integrate the new, emerging technologies with the old, existing ones, the results being usually a surprise for everybody – some hybrid technologies which can prove to be extremely useful and easy to assimilate or, quite the opposite, to be a weakness for the business area they reside in. In our opinion, the phases of the new technology assimilation cycle are as follows:

- The user employs the old and widely spread technology.
- The standardization organization advises the new technology.
- The user analyses the new offer, usually overestimating its flaws and underestimating its strong points because of the supplementary costs inflicted by its adoption.
- The standardization organization amends the standards and the proposals, giving more attention in responding to user's observations than to the initial objectives of the new technology. A hybrid technology arises.

- The accepted trade-offs render the hybrid technology less time-resistant and less affordable for the future employers than the initial project, so the cycle needs to be repeated.

In order to have a better image, the impact of the main solutions providers on the adoption of a new technology must also be taken into account. All the key IT developers, and mainly the software developers, had significant contribution to the *EDI* standards development, and then to the Web services standards development. The development of *ebXML* makes no exception to that rule. Depending on their own marketing goals, some developers support the new standard, while the others decide to promote their own e-commerce and e-business technologies which they already invested major resources in (like *Microsoft BizTalk*). While *ebXML* is considered to be of interest mostly for the European and Asian economies (*EDI* still has no real competitor in North America), Web services are already implemented and fully functional all around the world [European Comission, 2005].

A recent study [Webber, 2004] analyses the most important software instruments in the field of *ebXML*. The author classifies them as follows:

- *Enterprise Integration Solutions* (*EIS*) – supporting mainly the *ebXML* messaging facilities. *EIS* are the most visible group of *ebXML*-enabled applications on the market today and, in their majority, provide support for the *ebXML Process Specification Schema* as well.
- *EDI-style integration solutions*, performing as messaging servers within the network, or as an independent *ebXML* messaging tool. They generally use *ebXML Message Service – ebMS*.
- *EbXML Registry-type solutions* – usually fall into two categories: some of them are native, *ebXML*-dedicated solutions; others provide communication or translation to a different kind of repository (usually *EDI*) by the means of *ebXML*-compatible interfaces.
- *Dedicated design tools* – allow business process management, along with other information significant to *ebXML* implementation, by the means of a model-based approach.

CONCLUSIONS

Even if e-commerce is far from being a novelty, most of the technologies in the area haven't reached a satisfactory maturity level, able to allow for their large-scale employment or their commercial trade as full-bodied solutions. The long-awaited development of the e-commerce, based on the enormous growth of the users population cannot be made possible neither by the successful present approaches (designed almost exclusively for the large enterprises or for well-delimited niche industries), nor by the rapid assimilation of the new technologies (mainly the *World Wide Web* and the *XML*). In our opinion, both approaches are missing a satisfactory level of reflection and integration of the business process semantics, as the foundation of any electronic commerce relationship.

EbXML is an attempt to compensate for the lacks of the today's standards and approaches and has the potential to address and solve a number of their most pressing issues. Even though, *ebXML* has not reached full maturity and, as a consequence is not yet able to be commercially adopted on a large scale, like *EDI*.

Performing e-commerce and e-business usually involves working out a set of vital issues about security and reliability. The actual structure of Web services is not yet compliant to all the requests: some specifications have not been assimilated by all the developers, others have not been adopted as industry standards and others still represent

work in progress. *EbXML* superiority over Web services is uncontested in this area, but the future development could lead to a new breed of Web services endowed with all the *ebXML* major advantages. Even if the two competing technologies have some common areas, like the use of *Universal Business Language* (*UBL*) or the *UN/CEFACT Modeling Methodology* (*UMM*), the main discrepancy will not cease to exist: the top-down approach, specific to an elaborated standard such as *ebXML* will always have different objectives and will attract a different audience than the pragmatic bottom-up approach specific to Web services.

Even if both *ebXML* and the Web services are based on the *Service Oriented Architecture* (*SOA*), the two approaches have few common points. *EbXML* addresses the still emergent market offering time-resistant solidity, Web services bet on quick and low-priced implementation. In our opinion, the Web services-specific approach is not long-term sustainable, being over-focused on technical elements (platform, network, interoperability, collaboration) and showing a too shallow concern for the business process semantics and real content. Even if the gap between the two approaches widened during the last years, we think they are not irreconcilable.

In order to answer (to some extent) to the question in the title, *ebXML* has the potential to provide a long-awaited foundation for the new generation of e-business, especially in the *B2B* sector. Its real success still relies mainly on the reaction of the target organizations, not always positive to a technology requesting important expenses today for the promise of some important savings and profits in the future. For most of the targeted companies, the adoption of *ebXML* implies termination of some applications and technologies which proved to be successful in the immediate past and may even continue to be successful. For this reason we do not reject the possibility of a new hybrid technology emerging in the near future, a technology able to merge the quasi-totality of the present e-business standards and provide "the best of both worlds".

The research may continue with the identification of other flaws of the actual e-commerce and e-business standards and practices, along with the way *ebXML* development tendencies could address the aforementioned flaws.

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