The Role of XML in E-Business

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***Abstract* --The role of XML and XML e-business standards will be discussed at length. In particular, ebXML will be discussed in relation to other e-business specifications. ebXML is a set of interoperability specifications developed by a core group of industry experts managed under two organizations, UN/CEFACT and OASIS.**

I. Introduction

As the Web continues to evolve, eXtensible Markup Language (XML) will be the language of choice used to send internet content and electronic transactions. XML is a **syntax** that provides the ability to identify pieces of information based upon hierarchy and content. It is important to understand that XML is a syntax and not a vocabulary. Organizations have the ability to define information based upon their business rules in XML using their own vocabularies.

The ability for an organization to create their own vocabulary is an empowering capability of XML. However, this ability also comes at a price of interoperability problems, or the exchange of information.

Traditional EDI (Electronic Data Interchange) was based upon well established standards. The EDI standards developed a standard vocabulary. The vocabulary was a paper-based product. Delimiters within the EDI message differentiated the fields within an EDI message. The messages are concise.

There are currently two international standards for performing EDI transactions, ANSI X12 and UN/EDIFACT. The X12 standard is mainly used in North America while UN/EDIFACT is used by the rest world. These two EDI standards are not interoperable. Complex EDI mappers have been developed to enable the interchange of information between company databases and agreed upon EDI messages. The EDI standards requires that additional paperwork, meetings and telephone conversations have to take place in order to develop an agreement between two parties. The agreement between these two parties may not fit a third parties requirements so more agreements are necessary.

This paper will discuss XML and e-commerce and the standardizations efforts revolving around XML for EDI.*

II. Why XML for E-Business

* This paper has been created using XML and XSL-FO for composition.

Companies that use traditional EDI systems today are either Fortune 500 companies or companies who have been mandated to use EDI in order to do business with large companies and Government agencies. The larger companies and Government entities have EDI systems in use. In North America, there are over 6 million companies. Today around 100,000 companies use traditional standard EDI . These statistics show that the vast majority of companies are not using traditional EDI. Two reasons why EDI has not been embraced by small and medium-sized enterprises (SME) is cost and complexity. The SMEs do not use traditional EDI unless mandated from outside the organization. XML provides the mechanism for SMEs to play in the global marketplace.

Current methods for performing EDI predate the World Wide Web. EDI has not become thoroughly adopted by the business world. EDI continues to be used for one-to-one data exchange between businesses. When two organizations want to exchange EDI transactions, they must develop an EDI agreement based on the EDI standard. These agreements are usually defined in prose and implemented in software. The messages or transactions are usually accomplished through proprietary networks or using telephone dial-up communication or a VAN (Value Added Network). The use of internet for doing business is rapidly being deployed. EDI uses proprietary protocols that take time to optimize and, once instituted, are difficult and costly to change. XML can include the structural information and may prove to be a solution for many of EDI adoption barriers. XML provides greater levels of standardization, an intelligent structural framework, and eventual widespread use on the Web.

Currently, electronic commerce is alive and active on the internet but it is not being conducted using standard EDI methods. Instead, these transactions occur through customized programs and databases. XML is becoming popular as the underlying data format. Using XML as the standard for EDI transactions can provide standardized protocols that allow for exchange of information. Such standardization and flexibility can only increase the use of EDI, both through existing proprietary networks and over the World Wide Web.

Traditional EDI is delimited text. Transactions are usually sent in batch mode by a VAN (Value Added Network). Below is an example of a name segment in an X12 transaction. As you can see, this information is very succinct and difficult for a human to understand. If a piece of information were missing a delimiter would still be required as a place holder in order for the receiving computer to understand the fields.

EXAMPLE:

```
N1*SH*ACE MANUFACTURING*1*987654321
*N2*RECEIVING*N3*234 MARKET STREET
*N4*SAN FRANCISCO*CA*94103*US
**
```

If we take a look at the same transaction using XML syntax you can see that the information is understandable by both humans and computers.

EXAMPLE:

```
<shipper duns="987654321">
   <organization unique-id="aceman">
      <name>ACE MANUFACTURING</name>
    <division>RECEIVING</division>
      <address>
         <street>234 MARKET STREET</street>
            <city>SAN FRANCISCO</city>
        <state>CA</state>
            <postalcode>94103</postalcode>
          <country>US</country>
         </address>
      </organization>
</shipper>
```

Notice that the pieces of information are clearly identified. Also notice the relationship of the information. The information in XML can be displayed to an end user via a browser and a stylesheet. This allows the human sender and receiver the possibility of verifying the information before sending and after receiving the information.

III. ebXML

The ebXML initiative was a joint venture from the United Nations for Trade Facilitation and Electronic Business (UN/CEFACT) and the Organization for the Advancement of Structured Information Standards (OASIS). The ebXML framework was developed by over 200 individuals over an 18 month period. The ebXML imitative was intended to offer an "open technical framework to enable XML to be utilized in the consistent and uniform manner for the exchange of electronic business data in application-to-application, application-to-person and person-to-application environments" [1].

The participants of ebXML had a vast amount of experience in various industry, EDI and XML standards and initiatives. They were able to bring their wealth of knowledge and experience to the group to develop a set of specifications. The ebXML intuitive was an ambitious and aggressive effort. The ebXML working groups physically met every three months. Between meetings, the group worked via electronic media, mailing lists, web sites, etc.

There were a number of project teams organized. The project teams developed a set of building blocks designed to to meet common business requirements. The ebXML framework came from the established working groups. The ebXML framework consists of the following specifications:ebXML Technical Architecture Specification Business Process Specification Schema (BPSS)Registry Information Model (RIM)Registry Services Specification ebXML Requirements Specification Collaboration-Protocol

** Line were required for formatting purposes. In an actual transaction information would be received in a steady ASCII stream.

Profile and Agreement Specification Message Service Specification

Many technical reports and white papers were also created from technical working groups. The set of specifications provide a framework for enabling collaborative commerce. The set of specifications can used separately or in conjunction with each other. The ebXML family of specifications can be thought of as 'mix and match' e-commerce solution.

The specifications are very new but many XML and EDI software developers are beginning to prototype software surrounding the ebXML specifications.

There are a lot of different specifications that can be independent of the other specifications or can be combined with other specifications. Understanding the intersection of these specifications is confusing and in some cases ambiguous.

After the 18 month initial establishment of the ebXML working groups and the initial creation of the first versions of the specification, OASIS-Open has included the ebXML specification under their umbrella committee specifications.

In the next sections I will describe briefly the family of ebXML specifications developed by the ebXML working teams. The ebXML group of specifications can be confusing.

A. ebXML Technical Architecture[2]

The ebXML groups of specifications are a group of interlocking puzzle pieces. It is not required that organizations utilize all of the ebXML specifications. Organizations can pick and choose the specifications that best serve their business needs.

As stated before, the ebXML framework is a set of building blocks. The ebXML technical architecture document has been written as a general guideline for describing at a high level how the ebXML components or building blocks fit together. This specification can be used as a road map to enable end users to get an overall basic understanding of the components and where they fit in the ebXML puzzle.

B. Business Process Specification Schema (BPSS)

BPSS is an XML DTD and schema that formally defines the business processes. "The ebXML Specification DTD provides a standard framework by which business systems may be configured to support execution of business transactions. It is based upon prior UN/CEFACT work, specifically the metamodel behind the UN/CEFACT Unified Modeling Methodology (UMM) defined in the N90 specification."[3]

The BPSS supports the choreography of business transactions into business collaborations. The BPSS provides the choreography between business practices and the technical implementation. The specification relies heavily on Unified Modeling Language (UML).[4]

C. ebXML Registry and Repositories

The ebXML Registry and Repository Work Group developed two specifications. The first specification "Registry Information Model" defines the components or information contained in the registry. The second specification, "Registry Services Specification" defines the interface for querying and accessing information within the registry.

It is important to understand the registry is not the repository. Organizations have the option to use existing repositories, ERP, or content management systems.

a. Registry Information Model

"The Registry Information Model provides a blueprint or high-level schema for the ebXML Registry. Its primary value is for implementers of ebXML Registries. It provides these implementers with information on the type of metadata that is stored in the Registry as well as the relationships among metadata Classes." [5]

Basically, the RIM provides information on the type of metadata that is stored in the registry. It also provides the relationships between the metadata.

b. Registry Services Specification

The Registry Services Specification defines the interface used to the ebXML registry "as well as interaction protocols, message definitions and XML schema".[6] The registery services permits access to the repository or content management system.

D. ebXML Requirements Specification

The ebXML Requirements Specification was the first specification completed by the ebXML group in May 2000. [8] The Requirements Specification provides a functional specification for the design of the technical architecture.

E. Collaboration-Protocol Profile (CPP) and Agreement Specification (CPA)

The CPP and CPA are essentially XML documents that encode a parties e-business capabilities or parties e-business agreements. [9] An XML schema has been developed for the CPP and CPA. The schema has been developed with a *candidate recommendation* of the W3C XML Schema specification.

F. Message Service Specification

The messaging specification in my opinion is the most complete and currently used specification from the entire ebXML family of specifications. ebXML adopted Simple Object Access Protocol (SOAP) as the messaging envelope. SOAP is currently used by many major e-business/e-commerce systems such as Microsoft's BizTalk.

G. The Future of ebXML

After the initial 18 month period and the release of the first versions of the ebXML specification, work is still continuing. The original specifications were immature and untried. The OASIS organization has taken control of the ebXML standardization effort. OASIS is a member organization. The members consist of over 400 corporate and individual members.

Since the original 18 month period version 2 of several of the specifications have been released. As the specifications mature and software and tools are developed to enable ebXML transactions organizations and industries may adopt some or all of the ebXML specifications within their standards.

IV. Other E-Business Initiatives

There are several e-business standards initiatives that directly compete with ebXML as a whole or a particular component of ebXML. The marketplace will be the real judge of the merits of each of these standards or de facto standards. In this section I will discuss just a few of the various initiatives.

A. BizTalk™ Framework

BizTalk™ Framework is a Microsoft initiative to support their BizTalk™ server. BizTalk was an early implementor in the XML/edi arena.[10] The framework has a group of de facto standards, including SOAP, HTTP, SMTP. The BizTalk framework is less ambitious than the ebXML group of specifications.

Microsoft has developed a server, BizTalk Server™ that takes advantage of the BizTalk framework.

B. Universal Description, Discovery and Integration (UDDI)

"The project creates a platform-independent, open framework for describing services, discovering businesses, and integrating business services using the Internet, as well as an operational registry that is available today." [11] UDDI helps organizations discover businesses on-line. It also defines how they conduct business one the appropriate business is discovered.

The UDDI initiative has been very well received from a large number of organizations. It competed directly with the ebXML registry specifications.

C. RosettaNet

RosettaNet is a prime example of a successful industry standard. RosettaNet was established in late 1998. The consortium is comprised of companies like Microsoft, American Express and IBM.

RosettaNet is a " self-funded, non-profit organization, RosettaNet is a consortium of major Information Technology, Electronic Components and Semiconductor Manufacturing companies working to create and implement industry-wide, open e-business process standards." [12]

RosettaNet develops Partner Interface Protocol or PIP which is an XML specification designed to align a specific business process between supply chain partners.

D. Industry Initiatives

There are many horizontal and vertical industry initiatives that have been developed and are being used. There are many examples of successful XML-based industry e-business examples.

The Open Financial eXchange (OFX) is another successful initiatives. The "Open Financial Exchange is a specification for the electronic exchange of financial data between financial institutions, business and consumers via the Internet." [13]

OFX was created initially by Checkfree, Intuit and Microsoft. OFX currently has over 1500 financial institutions using the standard which represents over 3 million users.

The insurance industry released the Joint Venture Reinsurance standards in September 2001. The JV Reinsurance standard is an XML vocabulary based upon the original EDIFACT EDI standard.

The list of industry standards is quite extensive but I think the above standards provides a representation that industry is moving forward to cohesive and usable e-business XML standards. These standards are in wide use.

V. Conclusion

In conclusion, XML is currently being used successfully to perform ebusiness processes. Originally businesses developed their own vocabularies internally. There were many successful implementations of XML during the early days. As companies realized the success of XML for facilitating business transactions and business processes, some of these companies such as, Microsoft, IBM, Sun, etc. brought their experiences and knowledge to the various industry forums.

As ebXML and other business XML standards mature and better software will be developed that will take advantage of these standards.

Appendix A. Common Acronyms

1. BPSS

Business Process Specification Schema

2. CPA

Collaboration Protocol Agreement

3. CPP

Collaboration Protocol Profile

4. DTD

Document Type Definition

5. EDI

Electronic Data Interchange

6. HTML

HyperText Markup Language

7. OASIS

Organization for the Advancement of Structured Information Standards

8. RIM

Registry Information Model

9. SGML

Standard Generalized Markup Language

10. SME

Small and Medium-sized Enterprises

11. SOAP

Simple Object Access Protocol

12. UML

Unified Modeling Language

13. UMM

Unified Modeling Methodology

14. UN/CEFACT

United Nations for Trade Facilitation and Electronic Business

15. VAN

Value Added Network

16. W3C

World Wide Web Consortium - Develop specifications for the WWW.

17. WWW

World Wide Web

18. XML

eXtensible Markup Language

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