

**DRAFT**  
**XML and XML/EDI**  
**Standards Industry Profile**  
**and DoD Applicability Report**

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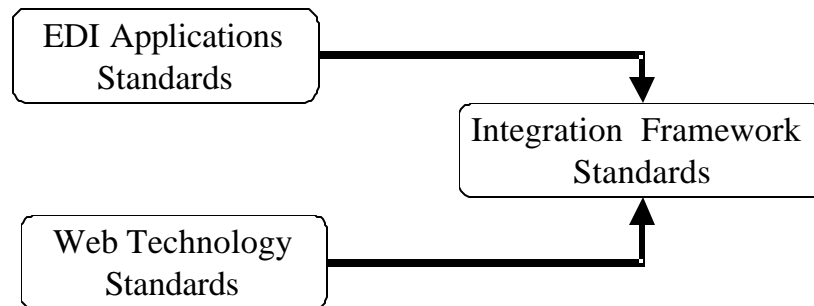
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## 1.0 INTRODUCTION

The purpose of this report is to assist Department of Defense (DoD) [in particular Defense Logistics Management Standards Office (DLMSO)] in evaluating the applicability of existing and future eXtensible Markup Language (XML)-based standards for use within DoD logistics business operations systems. A key part of the research conducted for this task was to identify and evaluate the current myriad of bodies and/or business standardization initiatives potentially applicable to DoD's emerging XML/EDI planning and migration efforts.

XML was formally recommended by the World Wide Web Consortium (W3C) in February 1998 - and since that time, XML tools, techniques, and methodologies are maturing. Software vendors are embracing this technology and they are beginning to build it into their products and services. XML is quickly becoming the standard markup language for the Web, which is a key part of why XML is touted as having the potential to revolutionize the way businesses exchange data. In addition to allowing companies to easily and cheaply conduct online business transactions with their customers and partners, XML also delivers a variety of other capabilities such as mapping data, application and database integration, styling data for screen display, and delivering a variety of other media across the Web. Although XML has great potential, the user community needs agreed upon standards in order to make XML a feasible mechanism for e-commerce applications, integration, and interoperability.

The following diagram illustrates the three key and independent areas of standardization relating to XML and Electronic Data Interchange (EDI).



**Figure 1.0-1 The Move Towards an Integrated Framework**

Figure 1.0-1 shows how the EDI and the Web XML are fueling the standardization of so called "Integration Frameworks." These frameworks include services such as Registries and Repositories, etc (see Section 1.3). Sections 1.1 and 1.2 introduce EDI and Web XML respectively. The remainder of this report addresses each of the three above-mentioned areas separately. Section 2.0 of this report provides an overview of the EDI standards bodies' (ANSI ASC X12/DISA and UN/EDIFACT) perspective with respect to XML. Section 3.0 provides addresses the World Wide Web Consortium and the relevant Web technology standards (XML family of specifications) and discusses the Internet Engineering Task Force (IETF). Section 4.0 discusses the various emerging industry consortia/frameworks and their respective mission, goals, status, and future plans. Section 5.0 of this report touches on some of the existing DoD

efforts related to XML and XML/EDI standardization. Finally, Section 6.0 provides some summary recommendations regarding the future of the standardization efforts and how DoD can, best position their organization to embrace and extend these emerging standards and frameworks.

### **1.1 What is EDI?**

Electronic Data Interchange (EDI) is the computer-to-computer exchange of business data in a standardized format. With EDI, information is organized according to a specified format set by both trading partners thus allowing a “hands-off” computer transaction requiring no human intervention or re-keying on either end. The information contained in an EDI transaction set is for the most part the same as on a conventionally printed document such as a purchase order, bill of lading, or invoice.

In the late 1960’s as businesses began to computerize their internal operations, the shipping and transportation industries developed EDI in an effort to reduce the burden of paperwork and also as an attempt at implementing the fictional “paperless” office. Although EDI never eliminated paper documents, it decreased the number of times such documents were handled by people. Reduced handling resulted in fewer errors and faster transfers, but unfortunately, it also increased the complexity of moving electronic documents around. Historically a company that switched from traditional methods – usually mail or fax to EDI saw savings in time and transaction costs, at the costly expense of having to implement and develop proprietary communication protocols.

Traditional EDI users, mostly Fortune 1,000 or Global 2,000 companies used leased or dedicated telephone lines or a Value-Added Network (VAN) such as those run by IBM, GE, or AT&T to carry data exchanges. A VAN was a system whereby a third party (the VAN provider) leased lines from local telecommunications providers, often enhancing them with elements such as error detection. These lines would then be used to connect participating trading partners who in turn would need to install the VAN’s proprietary software to translate and transmit their business documents in EDI formats. The result was a secure, swift, and accurate system. The drawback of a traditional VAN was the high costs involved, which effectively blocked most Small-to-Medium sized Enterprises (SMEs) from taking advantage of EDI and like many new innovations EDI was never able to reach critical mass.

As telecom infrastructure increased, the Internet became the obvious heir apparent to VANs. An already existing infrastructure and a growing market for secure transmissions showed pioneers that the market for EDI could reach well beyond those who could afford the traditional VAN approach. Soon the EDI format was adopted for transmission across the Internet, and “EDI-over-the-Internet” services were born.

There are two types of EDI on the Internet. The first is called “Web enabled EDI” and uses a common Web-browser to view messages in a graphical format. This is considered ideal if the volume of messages is not too high. Web enabled EDI uses a simple point and click interface to search and select specific messages for viewing, download and print. “Internet EDI” is a term for high volume message transactions. Available on many systems, File Transfer Protocol (FTP)

protocol complements the graphical point and click convenience of Web enabled EDI allowing high volume mass downloads matching the capability of most EDI VANs.

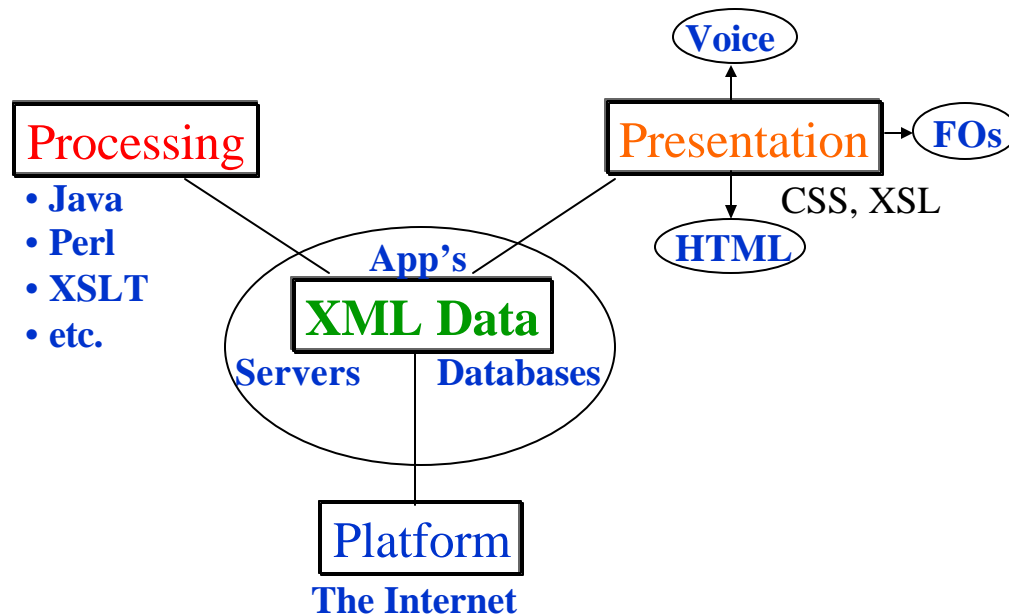
The changes in the computer technology environment and the increasingly integral role that information technology now plays in today's manufacturing, distribution and services environment, along with changes in business philosophy and practices, have changed the definition of EDI. The definition must now be more encompassing than merely the rapid transmission of electronic documents.

EDI must now be viewed as an enabling technology that provides for the exchange of critical data between computer applications supporting the process of business partners by using agreed upon, standardized, data formats. No longer is EDI merely a way to transmit documents, but it is a means to dynamically move data between trading partners whose computer systems will use the data to order raw materials, schedule production, schedule and track transportation, replenish stock, etc. Enter XML, which fulfills these requirements for real-time, IP-centric solutions, as it provides businesses a flexible, extensible and dynamic environment for integrated, interoperable data exchange.

## **1.2 What is XML?**

Very simply defined, XML is a subset of the Standard Generalized Markup Language (SGML) designed for use on the Internet. XML has been referred to as having 80% of the functionality of SGML, with only 20% of the complexity. As defined by the W3C, XML describes a class of data objects called XML documents and partially describes the behavior of computer programs which process them. XML is an application profile or restricted form of SGML, the Standard Generalized Markup Language [International Organization for Standardization (ISO) 8879], therefore by construction; XML documents are conforming SGML documents.

Referring to Figure 1.2-1, XML is a platform, a database, a language and media-independent. It is ideal for data-centric Web applications, easy to distribute, easy to manipulate on the client site, easy to customize data by using intelligent agents (that is the tags are machine processable).



**Figure 1.2-1 The Move Towards an Integrated Framework**

*“XML provides the content to be displayed with HTML, while Java provides a mechanism by which XML content can be processed.”*

XML is portable, which because the web is a distributed architecture, is very important. Note that eXtensible Style Language (XSL) is really two specifications: eXtensible Style Language Transformation (XSLT) for mapping and transformation and XSL for styling and Formatting Objects (FOs). XML will enable new ways to add value to business transactions, which include: dual support for machine-to-machine and machine-to-human (user interface) processing, intelligent agent queries/processing, intelligent awareness and discovery capabilities, and enhanced mapping and integration capabilities.

There are varieties of techniques for storing XML data in traditional relational database systems, which include:

1. Store XML document as a single intact object including its tags as a single large object,
2. Store XML document as data and distribute it untagged across object-relational tables, or
3. Combine XML documents and data using database views.

Storing XML documents as whole documents (document-centric) is a good strategy when the content is static. For example, storing XML documents as whole documents is good for such things as news articles, books, advertisements, etc. On the other hand storing documents as data (data-centric) is a good strategy when you have well defined structured data that is reused in other applications. Examples of data-centric applications include purchase orders, invoices, and several other business-to-business exchanges.

In many real-world applications however, the worlds of documents and data need to come together. For example, consider the following cases:

1. Business data needs to be delivered as an integrated part of business documents, and
2. Document content has meta-data that needs to be queried, analyzed, and manipulated without necessarily accessing the actual media content “chunks.”

It is therefore not uncommon for applications to make use of both the data- and document-centric approaches to managing their business information inside their databases. The leading enterprise relational databases, like Oracle 8i, offer seamless integration of both these approaches. Combining this structured and unstructured data to function as a single document can be accomplished using database views.

### 1.3 What is a Framework?

The term framework is used often in this paper. For the purposes of this paper, we provide the following definition for framework:

**Framework** - a structured set of reference specifications used to integrate organizational modules into an integrated architecture. A Framework comprises three architectures:

- Process Architecture - which defines the business processes of the integrated virtual enterprise.
- Information Technology Architecture - which defines the information technology used within the enterprise.
- Control Architecture - which defines the functional, technical, and data standards controlling the process and information technology architectures of the enterprise.

When considering XML frameworks for next generation EDI it is important to understand how the syntax, semantics, and application integration aspects differ when comparing traditional EDI to XML. The following diagram compares specific points of traditional EDI vs. a Web based replacement of EDI:

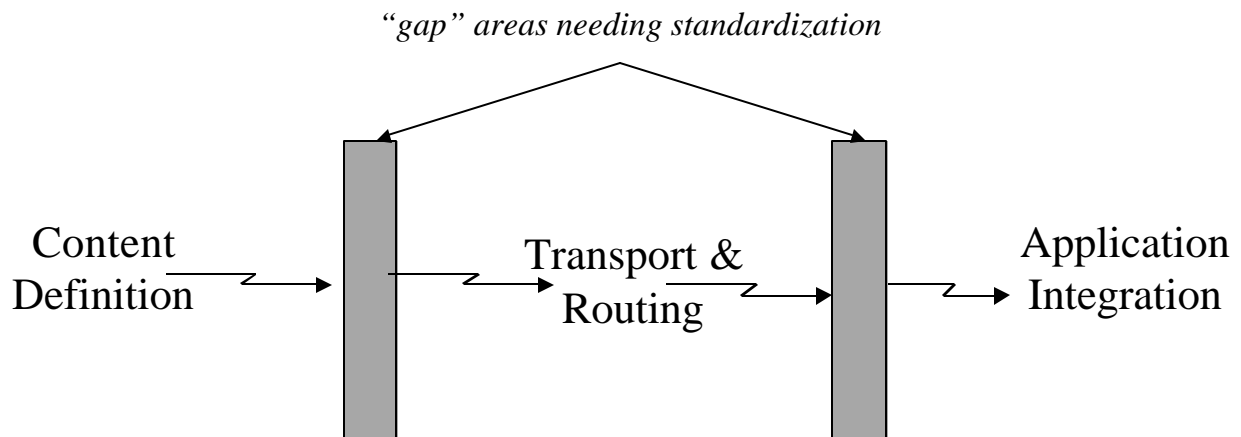
**Syntax + Semantics + Integration = Intelligent Business Information**

Traditional EDI	<ul style="list-style-type: none"> <li>• ISO 9735</li> <li>• X12.6,x</li> </ul>	<ul style="list-style-type: none"> <li>• ICs</li> <li>• DEDs</li> </ul>	<ul style="list-style-type: none"> <li>• Mapper / Translator</li> </ul>
Web EC	<ul style="list-style-type: none"> <li>• XML</li> </ul>	<ul style="list-style-type: none"> <li>• Schemas</li> <li>• RDF</li> <li>• Repository</li> <li>• Namespace</li> </ul>	<ul style="list-style-type: none"> <li>• XSLT, DOM, Links, JDBC, Agents, middleware, etc.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <ul style="list-style-type: none"> <li>XML RPC</li> <li>SOAP</li> <li>XMI</li> <li>CWMI</li> <li>WIDL</li> <li>APIs</li> </ul> </div>

**Figure 1.3-1 The Need for Standards in Migrating from Traditional EDI to the Web**

The purpose of the above diagram is to show how the syntax, semantics, and application integration areas compare for traditional EDI vs. Web XML/EC/EDI. It is important to note that XML (the language only - not the family of complementary suite of specifications) primarily provides the syntax and NOT the semantics for XML/EDI. Namespaces (see Semantics in above diagram) will allow you to define a 'scope' for a particular tagset to avoid the problem of tag name collisions. Most of the 'action' going on in the standards development area currently is in the semantics and integration areas.

An additional area that is being standardized involves Transport, Routing, and Packaging. See Figure 1.3-2.



**Figure 1.3-2 The Need for Standards in Conducting XML/EDI Business**

The above diagram illustrates some of the areas currently in need of standardization. Generally speaking, the emerging frameworks are transport agnostic - meaning you can choose your own type of transport. However, the design of the message headers and packaging, compression, security, etc. are each areas that are currently being standardized. (See ebXML's Transport, Routing, and Packaging work group - Section 4.2.3.5 of this report.)

Additional components which can be included as part of a XML / EDI framework include:

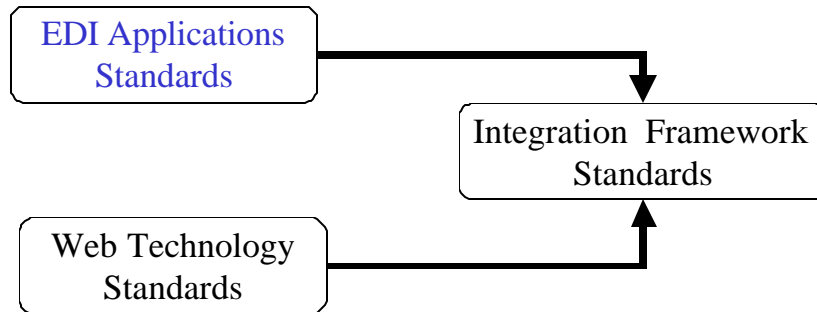
- Messaging frameworks for a common structure for interoperable messages sent between companies and among industries.
- Generic business process models.
- Core set of common data components.
- Distributed registry(s) and repository(s) for storing industry or company business requirements.

Note a *registry* is a mechanism whereby relevant documents and meta-data about them can be registered such that a pointer to their location, and all their meta-data, can be retrieved as a result of a query, where as a *repository* is a location or set of distributed locations where documents pointed at by a registry reside, and from which they can be retrieved by conventional (HTTP, FTP,SMTP, etc.) means, perhaps with an additional authentication/permissions layer.

Section 3.0 of this report covers in detail some of the leading emerging framework specifications.

## 2.0 TRADITIONAL EDI STANDARDS BODIES

This section discusses the traditional EDI standards bodies, which include both ANSI X12/DISA ([www.disa.org](http://www.disa.org)), and UN/CEFACT (EDIFACT standard) ([www.unece.org/cefact](http://www.unece.org/cefact)) as highlighted by Figure 2.0-1.



**Figure 2.0-1 EDI Application Standards**

By the end of the year (1998) there was a noticeable increase in recognition of the need for semantic harmonization to complement the syntactical harmonization introduced by XML. It is important to note that both of these standards bodies have been independently (for the most part) investigating the use of XML for EDI since 1997/1998 timeframe, however recently they have both agreed to focus all XML subcommittee efforts into the ebXML framework specification development initiative (See Section 4.2 on ebXML).

### 2.1 ANSI X12/DISA Background

As EDI usage increased during the late 1960's, the benefits gained from newly developed technology in the electronic transfer of business information did not go unnoticed and development of industry specific procedures began to take shape. As this development increased so too did the need for standardization.

During this time, The Transportation Data Coordination Committee (TDCC) developed standards for the transportation industry and began to work with development for non-transportation industries. The TDCC was renamed in 1969 to the Electronic Data Interchange Association (EDIA), to reflect the broader application of its work. Throughout the 1970's, the auto industry and large retail chains moved to implementing EDI systems and gradually industry specific forms were abandoned in favor of standardized forms.

In 1979 the American National Standards Institute (ANSI) chartered the Accredited Standards Committee (ASC) X12 (see [www.x12.org](http://www.x12.org)) to develop uniform standards for inter-industry electronic interchange of business transactions – hence, EDI. X12 elected to include industry specific requirements as subsets thus aiding in the acceptance of X12 by industry EDI users. With each transition users had to endure multiple versions. In 1989 grocers merged with X12 and ANSI accepted their transaction sets and grocer-specific definitions. Individual trade groups

as well as drug manufacturers complied and accepted changes needed by others. As a result, no new proprietary industry standards have been developed outside X12 since the early 1990's.

One of the most intellectually active groups with respect to new enabling technologies with the X12 body has been the Strategic Implementation Task Group (SITG). The SITG conducts research and development of new enabling technologies (see TMWG in next section).

In 1987 in response to the rapidly growing number of industries employing the X12 standards, the Data Interchange Standards Association (DISA) was chartered by ANSI to provide the committee with administrative support and to be the ASC X12 secretariat. In addition to national standardization efforts, DISA offers the opportunity for its members to participate in the international standards-setting process through its affiliation with the United Nations Rules for Electronic Data Interchange for Administration, Commerce and Transportation (UN/EDIFACT).

## 2.2 UN/CEFACT Background

On the other side of the Atlantic a first set of electronic data interchange rules was developed and published in 1981 in the form of "Guidelines for Trade Data Interchange" (GTDI) which offered potential users a basis for developing their systems. Later on, in the light of experience gained by the many users of GTDI and the various projects under way, the guidelines were enhanced with a view to permitting their wider acceptance.

The next stage in the work towards a common universal set of interchange rules for trade data was a reconciliation carried out by a joint European/North American ad hoc Group, known as United Nations Joint EDI (UN-JEDI). The work was commissioned by the Working Party on Facilitation of International Trade Procedures to bring together the enhanced GTDI and a set of standards for Electronic Business Data Interchange developed in the United States. The recommendations of the UN-JEDI Group were agreed by the Working Party at its September 1986 session. They led to the development of the UN/EDIFACT syntax rules.

Within the United Nations, is the United Nations Centre for Facilitation of Procedures and Practices for Administration, Commerce and Transport (UN/CEFACT), and is located in the United Nations Economic Commission for Europe (UN/ECE), a part of the UN network of regional commissions. The regional commissions report to the highest UN body in the area of economics, trade and development: Economic and Social Council (ECOSOC). UN/CEFACT was established in 1996 in response to new technological developments, and the UN/EDIFACT Working Group (EWG) is a part of the UN/CEFACT commission.

As a definition, UN/EDIFACT rules comprise a set of internationally agreed standards, directories and guidelines for the electronic interchange of structured data, and in particular that related to trade in goods and services between independent, computerized information systems. Recommended within the framework of the United Nations, the rules are approved and published by the UN/ECE.

Within the United States, ASC X12 has been granted authority by the Head of Delegation to CEFACT to appoint experts to the CEFACT empowered groups. Prior to April 29, 1998, the Pan American EDIFACT Board (PAEB), representing one of the six regions under the regional

Rapporteur structure, was the official coordinating body of UN/EDIFACT activity in North and South America.

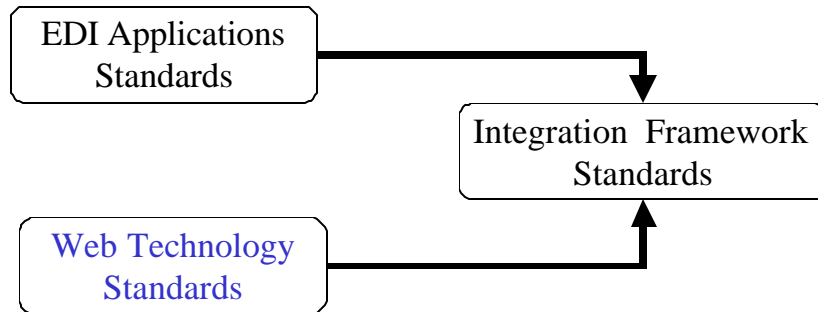
One of the most intellectually active groups with respect to new enabling technologies with the UN/CEFACT body has been the Techniques & Methodologies Working Group (TMWG), which convened its first session on November 13, 1997 in Paris, France (see the following links:)

- <http://www.harbinger.com/resource/klaus/tmwg>, and
- <http://www.disa.org/international/ac1home.htm>).

This group works with the Strategic Implementation Task Group (SITG) of the X12 SITG.

### 3.0 WEB (XML) STANDARDS AND THE INTERNET

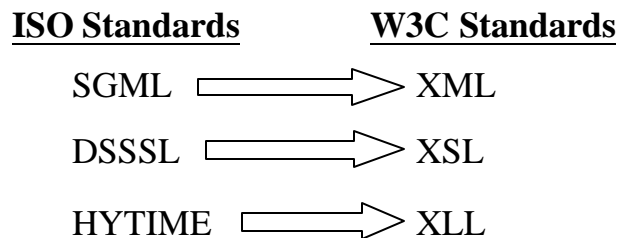
The “fusion” of EDI with Web technology standards is fueling the development of next generation e-business integration frameworks. This section is the last stop before we go on to describe the development of next generation e-business integration frameworks. This section focuses on "Web Technology Standards" as illustrated in the following diagram:



**Figure 3.0-1 Web Technology Standards**

The two main management standards management organizations for Web and Internet standards/specifications are the World Wide Web Consortium (W3C) and the Internet Engineering Task Force (IETF). This section presents a high-level overview of the aforementioned standards management organizations and some of the key XML/EDI specs/standards for each organizations.

The next section describes the W3C and the relevant XML specifications that continue to emerge within the W3C. However, before we continue it is important to note that the three ISO standards (Figure 3.0-2) were used, in part, as the basis for the initial development of Web compatible counterpart specifications, also shown below, which are developed and maintained by the W3C.



**Figure 3.0-2 Web Technology Standards**

#### 3.1 World Wide Web Consortium (W3C)

The World Wide Web Consortium is the main standards body (non-accredited) for the World-Wide Web. W3C was created by the Massachusetts Institute of Technology (MIT) during

October 1994. Netscape Communications Corporation was a founding member. The Consortium is operated by MIT Laboratory for Computer Science (LCS) and The French National Institute for Research in Computer Science and Control (INRIA), in collaboration with CERN where the Web originated. W3C is funded by industrial members and with support from DARPA and the European Commission but its products are freely available to all. Organizations may apply for membership to the Consortium; individual membership isn't offered. The director is Tim Berners-Lee who invented the World-Wide Web at the Center for European Particle Research (CERN).

The W3C works with the global community to establish international standards for client and server protocols that enable on-line commerce and communications on the Internet, which include the XML specification and its complementary specifications (often referred to as the "XML Family of Standards"). The W3C also produces reference software. The various types of specifications/publications produced by the W3C are as follows:

**Table 3.0-1 W3C Specifications/Publication Description**

Notes	A <i>note</i> is a dated, public record of an idea, comment, or document. A note does not represent commitment by W3C to pursue work related to the Note.
Working Drafts	A <i>working draft</i> represents work in progress and a commitment by W3C to pursue work in this area. A working draft does not imply consensus by a group or W3C.
Proposed Recommendations	A <i>proposed recommendation</i> is work that (1) represents consensus within the group that produced it and (2) has been proposed by the Director to the Advisory Committee for review.
Formal Recommendation	A <i>formal recommendation</i> is work that represents consensus within W3C and has the Director's stamp of approval. W3C considers that the ideas or technology specified by a Recommendation are appropriate for widespread deployment and promote W3C's mission.

Although the W3C is the organization responsible for specifications such as HTTP, et. al., this section focuses solely on the XML. Although XML, itself, is a W3C specification, there are a family of specifications accompanying and complementing XML. Currently the following members of the XML family of specifications have been *formally recommended* by W3C:

1. [The Extensible Markup Language \(XML\)](#),
2. [The Document Object Model \(DOM\), Level 1](#),
3. [XSL Transformations \(XSLT\)](#),
4. [The XML Path Language \(XPath\)](#),
5. [Namespaces in XML](#), and
6. [The Extensible HyperText Markup Language \(XHTML\)](#).

**Table 3.0-2 Description of XML Specifications**

XML	Refer to Section 1.0.
DOM	The Document Object Model (DOM) is an application programming interface (API) for HTML and XML documents. It defines the logical structure of documents and the way a document is accessed and manipulated.
XSLT	This specification defines the syntax and semantics of XSLT, which is a language for transforming XML documents into other XML documents. XSLT is designed for use as part of XSL, which is a stylesheet language for XML. In addition to XSLT, XSL includes an XML vocabulary for specifying formatting. XSL specifies the styling of an XML document by using XSLT to describe how the document is transformed into another XML document that uses the formatting vocabulary. XSLT is also designed to be used independently of XSL. However, XSLT is not intended as a completely general-purpose XML transformation language. Rather it is designed primarily for the kinds of transformations that are needed when XSLT is used as part of XSL.
XPath	XPath is the result of an effort to provide a common syntax and semantics for functionality shared between XSL Transformations [XSLT] and XPointer [XPointer]. The primary purpose of XPath is to address parts of an XML [XML] document. In support of this primary purpose, it also provides basic facilities for manipulation of strings, numbers and booleans.
Namespaces	XML namespaces provide a simple method for qualifying element and attribute names used in XML documents by associating them with namespaces identified by URI references. XML namespaces provides a way to eliminate the problem of tag name recognition and tag name collision.
XHTML	XHTML 1.0 is W3C's recommendation for the latest version of HTML, following on from earlier work on HTML 4.01, HTML 4.0, HTML 3.2 and HTML 2.0. With a wealth of features, XHTML 1.0 is a reformulation of HTML 4.01 in XML, and combines the strength of HTML4 with the power of XML.

In addition to the formally recommended XML specifications, the following W3C specifications are currently in a *working draft* format:

1. [Document Object Model \(DOM\), Level 2](#)
2. [The XML Pointer Language \(XPointer\)](#)
3. [The XML Linking Language \(Xlink\)](#)
4. [XML Schema Part 1: Structures](#)
5. [XML Schema Part 2: Datatypes](#)
6. [XML-Signature Requirements W3C Working Draft 14-October-1999](#)
7. [XML-Signature Syntax and Processing W3C Working Draft 10-May-2000](#)

A very important area receiving great attention in the W3C is XML Schemas. The Schemas specifications should be formally recommended sometime around the 3-4 QTR 2000. Oracle is working together with IBM, Microsoft, CommerceOne, and others in the W3C XML Working Group to define an Internet Standard for "XML Schemas." This effort will create a standard to

describe the data types, structure, ordering, and mapping support for a document's elements, which will enable more automated and seamless integration of XML with databases, e-commerce applications, and programming languages. It is important to note that the majority of COTS XML/EDI applications currently use some form of an XML Schemas syntax as opposed to traditional XML Document Type Definitions (DTDs). All COTS vendors have stated that they will move to support the recommended W3C XML Schemas syntax standard when it is released.

An additional W3C specification emerging with potential applicability to XML / EDI is the Resource Description Format (RDF). With the benefit of experience, RDF makes a great step forward from specifications such as HTML and HTTP. These specifications have been extended significantly during their evolution to date. The process has been one of the experimental additions of new tags. The significance or importance of new tags has never been evident to software not involved in the experiment, with resulting danger of serious incompatibility.

RDF has the goal to allow documents to be written in a mixture of old standard vocabularies and specific new experimental or proprietary vocabularies, but with well defined way of knowing what is important, what can be ignored, and how old software can deduce or download and understanding of a new vocabulary. This will hopefully allow powerful combinations of applications when, for example, documents can be made which combine in a well-defined way concepts for instance from banking, engineering and legal vocabularies. The power of the Web as an expressive medium will become the product (rather than the sum) of the individual developments. Furthermore, by allowing experimental vocabularies to intermix with standard vocabularies without threatening the integrity of the system, RDF will give a surer and faster deployment path for new ideas free from the need for so many standards meetings.

In summary, the W3C is a Web technology standards organization. The application of these Web technologies and the integration of these technologies into standard frameworks is what we see occurring within various industry consortia standards organizations, which is discussed in the next section.

### **3.2 Internet Engineering Task Force (IETF)**

The Internet Engineering Task Force (IETF) is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. The IETF has been in existence much longer than the W3C and it is open to any interested individual. The actual technical work of the IETF is done in its working groups, which are organized by topic into several areas (e.g., routing, transport, security, etc.). Much of the work is handled via [mailing lists](#). The IETF holds meetings three times per year. Much of the work of the IETF involves messaging and communications transport of the

The IETF working groups are grouped into areas, and managed by Area Directors, or ADs. The ADs are members of the Internet Engineering Steering Group (IESG). Providing architectural oversight is the Internet Architecture Board, (IAB). The IAB also adjudicates appeals when someone complains that the IESG has failed. The IAB and IESG are chartered by the Internet

Society (ISOC) for these purposes. The General Area Director also serves as the chair of the IESG and of the IETF, and is an ex-officio member of the IAB.

One of the working groups of the IETF is called EDIINT, which is addressing Electronic Data Interchange-Internet Integration. The initial request for comment Request For Comment (RFC) 1767 defined the method for packaging the EDI X12 and UN/EDIFACT transactions sets in a MIME envelope. However, several additional requirements for obtaining multi-vendor, interoperable service, over and above how the EDI transactions are packaged, have come to light since the effort concluded. These currently revolve around security issues such as EDI transaction integrity, privacy and non-repudiation in various forms. Additional requirements that mimic many of the heading fields found in X.435 EDI messages (e.g., Interchange Sender, Interchange Recipient, interchange Control Reference, Communications Agreement ID, and Syntax Identifier) are also needed to support exchanges by point-to-point, FTP and SMTP protocols. Many believe these heading fields are best described in XML. Standards in these and other areas are necessary to ensure inter-operability between EDI packages over Internet. Various technologies already exist for these additional features and the primary requirement is to review and select a common set of components for use by the EDI community when it sends EDI over the Internet. In effect, the effort is to provide an EDI over the Internet Informational and Applicability Statement Documents. The ebXML initiative is borrowing on the lessons learned from this effort in their transport, routing, and packaging-working group (see ebXML Section 4 of this document).

A very important area receiving a lot of attention in both the W3C and IETF is XML Digital Signatures. According to their charter, the XML Signature Working Group is tasked with developing “an XML compliant syntax used for representing the signature of Web resources and portions of protocol messages [anything referencable by a Uniform Resource Identifier (URI)] and procedures for computing and verifying such signatures.” This is a joint effort between the IETF and the W3C. The current schedule for the XML Signature Working Group shows that the “Signature Syntax and Processing Specification” will be submitted in July 2000 for W3C Recommendation.

To date the working group has two major documents and many supporting documents on its website (<http://www.w3.org/Signature/Overview.html>). The Core Syntax document dated May 10, 2000, titled *XML-Signature Syntax and Processing* (<http://www.w3.org/TR/2000/WD-xmlsig-core-20000510/>), specifies the syntax and processing rules for the encoding of digital signatures using XML. Such signatures can provide integrity, message authentication, and/or signer authentication services for data of any type, whether located within the XML that includes the signature or locatable elsewhere.” The Requirements Document, dated October 10, 1999, “lists the design principles, scope, and requirements for the XML Digital Signature specification. It includes requirements as they relate to the signature syntax, data model, format, cryptographic processing, and external requirements and coordination.”

The specification dictates an XML tagset structure that defines the components of the signature and their occurrences (where "?" denotes zero or one occurrence; "+" denotes one or more occurrences; and "\*" denotes zero or more occurrences). The following structure has been defined by the working group by both DTD's and XML-Schema.

```
<Signature>
  <SignedInfo>
    (CanonicalizationMethod)?
    (SignatureMethod)
    <Reference (URI=)? >
      (Transforms)?
      (DigestMethod)
      (DigestValue)
    </Reference>)+
  </SignedInfo>
  (SignatureValue)
  (KeyInfo)?
  (Object)*
</Signature>
```

Signature – Root Element.

CanonicalizationMethod – Specifies canonicalization algorithm applied to the SignedInfo element prior to performing signature calculations.

SignatureMethod - specifies the algorithm used for signature generation and validation. This algorithm identifies all cryptographic functions involved in the signature operation (e.g., hashing, public key algorithms, MACs, padding, etc.).

Reference - specifies a digest algorithm and digest value, and optionally an identifier of the object being signed, the type of the object, and/or a list of transforms to be applied prior to digesting.

Transforms - contains an ordered list of Transform elements; these describe how the signer obtained the data object that was digested.

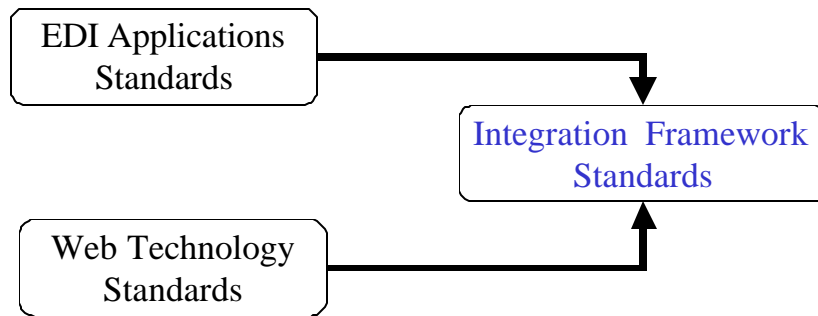
DigestMethod - identifies the digest algorithm to be applied to the signed object.

DigestValue - contains the encoded (base64) value of the digest.

KeyInfo - It enables the recipient(s) to obtain the key(s) needed to validate the signature and contains keys, names, certificates and other public key management information, such as in-band key distribution or key agreement data.

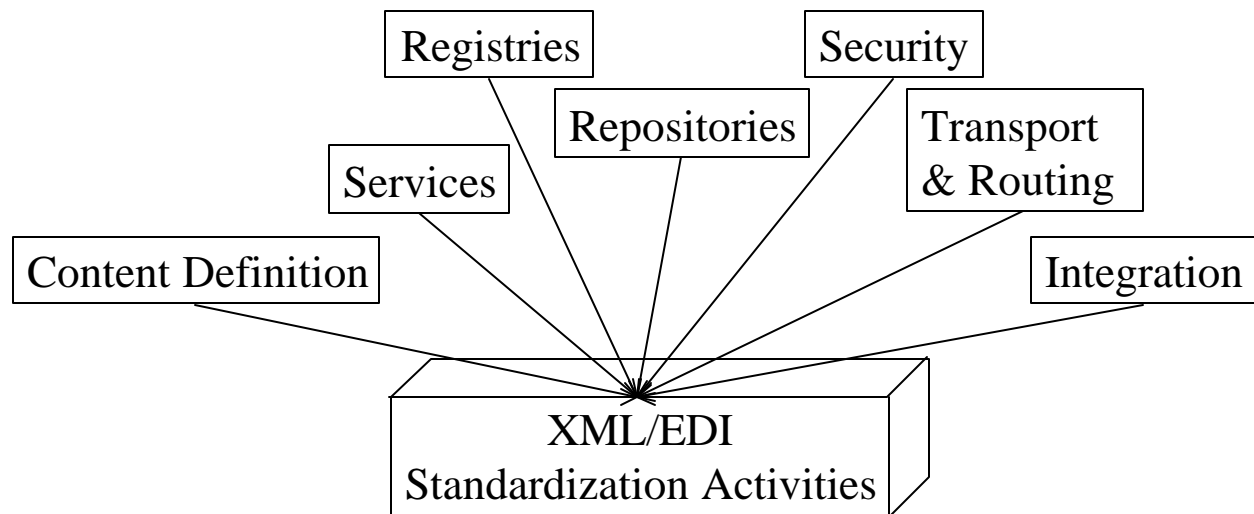
#### 4.0 EMERGING INDUSTRY FRAMEWORKS/REPOSITORIES

It is astonishing to think about the number of new software technologies that have emerged in recent years. With each new technology, we have to separate marketing hype from reality and understand where and how these new technologies can be applied to, our enterprise needs. This section covers some of the key emerging integration framework initiatives and their underlying enabling technologies.



**Figure 4.0-1 Integrated Framework Standards**

It is important to note that the standardization activities covered in this section address such areas as Frameworks, Repositories, Content Definition, Application Integration, etc. as illustrated in Figure 4.0-2.



**Figure 4.0-2 XML/EDI Standardization Activities**

The purpose of the above diagram is to illustrate that separate specs and standards are being developed for each of the boxes shown above. Note that some standardization activities are attempting to address all of the above areas, while other activities are just focusing on particular areas. The key framework (or related) initiatives covered in this section are as follows:

- *RosettaNet*,
- *ebXML – Electronic Business XML*,
- *BizTalk*,
- *Common Business Library (xCBL 2.0)*,
- *OASIS / XML.Org- the Organization for the Advancement of Structured Information*,
- *Open Applications Group (OAG)*,
- *eCo Framework / CommerceNet*, and
- *cXML – commerce XML*.

## **4.1 RosettaNet**

“Founded in June 1998, RosettaNet is an independent, self-funded, non-profit consortium dedicated to the development and deployment of standard electronic commerce interfaces to align the processes between IT supply chain partners on a global basis. RosettaNet’s global initiative is to adopt and deploy open and common business interfaces, enabling small and large buyers and sellers of computer technology to do electronic business more efficiently.”

“More than 200 companies representing \$1 trillion in annual information technology and electronic components revenues currently participate in RosettaNet’s standards development, strategy and implementation activities.” More information on RosettaNet can be found on the World Wide Web at <http://www.rosettanet.org>.”

### **4.1.1 RosettaNet Organization**

RosettaNet’s structure includes CEO, VicePresident of Operations, Project Coordinator, Chief Architect, Project Facilitator, Project Leader, Project Management Team, RosettaNet Managing Board, Architect Partners (Coalition Partners, Supply Chain Partners, and Solution Partners), Project Team Architects, and Business Research Team. Of these members we will focus on the Architect Partners and the RosettaNet Managing Board which will be defined in the following paragraphs.

The CEO is a Dedicated role responsible for overall execution of the RosettaNet Initiative according to the direction, budget, and priorities set by the RosettaNet Managing Board. Currently Jennifer Hamilton is chief executive officer of RosettaNet. Ms. Hamilton is an executive on loan from Quantum Corporation.

The RosettaNet Managing Board consists of twenty-eight members representing the IT community. The Managing Board is the governing body for the initiative providing its overall direction and strategy. It is responsible for Initiative funding, project prioritization, interface promotion and implementation, and interface design approval. Managing Board members designate part-time volunteers from their companies for at least three projects a year which staff RosettaNet project teams and are responsible for the creation of the Partner Interface Processes (PIPs) and dictionaries. EC Managing Board Members include: AMD, Cisco Systems, Hitachi Semiconductor, IBM, INTEL, Kemet, Lucent Technologies, Micron, Motorola, National, NEC

Corporation, Philips Semiconductor, Pioneer, Texas Instruments, Toshiba America Electronic Components.

Architect Partners are the participating Initiative companies responsible for providing Project Team Architects and serve as initiative champions, as well as providing interface design approval. These include Coalition, Supply Chain, and Solution Partners.

Coalition Partners provide a support base for the PIP implementation. To qualify as a Coalition Partner, your organization must be a trade association or government agency that is not for profit. The goal of the Coalition Partner membership is to enlarge the support base and constituency of RosettaNet. Coalition Partners include: AFDEC, ASC X12, CommerceNet, CompTIA, CTC, EIDX, ITAA, NEDA, NEMI, NIST, OAG, OBI, SIIA, and Uniform Code Council to name a few.

Supply Chain Partners provide subject matter expertise for the interface development project teams. To qualify as a Supply Chain Partner, your organization must fall in the Electronic Component or Information Technology supply chain and your organization must be a manufacturer, distributor, reseller, shipper or end user. The goal of the Supply Chain Partner membership is to provide the subject matter expertise and human resources for the interface development project teams. Supply Chain Partners designate part-time volunteers from their companies for at least three projects a year which staff RosettaNet project teams and are responsible for the creation of the PIPs and dictionaries. Each Supply Chain Company contributes \$10,000 per year to support RosettaNet activities. Supply Chain Partners include: Fujitsu, Lexmark, Seagate Technology, Sun Microsystems, TTI, and Western Digital to name a few.

Solution Partners provide tools and services to aid companies in adopting RosettaNet interfaces. Solution Partners do not have voting privileges or access to PIP workshops, but are encouraged to participate in industry feedback phases and join with Supply Chain Partners to implement PIPs. To qualify as a Solution Partner, your organization must be a systems integrator, software developer, consultant or other organization that provides tools and/or services that enable supply chain partners to implement RosettaNet business process interfaces. Typically, software developers, systems integrators and consultants are represented in this category. These partners will be trained in RosettaNet methodologies and will have an opportunity to certify software as RosettaNet-compliant. The annual membership fee is based on the company's annual worldwide revenue. Solution Partners include: Anderson consulting, CommerceOne, Dun & Bradstreet, Edifecs, GE Information Service, Harbinger, J.D. Edwards, PeopleSoft, RSA Security, SAIC, Sterling Commerce, Viacore, webMethods, and XMLSolutions to name a few.

Combined, all of these members develop and use the frameworks and guidelines in e-business transactions. E-business guidelines are developed from RosettaNet e-business framework specifications. The guidelines define how computer systems will execute the business processes and form the rough draft of the PIP detailed specification. Implementation guidelines are provided to interested partners. The guidelines are used to validate the information exchanged between companies, create the data content, and support the management and creation of internal tools used within a member company. Companies may extend the implementation guideline for

their own individual needs but they may not override RosettaNet specifications. The final guidelines are then exchanged between member companies allowing for validation of message extensions during an e-business exchange.

#### **4.1.2 RosettaNet Scope**

RosettaNet's mission is to develop a standard set of parameters under which e-commerce can be conducted in real time over the Web.

##### **4.1.2.1 Core Components**

RosettaNet's Development Process includes Business Process Modeling and Analysis, PIPs, and Data Dictionaries all implemented within a set of related architectural components termed a framework. RosettaNet has used heavily many components of the Open Buying Initiative (OBI) in development of their Implementation Framework. For example, OBI data formats and process descriptions were broadened to be applicable to agent software components and service software component use.

###### **4.1.2.1.1 Business Process Modeling**

Business Process Modeling is used to identify and quantify the individual elements of a business process, creating a clearly defined model of the supply chain partner interfaces, as they exist today. This is called "As Is" modeling. This model reflects the results of extensive research at every level of the supply chain and is then analyzed to identify any misalignments or inefficiencies.

###### **4.1.2.1.2 Business Process Analysis**

Through the analysis of the detailed "As Is" model, a "generic To-Be" process emerges, showing the opportunities for re-alignment in the form of a Partner Interface Process (PIP) target list, and estimating the business impact of implementing the resulting PIPs (savings as a function of time and money).

###### **4.1.2.1.3 PIP Development**

The purpose of each PIP is to provide common business/data models and documents enabling system developers to implement RosettaNet e-Business interfaces, each of which includes the following:

- a) *XML document(s) based on Implementation Framework DTDs, specifying PIP Service(s), Transactions(s), and Messages(s) which include dictionary Properties;*
- b) *Class and sequence diagrams in UML;*
- c) *Validation tool; and*
- d) *Implementation guide.*

RosettaNet develops PIPs through extensive process modeling to determine how partners (manufacturers, distributors, resellers, carriers and end-users) in the IT supply chain interact with

each other as they carry out day-to-day business activities in each of six high-level business process areas -- Partner/Product Review, Product Introduction, Order Management, Inventory Management, Marketing Information Management, and Service and Support.

The first step in the development of a PIP guideline is for the users to capture the current “As-Is” business processes to create an understanding of the current partner business processes, their employee role interactions and business information needed to exchange information. Users then create a “To-Be” model that comprises partner roles and partner interface processes. The to-be model will define partner roles and structured properties that they exchange when they interact. The defined properties are captured in two property databases: technical specification property database and a business property database.

The process model is now used as functional requirements for a networked application execution process model, called a “PIP Blueprint” that specifies how agents and services execute partner processes in a networked system. The agents and service software exchange messages in transactions that are sequenced by execution processes. Finally, the PIP guideline is used to create a PIP specification. This specification includes business message guidelines (HTML format) needed to carry the business processes contained in the PIP and corresponding DTDs for each message guideline.

Currently RosettaNet messages are created using the set of elements and codes defined in business and technical dictionaries. This set is used as a baseline from which teams create specific message exchange specifications. The values and codes that can be assigned to each of the data elements are precisely defined within the PIP implementation guideline. These guidelines are sent from RosettaNet to supply chain partners and solution partners. The guidelines define the vocabulary, structure and allowable data element values and value types for each message exchanged during the execution of a PIP and can be used to validate received messages by translation systems.

PIP specifications contain three parts: the Preamble Header, the Service Header, and the Service Content. All three are packaged for transport as Multipurpose Internet Main Extensions (MIMEs) messages. Each business message consists of a message header and a message body. Both the header and the body are complete, valid XML documents and are encoded within a multipart/Related MIME message. The Preamble Header section contains elements that are global to the RosettaNet service and are common to the Service Header and Service Content. Each message body and header has its own DTD. Since RosettaNet validates the grammar, sequence, schema, and then content the header is validated first (grammar and sequence validation) followed by the body (schema validation). This allows the message to have content errors but since the header has been parsed a failure message may be sent by the recipient to the sending party.

#### **4.1.2.1.4 Dictionaries**

As part of RosettaNet's foundational projects, two data dictionaries are developed to provide a common set of properties required by PIPs. The first is a technical properties dictionary (technical specifications for all product categories), and the second is a business properties dictionary, which includes catalog properties, partner properties (attributes used to describe

supply chain partner companies) and business transaction properties. The Information Technology (IT) technical dictionary provides for a common platform to conduct business processes in an effort to try to eliminate disparity and provide for all partners to use a common language in which to do business. The Business properties dictionary defines business properties within PIPs, which describe the content of the Business Documents, which are to be exchanged between partners. This dictionary defines the business properties and allows for reuse of the properties in multiple PIPs. Business Dictionary content is approved during the approval of the PIP Blueprint and Business documents. These dictionaries, coupled with the RosettaNet Implementation Framework (exchange protocol), form the basis for each RosettaNet Partner Interface Processes.

Master dictionaries are used to define properties for products, partners, and business transactions. The master dictionary, coupled with an established implementation framework (exchange protocols), is used to support the e-Business dialog known as the Partner Interface Process or PIP. RosettaNet PIPs create new areas of alignment within the overall EC and IT supply-chains e-Business processes, allowing EC and IT supply-chains partners to scale e-Business, and to fully leverage e-commerce applications and the Internet as a business-to-business commerce tool. Previously, every distributor and manufacturer had its own proprietary dictionary of terms resulting in redundant, overlapping efforts by individual companies as well as confusion in the procurement process due to each company's unique terminology. With the RosettaNet technical dictionary, these companies will now be able to use a common platform to conduct business processes. For example, when introducing a new product, information describing that product will only have to be entered once by the manufacturer and will then appear consistently throughout distributor and reseller catalogs. RosettaNet is quick to point out that the dictionary's hierarchical structure is far more than a compendium of words and meanings. Layers within layers of descriptive fields refer to product type, multiple specifications and their definitions, terms to explain dimensions and their units and a value domain field for listing model variations. Another aspect of the RosettaNet dictionary is providing a precise language that enables fast and economical machine-to-machine translation of the words into foreign languages. This flexibility, which is characterized as essential to RosettaNet's overall mission to globalize the IT supply chain's business processes, promotes international, multilingual e-business initiatives that cross all geographic boundaries. Businesses can now understand each other and seamlessly integrate their business transactions.

#### **4.1.2.1.5 Framework**

RosettaNet's framework architecture (E-business Process), based on ISO Open Systems Interconnect (OSI) reference model, defines layers, which provide application, transport functionality, and defines the activity that occurs within the OSI application and session layers. The framework enables RosettaNet's networked applications to execute and validate PIP specifications. The RosettaNet Implementation Framework Specification defines the OSI application into the following layers:

- 1. Action Layer. This layer provides business actions that act either on or with accompanying information.*

2. **Transaction Layer.** *This layer provides transaction monitoring for sequences of message exchanges that perform a unit of work. Either all parties to the transaction commit to the unit of work or they all roll back to a previous state before the transaction was started.*
3. **Process Layer.** *This layer encapsulates conditional choreography of transactions for executing a partner interface process.*
4. **Service Layer.** *This layer provides network resources that perform network and business related functions.*
5. **Agent Layer.** *This layer provides communication interfaces for user and machine agents.*
6. **Message Handling Layer.** *This layer provides reliable, asynchronous and scaleable information delivery.*
7. **Transfer Layer.** *This layer provides information transfer between uniquely named network resources.*
8. **Security Layer.** *This layer provides a secure communications channel that, together with digital signatures, can be used to implement authorization and authentication.*

RosettaNet is primarily in the business of creating PIP guidelines with which their partner organization members agree to conduct e-business. RosettaNet expects members of the industry to implement the guidelines in a manner that is compatible with their existing information systems and their future information system plans. It is also expected that industry members will build application systems that can accommodate both RosettaNet guidelines and other existing industry guidelines that are used in commercial applications that are outside of RosettaNet's scope.

#### 4.1.3.2 RosettaNet Process Methodology

RosettaNet's framework is centered on the development of common e-business processes that they term Partner Interface Process. Simply put, a PIP is XML based dialogs that define business processes conducted between trading partners. PIPs are both machine-readable (i.e., XML DTDs) and human-readable. Members use PIP guidelines to configure specific e-business processes with other organizations. These e-business processes include the use of networked computer applications that span partner organizations in the supply chain and adhere to RosettaNet network application architecture specifications.

The RosettaNet business model is intended to enable supply chain business partners to execute interoperable e-business processes by continuously developing, maintaining and distributing PIP implementation guidelines. According to the RosettaNet Implementation Framework Specification, RosettaNet adopts existing e-business standards, guidelines, and specifications wherever possible and creates new e-business framework specifications where necessary. They frameworks are generic in nature so that they can be used for all types of e-business applications. According to the specification, there are five conceptual parts to the RosettaNet business model:

1. *RosettaNet's PIP teams use frameworks to create PIP guidelines that define how computer systems will cooperatively execute e-business processes in the supply chain. They narrow the general information frameworks into detailed specifications that must be embraced by all members who wish to conduct e-business with RosettaNet-compliant partners.*

2. *The implementation guidelines are provided to companies who wish to conduct e business according to the RosettaNet's specifications.*
3. *Information exchanged between companies is validated against RosettaNet guidelines. These guidelines can also be used to create the content that is exchanged and to support tools used to create and manage content in each company's internal system.*
4. *Companies may extend RosettaNet implementation guidelines for their own individual needs and per RosettaNet's broad framework. However, companies cannot override the guidelines as specified by RosettaNet.*
5. *The extended implementation guidelines are then exchanged between companies allowing them to validate these message extensions during their exchange.*

All guidelines and translations are defined within RosettaNet's e-business model as being distributed as machine-readable documents. This allows companies to quickly configure their RosettaNet-compliant applications to execute and validate new or updated PIP specifications.

### **4.1.3 RosettaNet Development Activities**

The following section provides an overview of key development activities within RosettaNet. Topic areas covered in this section include the implementation of eConcert, current and planned future RosettaNet standards development activities.

#### **4.1.3.1 Implementation Phase - eConcert**

Launched in June 1998, RosettaNet has just concluded the pilot phase, eConcert, of its development cycle in February 2000. The pilot phase saw participants link full production systems. eConcert focused on the development of RosettaNet frameworks for catalog information, and software, memory and laptop technical specifications. This project was designed to streamline the search, ordering, shipping, and licensing of information technology products. RosettaNet's first industry projects included:

Catalog Information - defines the data fields representing general product information; including product identification numbers, structured short product description, product classification and product shipping data.

Software Technical Specification - defines the technical attributes and determines sample values associated with them for packaged software and software licensing products.

Memory Technical Specification - defines the technical attributes and determines sample values associated with them for packaged software and software licensing products.

Laptop Technical Specification - defines the technical attributes and sample values associated with laptop computers.

“eConcert involved project planning by many different departments and third-party solution providers. These collaborators created an internal network infrastructure, described all products and components consistent with RosettaNet dictionaries, developed interfaces to ERP and workflow systems, and implemented software that controls access to Web and database servers.”

This involved aligning internal business processes with one or more published PIPs, preparing internal systems to exchange one or more PIPs with another supply chain partner, and adopting the Guidelines for Trade Data Interchange (GTIN) part numbering schema, the Data Universal Numbering System (DUNS) number, the UN: Standard Products and Service Code (UNSPSC) product classification code, and the RosettaNet Technical Specifications Dictionary (at least for PIP exchange purposes – not necessarily for internal usage). Members reporting readiness of internal business process alignments with selected PIPs were Avnet, Cisco Systems, Compaq Computer, Computacenter, Federal Express, GSA, Insight, MicroAge, NEC Technologies, Netscape, Soletron, Tech Data and UPS. Trading partners that have reported readiness and are also exchanging PIPs in pilot or production mode include Intel and Arrow Electronics, Hewlett-Packard and SAP, 3Com and CompUSA, and Ingram Micro with CompUSA.

#### **4.1.3.2 Current and Future Efforts**

European activity will be a goal for implementation in the year 2000 for RosettaNet. In December 1999, RosettaNet announced that it had opened a European Office and appointed Thierry Ceillier as Director of European Partner Relations. Headquartered near Geneva, Ceillier will manage the RosettaNet effort to identify and integrate specific European requirements of companies participating in a global initiative to align supply chain interface e-Business processes within the Information Technology (IT) and Electronic Component (EC) industries. He will also manage the European Partner Relations in these two industries.

Other initiatives that RosettaNet is focusing on for the year 2000 include:

- Catalog Properties v.2 - As a follow on to Catalog Information v.1, the scope of this project is to define the properties for price, marketing information, and associative properties.
- Business Properties - The scope of this project will be to normalize or create baseline EDI properties from ASC X12, UN/EDIFACT, and CompTIA.
- Implementation Framework - The scope of this project will be to define an exchange protocol that will enable IT supply chain members to rapidly and efficiently implement RosettaNet Partner Interface Processes - PIPs.
- Catalog Update PIP/001 - This is a Beta project, which will define the XML documents, Unified Modeling Language (UML) Model and validations tool for updating a catalog with a new Stock Keeping Unit (SKU).
- Logistical Properties - The goal of this project is to identify, select and define all data elements - data fields – to represent proper and distinctive logistics information to be used during all processes of the IT supply chain.
- EC Technical Dictionary - The goal of this project will be to define the product classifications, as well as data properties and values describing Passive Components, Active Components, and Connectors.

#### 4.1.4 Challenges

Currently RosettaNet's PIP's include only those for catalog information and computer specifications. To become a force in the years to come they must achieve buy in from more and diverse business entities in the world marketplace.

Development mimics the organization of today's standards bodies. While they boast of short turnaround times for implementation of new PIPs and changes to existing PIPs, as they grow this may not remain efficient. We may see either a return to today's EC/EDI Standards Body turnaround times or the emergence of industry specific standards organizations. In addition as more and more companies are added will the simplicity of the current PIP structure be maintained or will their develop the duplicity in documented processes to meet the global industry/company needs that we see today in our e-commerce standards.

Is this the creation of the 21<sup>st</sup> century VAN?

#### 4.1.5 Summary

Currently focusing on the electronic business interfaces in the EC and IT supply chains, RosettaNet is attempting to develop a common business environment in which these companies may operate, however they plan to quickly spread into other supply chain markets. RosettaNet is defining master dictionaries to define properties for products, partners, and business transactions. These dictionaries coupled with RosettaNet's Partner Interface Processes (PIPs) are intended to allow "EC and IT supply chain partners to scale e-Business, and to fully leverage e-commerce applications and the Internet as business-to-business commerce tools." According to a recent RosettaNet press release, "More than 200 companies representing \$1 trillion in annual information technology and electronic components revenues currently participate in RosettaNet's standards development, strategy and implementation activities." An admirable start but are we now seeing a true revolution or yet another consortium of companies beginning to cloud the e-business community. One has to wonder where this will all lead. With existing standards bodies like ANSI/X12 and UNEDIFACT no closer to merging into one EC/EDI language we now have organizations like RosettaNet, Organization for the Advancement of Structured Information Standards (OASIS), and ebXML coming to light promising electronic architectures with which to improve the e-business environments. Are we seeing a true evolution or just a muddling of the e-business waters? The true evolution, if it is to occur, will result in a merging of the languages, platforms, and environments into a single global standard promoting a malleable language, message transport and protocols, digital security, and infrastructure architecture that allows for business, both large and small, room for innovation.

#### 4.2 ebXML – Electronic Business XML Initiative

This section discusses the impetus behind the ebXML initiative and the makeup of the ebXML organization (see <http://www.ebxml.org>). In this section, we will also look at where this work is headed and provide a recommendation for DoD participation and/or involvement relating to the ebXML initiative.

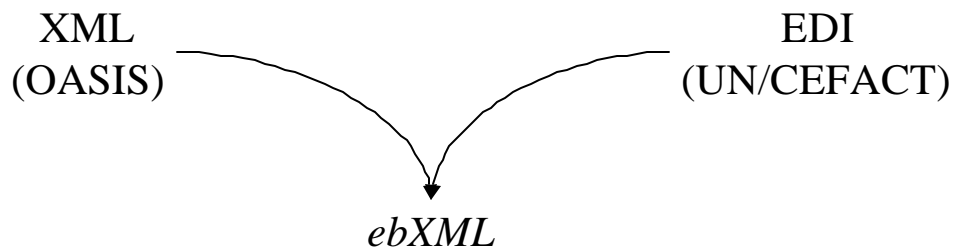
The ebXML initiative is a joint effort of the United Nations Center for Facilitation of Procedures and Practices for Administration, Commerce and Transport (UN/CEFACT) and OASIS with the collaboration of cross-industry electronic business experts and e-commerce initiatives to establish a global framework specification to standardize XML business specifications for the exchange of electronic business data. ebXML is currently focusing on areas such as the transport and routing, business process methodology, technical architecture, and the core components needed to facilitate trade worldwide. ebXML can be best defined as a vendor, platform, operating system and data source/destination neutral method for exchanging electronic business data on a global scale.

The purpose of the ebXML initiative is to research and identify the technical basis upon which the global implementation of XML can be standardized. The mandated projected goal of 18 months, convening in late November 1999, is to provide an open technical framework specification enabling XML to be utilized in a consistent and uniform manner. ebXML will attempt to standardize the exchange of electronic business data in application to application, application to person, and person to application environments.

The ebXML initiative is chaired by a senior member of the UN/CEFACT Steering Group, Klaus-Dieter Naujok of the Harbinger Corporation, with Dr. Robert Sutor of IBM, who is also the Chief Strategy Officer of OASIS, as the Vice Chair. The two main organizations involved with development of the ebXML initiative are briefly explained in the next section.

#### 4.2.1 ebXML Organization

As mentioned previously, the ebXML initiative is a joint effort of the UN/CEFACT and OASIS. Note that both UN/CEFACT and OASIS are discussed in detail in Sections 2.2 and 4.5 respectively. Figure 4.2.1-1 shows a simplified view (and strong points) of the two organizations that founded the ebXML initiative.



**Figure 4.2.1-1 The Founding Organizations for the ebXML Initiative**

UN/CEFACT – the joined forces with OASIS to initiate a worldwide project to standardize XML business specifications. UN/CEFACT has established the ebXML Working Group to develop a technical framework that will enable XML to be used in a consistent manner for exchanging all electronic business data. The Steering Group has requested a moratorium on XML development among its member groups to allow the ebXML initiative to take the lead as the lone standard for cross-industry XML.

OASIS – The Organization for the Advancement of Structured Information Standards dedicated solely to product-independent data and content interchange, and focusing on product interoperability, OASIS embraces the complete spectrum of structured information standards including XML. OASIS operates XML.org, the first global XML industry portal featuring the XML.org Registry and Repository that offers automated public access to XML schemas for electronic commerce, business-to-business transactions, and tools and application interoperability. OASIS has joined with UN/CEFACT and end user organizations, including those mentioned below, to create a global XML standard; thus the ebXML.

## 4.2 Additional Support and Endorsement

Support for and endorsement of the ebXML initiative is being voiced by a wide variety of companies and organizations from around the world including:

- ASC X12 (Accredited Standards Committee X12)
- DISA (Data Interchange Standards Association)
- FORESIGHT
- JIPDEC (Japan)
- Ontology.Org
- Swisscom Ltd.
- XML/EDI Group
- Australian Customs
- DataChannel
- GENCOD-EAN France
- Kraft Foods, Inc.
- PeopleSoft, Inc.
- Trinary Systems
- XML Solutions

A comprehensive list of participants is available from the ebXML.org Website.

The Data Interchange Standards Association (DISA) is uniquely poised to support the development of robust industry specifications that harness extensible markup language (XML), Internet technology and EDI. Moving aggressively ahead to pursue ground breaking technological developments impacting the e-business community, the newly appointed president and CEO of DISA, Kerry Stackpole states “As DISA propels global e-commerce, we remain committed to building productive partnerships with complementary initiatives and organizations such as the electronic business XML initiative.”

DISA endorses the ebXML initiative to design electronic business XML specifications, and is currently facilitating for organizations such as ASC X12, the Interactive Financial Exchange, the Mortgage Industry Data Standards Maintenance Organization and the Open Travel Alliance, who are highly focused on the integration of XML.

ASC X12 – The Accredited Standards Committee X12 is working to represent X12 semantics in an XML format to support the data transfer needs of a broad base of users, including small and medium sized enterprises, ASC X12 is anxious to participate in the ebXML initiative.

ASC X12’s strategic policy statement of endorsement to support the work of ebXML reads, “Building on the momentum of two successful meetings of the newly-formed ebXML Work Group, the Steering Committee of ANSI ASC X12 has voted to endorse the mission, goals and efforts of ebXML. X12 will ensure that its XML efforts are consistent with the work and

recommendations of ebXML. Furthermore, X12 encourages XML education, development of business requirements, and participation in the ebXML initiative.”

As noted by William J. Kammerer of the FORESIGHT Corporation, “the case for ebXML is so compelling that at the February 2000 Denver X12 Trimester meeting, all attention was paid to ebXML.”

Kirk Chan, Manager of Product Strategy for PeopleSoft states, “PeopleSoft applauds the ebXML standardization efforts--ultimately our customers will benefit most. With XML rapidly becoming the lingua franca for electronic commerce, broad international standards will help customers running PeopleSoft Applications for e-business to establish relationships with suppliers, partners and customers without regard to the size of the enterprise.”

The scope of the ebXML initiative, which follows, is in no doubt a huge undertaking of which we will attempt to provide an acceptable overview of work requirements, accomplishments, and work still in progress.

#### **4.2.3 Scope of the ebXML Initiative**

A primary objective of Electronic Business eXtensible Markup Language is to lower the barrier of entry to electronic business in order to facilitate trade, particularly with respect to small and medium sized enterprises (SMEs) and developing nations. According to ebXML marketing information, the value of ebXML is to:

- *Provide the only globally developed open XML-based standard built on a rich heritage of electronic business experience.*
- *Create a single global electronic market enabling all parties irrespective of size to engage in Internet-based electronic business.*
- *Provide for plug and play shrink-wrapped solutions.*
- *Enable parties to complement and extend current EC/EDI investments and expand electronic business to new and existing trading partners.*
- *Facilitate convergence of current and emerging XML efforts.*

ebXML delivers its value by utilizing available technologies and e-commerce expertise in the following areas:

- *Using the strengths of OASIS and UN/CEFACT to ensure a global open process.*
- *Developing technical specifications for the open ebXML infrastructure.*
- *Creating the technical specifications with the world's best experts.*
- *Collaborating with other initiatives and standards development organizations.*
- *Building on the experience and strengths of existing EDI knowledge.*
- *Enlisting industry leaders to participate and adopt ebXML infrastructure.*
- *Realizing the commitment by ebXML participants to implement the ebXML technical specifications.*

The ebXML vision is to deliver a single set of internationally agreed upon technical specifications that consist of common XML semantics and related document structures to facilitate global trade. This single set of ebXML technical specifications will create a single global electronic marketplace, which will provide architecture with the following attributes:

- *Fully compliant with W3C XML technical specifications holding a recommended status,*
- *Interoperability within and between ebXML compliant trading partner applications,*
- *Maximizes interoperability and efficiency while providing a transition path from accredited electronic data interchange (EDI) standards and developing XML business standards, and*
- *Will be submitted to an appropriate internationally recognized standards body for accreditation as an international standard.*

The ebXML organization is comprised of several working groups, each with specific areas of concentration. The Working Groups, also referred to as “Project Teams” are as follows:

- *ebXML Requirements,*
- *Business Process Methodology,*
- *Technical architecture,*
- *Core Components,*
- *Transport/Routing and Packaging,*
- *Registry and Repository,*
- *Technical Co-ordination and Support, and*
- *Marketing.*

The subsequent subsections 4.2.3.1 - 4.2.3.8 discuss each working group in detail.

#### **4.2.3.1 Requirements**

Project Leader – Mike Rawlins, Rawlins EDI Consulting.

The ebXML Requirements Project Team is focusing on the following three key areas:

- *Requirements (informative),*
- *ebXML Requirements (normative), and*
- *ebXML Organizational and Process Requirements (normative).*

With a single point of focus, the team will strive to collate requirements developed within the work group and to solicit requirements from the other work groups, with an initial draft by December 20, 2000. The ebXML Requirements Specification Working Draft is currently available at the ebXML Website at <http://www.ebXML.org> with periodic updates as information becomes available.

#### **4.2.3.2 Business Process Methodology**

Project Leader – Paul Levine, Telecordia.

The vision of ebXML with respect to business processes is that organizations be able to express their business processes according to a specification to insure that they are understandable by other organizations. This shared understanding in turn would help integrate the business processes of trading partners.

Business process models would provide meta-data for technology mapping and structures for the component library. Messages containing business and technical content, sent and received by host services, would support the common technical architecture. This common architecture, in turn, would define the distributed repository, syntax and schema, registry, security and transport services.

The scope and key issues of the Business Process Task Group include:

- *Industry has many “vertical” initiatives in business process modeling, and it is critical that industry recognizes and accepts the work of the ebXML.*
- *ebXML requires a methodology be selected to specify "vertical" business processes according to a uniform “template” so they can be compared.*
- *ebXML requires industry “verticals,” or clusters of "verticals" that are closely related, to work cooperatively with ebXML to accurately specify their business processes using the chosen methodology.*
- *ebXML requires a repository to retain the business process models collected.*
- *Common business process components discovered through comparative analysis of the models shall be submitted as candidates for core components.*
- *Cross-industry or industry-related standards to be identified as “core components.”*
- *Internet technology creating opportunities to re-engineer business processes using common scenarios.*
- *ebXML requires that related efforts in UN/CEFACT TMWG, OAG, OMG, ECO, REDX (Retail Enterprise Data in XML), WFMC (WorkFlow Management Consortium), etc. be leveraged in integrating XML-based business process scenarios.*
- *Specifying reusable objects.*
- *Creating a glossary of XML tags.*
- *Development in conjunction with the Registry and Repository Project Team to incorporate technical specifications, models, and required glossaries into the ebXML repository.*

#### **4.2.3.3 Technical Architecture**

Project Leader – Duane Nickull, XML Global.

Duane Nickull states, “Ideally, a move towards ebXML will preserve the semantic information derived from mature EDI formats. The 20 years experience of EDI will immensely benefit the ebXML initiative.”

The focus of the Technical Architecture team is a goal to support automated generation of XML schema, including DTDs now supported by XML and the upcoming XML-Schema specification.

With a recommendation for populating schema through an automated process that takes advantage of common components and technology mapping, this would allow developers to concentrate on common components and businesses to respond more quickly and effectively to new opportunities.

Technical Architecture Design Rules would include the following recommendations/proposals:

- *Platform independence as a requirement.*
- *Acceptance of synchronous or asynchronous.*
- *Mapping methods for those wishing to directly convert existing EDI to ebXML and mechanisms to provide existing EDI systems with entry points to the ebXML global architecture. (This recognizes an initiative to protect mature EDI systems.)*
- *ebXML compliant data as the sole I/O messaging mechanism for communicating with other ebXML compliant components.*
- *The use or adoption of an international data encoding such as UTF-8 and UTF-16 as the only encoding for ebXML XML data.*
- *An infrastructure message protocol – a request/response rule set to encompass:*
  - *Message errors,*
  - *Transport problems,*
  - *Security authentication issues,*
  - *Handling for malformed messages, and*
  - *Corrupt message-handling protocols.*

Develop clear visual representation/documentation of the architecture for software vendors, conforming organizations and corporate clientele. Define technical requirements for repositories. Leverage existing technologies and standards.

#### **4.2.3.4 Core Components**

Project Leader – Lisa M. Shreve, SysCom Strategies Inc.

The mission of the ebXML Core Components Project team includes the following:

- *Develop guidelines/methodology for consistently building/deriving of core components,*
- *Identify and develop reusable core components,*
- *Define meta-data for core business information model,*
- *Define rules for extensibility,*
- *Recommend procedures for approving core semantic elements,*
- *Define algorithm/conventions for producing tag names, and*
- *Develop guidelines for bridging core elements from EDI.*

The Guiding Principles/Requirements of the Core Components consist of the following:

- *Syntax independent,*
- *Learn from the experiences with X12, EDIFACT and XML,*
- *Utilize Object-Oriented design principles,*

- *Short term – DTDs, long term Schemas; principles to bridge between DTDs and Schemas,*
- *Interoperable between EDI, XML and UN Layout Key code,*
- *Global and multilingual,*
- *Respect ISO 11179 rules, and*
- *Methodology to ensure repeatable results.*

#### **4.2.3.5 Transport/Routing and Packaging**

Project Leader – Rik Drummond, Drummond Group.

This project team is focused on defining the requirements for a universal business-grade transport system to support the movement of ebXML and non-ebXML objects. Existing transport standards will be evaluated against the requirements for suitability as the ebXML transport mechanism to enhance implementation.

This team outlined a layered ebXML message with message structure information at the top followed by message headers and a message body. The headers would include transport routing, application routing, digital receipts requests, intermediate status requests, workflow data and security protocols. The message body would include signature and encryption-description blocks and content sections known as body parts.

The team's project overview as presented is to:

- *Provide an envelope and header for routing of message content,*
- *Define template sequences for the exchange of messages,*
- *Adopt security protocols that enable,*
- *Non repudiation of sending of messages and acknowledgements,*
- *Privacy and integrity of communications between parties,*
- *Authentication of senders of messages,*
- *Control over access to services,*
- *Support verifiable audit trails,*
- *Provide mechanisms for reporting on errors or other problems, and*
- *Develop a messaging protocol for reliable message delivery.*

The project team's objectives are the following:

- *Enable any party to carry out integrated e-commerce transactions with any other party anywhere in the world using their hardware and software vendor of choice,*
- *Persuade a wide variety of vendors to implement the approach,*
- *Enable existing 'messaging' solutions to 'bridge' to the ebXML solution,*
- *Scalable from SMEs (small-to-medium enterprises) to large companies, and*
- *Support platform independent interoperability.*

#### 4.2.3.6 Registry and Repository

Project Leader – Scott Nieman, Norstan Consulting.

The objective of the project team is to “define the business and functional requirements for an ebXML registry and repository” and “XML-based interfaces to interact with the registry and repository.”

The team’s mission is to deliver requirements and specifications for the creation and use of a registry and repository. The registry and repository will be comprehensive, distributed, business analysis driven, and support the runtime and development viewpoints of the ebXML architecture.

This team specifically recommended against setting up a new ebXML repository but instead suggested adopting the XML.org repository begun by OASIS. The group, like others in the ebXML project, also proposed following an object-oriented approach, specifically the XML meta-data interchange developed by the Object Management Group (OMG), or the XMI specification for registry and repository efforts.

The business requirements for the repository are presented as the following:

- *Storage of items in their original form.*
- *Support services:*
  - *Query: search / retrieval,*
  - *Workflow; development of process models,*
  - *Quality Assurance; ensure consistent process models,*
  - *Transformation; to / from different forms,*
  - *Repository interface; capabilities of distributed repositories, and*
  - *Logging; transactional requirements.*
- *Specific workflow business requirements.*
- *Best Practices.*

Project deliverables of the Registry and Repository Project team include the following:

- *Identification of the long-term maintainer of this repository*
- *Develop detailed blueprints for an ebXML repository that*
- *Uses open management processes*
- *Has open access*
- *Has interfaces with other existing and planned XML business standards repositories*
- *Accommodates Versioning:*
  - *Meta-data Registry*
  - *Model interchange (e.g., UML – XML schemas)*
  - *Tool-to-tool queries and exchanges*
  - *Repository to repository queries and exchanges*
  - *Tool to repository queries and exchanges*
  - *Repository to tool queries and exchanges*
- *Supports Web access*

- *Supports legacy information, including historical EDI directories (X12, UN/EDIFACT, etc.)*
- *Stores a legacy data model (e.g., IDEF-1X) and retrieves it back out as a UML class diagram*
- *Supports exact and fuzzy search capabilities*
- *Differentiates work in progress to that which is an actual standard*
- *Supports existing software and standards that are already in place*
- *Identifies what networking schemes must be used to physically communicate with a trading partner*

### **What are Registries and Repositories?**

Registries and repositories are two mechanisms that offer assistance to the problem of making available for widespread machine based use the fruits of efforts to standardize commonly used semantics. For those familiar with existing EDI Standards, a repository is related to the data dictionaries and directories a standards organization uses to store descriptions of approved semantics.

Just as with the data dictionaries and repositories of an EDI Standards organization, the repository is dynamic. In both cases, new development and maintenance introduce changes to the content. In traditional EDI, the state of the dictionaries and directories at given points in time are published, and given a unique reference identification. Using these published documents, parties to information exchange have a basis upon which to implement systems, which properly reflect the semantic intent of data exchanged in compliance with these published snapshots of the ever-changing dictionaries and directories.

A Registry is the electronic equivalent of the act of publishing a snapshot of the dictionaries and directories in the EDI standards environment. No further change is allowed to the information pointed to by a registered identifier. Just as with standards, registered identifiers may become obsolete, but a replacement for the obsolete information requires registration of a new identifier. A registry must include a secure mechanism for verifying that registered content is not altered after registration. In addition, a unique naming service for registration names must exist.

#### **4.2.3.7 Technical Coordination and Support**

Project Leader – Dick Raman, EDI-TIE.

The purpose of the Technical Coordination and Support Project Team is to coordinate the work among the ebXML technical project teams in order to identify inconsistency among their deliverables. Other responsibilities include defining that ebXML is compliant in regard to implementing ebXML deliverables. Further, the team shall research external work related to the overall ebXML deliverables in regard to their applicability and benefits to the ebXML work efforts.

#### 4.2.3.8 Marketing, Awareness and Education

Project Leader – Ann Bullen, PricewaterhouseCoopers.

The real success for ebXML will be in its adoption by the business community. The mission of the ebXML Marketing, Awareness and Education team is to stimulate, inform and communicate to the business community the opportunities, benefits and outcomes of the ebXML project. In order to achieve success, the Marketing, Awareness and Education team will develop requirements and deliverables that address the following:

- *Marketing and promotion of ebXML,*
- *Recruitment of expanded participation by relevant bodies, companies, organizations, and other entities involved in EDI and XML development, standardization, and deployment, and*
- *Awareness and education of ebXML technical specifications.*

#### 4.2.3.9 Proof-of-Concept Pilot Development and Demonstrations

Project Lead - Sun Microsystems Representative.

This newly formed work group, which is lead by a representative from Sun Microsystems, is to facilitate the development of ebXML proof-of-concept pilot demonstration systems. There is currently an open invitation from participants in the ebXML effort to suggest/participate with this effort. A proof-of-concept demonstration for the routing and enveloping of ebXML messages based on sample OpenTravel Alliance (OTA) business messages were exchanged between a small company and a large enterprise at the conclusion of the May ebXML meeting. The messaging prototype implemented the draft ebXML specification for exchange of business documents between trading partners using the very popular Internet Web and E-Mail protocols, HTTP and SMTP.

#### 4.2.4 EDI Specific Points

Excerpts from the ebXML Requirements Specification Version 0.60 March 3, 2000 emphasizes that EDI is very much a part of the initiative. Some of the EDI specific points include the following:

- *Provide a migration path from accredited EDI and developing XML business standard.s*
- *Provide support for XML meta-data, such as the ebXML version/release and information corresponding to existing EDI standards interchange headers.*
- *To be expected that using XML for electronic business will be less costly than traditional forms of EDI and other existing electronic commerce technologies. (This expected cost reduction is a driving force for considering XML over traditional EDI technologies.)*
- *Include a registry required to allow process owners to submit or update their mapping templates and support legacy information including historical EDI directories (X12, UN/EDIFACT, etc.).*
- *Realize reliable secure sending and receiving of messages over the Internet.*

- *Detail the format and structure of the wrapper, header, and any other data within the message to include signatures and encryption.*
- *Maximize interoperability and efficiency while providing a transition path from accredited EDI standards and developing XML business standards.*
- *Use semantics solutions that accommodate currently defined accredited EDI semantics where they add value.*

As stated previously, work within ebXML will be a “work in progress” tentatively accommodating 18 months. The schedule for the planned ebXML development meetings is provided in the next sub-section of this report.

#### 4.2.5 ebXML Development Meetings

Meetings of the ebXML initiative are held every quarter. It is the intention to hold these meetings at different locations around the world in order to encourage and facilitate global participation.

The next meeting will be in Brussels, Belgium, May 8–12, 2000. The tentative schedule for the remainder of year 2000 and first half of 2001 is:

<b>Date</b>	<b>City</b>
• August 7-11, 2000	USA (city to be determined)
• November 6-11, 2000	Tokyo, Japan
• 1st Quarter 2001	TBD
• 2nd Quarter 2001	TBD

#### 4.2.6 Challenges

While the ebXML initiative identifies with the need for standardization in applying XML for the exchange of electronic business data, unfortunately it seems, not everyone is willing to cooperate, compromise, or share their experiences and goals for standardization. It is interesting to note the following quote from the “XML Standard is Near” article by Alan Kotok in the March 3, 2000 issue of Planet IT. “Despite the broad representation of interested parties at the initial meeting for ebXML, two major players were absent from the second meeting in February: Microsoft’s BizTalk and RosettaNet. BizTalk offers a framework based on a flavor of XML called XML-Data Reduced, as well as its BizTalk repository. RosettaNet is perhaps the most advanced XML vocabulary, and although it focuses on the computer business, it offers a methodology that other industry groups can readily adopt.” The ebXML Core Components team has addressed the important need to ensure participation from organizations such as RosettaNet, OBI, and BizTalk, among others.

#### 4.2.7 Summary

In summary, as the concepts of this paper and the work being done within the ebXML are considered, one might question the effect or impact that this initiative may have on current business practices within the DoD. It is encouraging to note the level of intensity at which

ebXML is attempting to address issues regarding XML-based standardization for the exchange of electronic business data. Issues of the utmost importance, such as in developing ways to complement traditional EDI investments- which has a rich heritage among predominantly larger organizations, while remaining focused on the needs of SMEs and developing nations, are being scrutinized.

In a recent report from Giga Information Group challenging the popular notion that traditional EDI transactions will be widely replaced by emerging Web alternatives, it seems that EDI is being used more than anybody thought, and appears that EDI usage will not slow down anytime soon. The report projects the value of EDI transactions to grow to \$3.8 billion by the year 2002. However, the mode of transport for electronic data and the limited flexibility that traditional EDI allows will be strongly affected by Web technologies such as XML which promises a smarter, faster, cheaper way to transport business data. It is important for DoD to consider the ongoing work of the ebXML initiative, since this effort is focusing on developing a single standard framework for XML/EDI.

Recall that the ebXML initiative is an 18-month effort, which began November 1999. After the initial ebXML framework is formally released (circa June 2001), the potential effects might be experienced immediately by smaller companies wishing to conduct electronic business with large traditional EDI-based companies which were too costly due to deployment of EDI systems and VAN services. ebXML will enable SMEs to be positioned to play a strategic and important role in the global supply chain because of the lower barrier to entry in this market.

By placing a moratorium on XML development and directing all attention to ebXML, UN/CEFACT is expressing their seriousness in the need for harmonization among international standards. With the endorsement of ebXML by DISA and the X12 community, it is expected they will soon follow with their own moratorium on independent XML development.

While it is still premature to surmise that ebXML will become the “holy grail” of standardized electronic business exchanges, it remains to be seen if it will live up to the tentative promises being expressed. There apparently are many ongoing issues yet to be addressed by ebXML, one of which is a common solution to synchronize the functionality across X12 and UN/EDIFACT.

ebXML promises to deliver a framework by the end of their 18 month timeframe, and the e-commerce industry collectively will agree that standardization is not only long over due, but also required to achieve a “single global electronic market.” Will a grand unified specification become reality or will competing developers go off in all directions building an XML Tower of Babel?

### **4.3 BizTalk**

BizTalk is an industry initiative started by Microsoft and supported by a wide range of organizations, from technology vendors like SAP and CommerceOne to technology users like Boeing and BP/Amoco. BizTalk is not a standards body but a community of standards users, with the goal of driving the rapid, consistent adoption of XML to enable electronic commerce and application integration.

Announced in March 1999, BizTalk is comprised of the following components: the BizTalk Framework provides a technical road map for describing business processes in industry-standard XML, BizTalk Server 2000 technology preview is Microsoft's second-generation software solution supporting the BizTalk Framework and supplants the earlier BizTalk JumpStart Kit with a significantly expanded set of capabilities and infrastructure, and BizTalk.org (<http://www.biztalk.org>), a community resource to accelerate the expression of business processes in XML, is an open XML business process schema repository which provides access to XML schema from industry standards bodies like ACORD, BASDA, the HR-XML Consortium and OAG as well as popular applications vendors like Autodesk Inc., Clarus Corp., CommerceOne Inc., Great Plains Software Inc., Intelisys Electronic Commerce LLC, Navision Software U.S. Inc., SAP AG and Scala Business Solutions, NV.

#### **4.3.1 BIZTALK ORGANIZATION ([www.biztalk.org](http://www.biztalk.org))**

Companies that want to use XML need a simple way to find the information about the schemas, documents and business processes that other businesses and applications support. Microsoft has chosen to create and manage [www.biztalk.org](http://www.biztalk.org). Over the course of the summer in 1999, this site became into a portal for locating, managing, learning about and publishing XML, XSL, and the information models used in applications. [www.biztalk.org](http://www.biztalk.org) is an on-line repository providing member and partnership programs.

##### **4.3.1.1 Membership**

Membership, which is a free service, puts developers in touch with the businesses that use software that uses XML. The [www.biztalk.org](http://www.biztalk.org) serves as a centralized and managed library that lets companies and software vendors share information about schemas, XSL and business processes that are supported by applications that support the BizTalk Framework.

Other membership services planned include on-line community discussion groups where developers of all experience levels can share information about their experiences. The discussion groups are also educational and support channels that are monitored by experts at Microsoft. Periodic on-line seminars will be held using chat-group technologies. These hosted discussions feature experts from Microsoft and from partner companies and provides developers with a way to interact with the companies that are developing the BizTalk Framework and products based on it.

Finally, members are entitled to access to the latest tools, samples and educational materials for download, as well as articles and news about real integration projects and software products that use or are based on the BizTalk framework.

##### **4.3.1.2 Schema Publishers**

Companies that are the registered owner of either a trademark or Internet domain name will be granted the ability to publish information about the schemas that their products or standards require. Software vendors and standards bodies are examples of the kinds of organizations that will become Schema Publishers.

Schema Publishers will be provided with storage space, access to schema design and editing tools and will be allowed to publish information about their schemas and business processes. Schema Publishers that complete a submission process, a collection of documents that describe and categorize an XML schema based on the BizTalk Framework, will be able to make their submissions visible to the membership, who can search by author, company, product industry, process and document type.

Schema Publishers will be given control of their schemas and will have the ability to measure how many other companies use the information they've published as well as notify their customers of impending or proposed changes. A reviewer feature will allow Schema Publishers to share proposed changes with select individuals of their choosing. These "in review" submissions will not be accessible via the general search capabilities.

#### **4.3.1.3 Partners**

Partner programs are being defined for software companies that have developed products or published schemas and information that other companies need in order to integrate with their software. Partners have access to the BizTalk Framework Publisher's Toolkit as well as logo programs. The Publisher's Toolkit will link companies that purchase products that use the toolkit directly into [www.biztalk.org](http://www.biztalk.org) and provide the same portal services that let members locate the information that they need to do business together through the internet. Through this toolkit the software will be able to automatically create and publish information as desired by the end customer.

#### **4.3.1.4 The Steering Committee**

The [www.biztalk.org](http://www.biztalk.org) was set up with a built-in watchdog group called the Steering Committee in order to prevent anyone from subverting the BizTalk Framework or XML in proprietary ways that benefit one vendor or group of customers more than another. The purpose of the BizTalk Steering committee is to provide the oversight and guidance that will make the BizTalk Server, the BizTalk Framework and [www.biztalk.org](http://www.biztalk.org) an open and level playing field.

The steering committee is a hand-selected group of standards bodies, government agencies. This group was chosen for their experience, insight, interest and commitment to the BizTalk Framework. Steering committee representatives review proposed changes to specifications earlier than they are posted to the [www.biztalk.org](http://www.biztalk.org) site. This preview step assures Microsoft that the changes that are planned make sense and don't violate the core principals of the initiative. The changes that are reviewed are based on feedback gathered at the web site and via E-Mail.

#### **4.3.2 Additional Support and Endorsement**

In May 1999, Microsoft and Ariba joined forces to accelerate the adoption of Business-to-Business E-Commerce and will cooperate in developing BizTalk schema for E-Commerce. According to the press release, "The companies will join to integrate Commerce XML (cXML), an emerging standard for business-to-business e-commerce, with the Microsoft BizTalk™ framework to define schema for communicating operating resource transactions, such as catalogs and orders. In addition to collaborating on BizTalk and cXML, Ariba and Microsoft plan to

work together to implement these e-commerce frameworks into products offered by both companies. Ariba will support the BizTalk framework in Ariba e-commerce solutions, and Microsoft will integrate support for cXML into the upcoming releases of the Microsoft Commerce Server and BizTalk Server. Under the planned development, Ariba will use XML-Data Reduced (XDR), the preferred syntax for BizTalk, in the next version of cXML. XDR is an alternative to the DTDs that are outlined in the Extensible Markup Language standard and provides a richer way to define XML documents. Not only does XDR use XML itself to describe the format of a document, it supports two features critical to reusable e-commerce documents—data types and name spaces. Support for data types enables the more reliable processing of data.”

While BizTalk will integrate concepts of cXML, Dan Rogers, a program manager on BizTalk.org, discussed on a [www.biztalk.org](http://www.biztalk.org) discussion forum that “there are no current plans for Microsoft to directly support, adopt or contribute to the ebXML effort.”

### **4.3.3 BIZTALK SCOPE**

BizTalk is a cross-platform e-commerce framework that is intended to make it easy for businesses to integrate applications and conduct business over the Internet with trading partners and customers. The BizTalk framework is composed of XML schema and industry standards that enable integration across industries and between business systems, regardless of platform, operating system or underlying technology. The newly created XML specification will provide streamlined, accelerated and easy-to-use business processes and eliminate current system boundaries, help companies create more online business, and increase the opportunity to communicate and cooperate with other companies.

#### **4.3.3.1 CORE COMPONENTS**

The following section provides an overview of the core components within BizTalk. Topic areas covered in this section include the BizTalk framework, BizTalk server, and the BizTalk process methodology.

##### **4.3.3.1.1 BizTalk Framework**

The BizTalk Framework is designed to foster application integration and electronic commerce through data interchange standards based on XML. It assumes that application programs are distinct entities, and application integration takes place using a loosely coupled, message-passing approach. There is no need for a common object model, programming language, network protocol, database or operating system for two applications to exchange XML messages formatted using the BizTalk Framework. The two applications simply need to be able to format, transmit, receive and consume a standardized XML message.

Messages are the basis for the most significant contributions of the BizTalk Framework. A message flow between two or more applications is a means to integrate applications at the business-process level by defining a loosely coupled, request-based communication process.

Microsoft anticipates that the vast majority of interchanges, the exchange of XML documents and messages between trading partners or applications, implemented using the BizTalk Framework will use a simple HTTP post transport, but business may also be able to use other transports including FTP and message queuing technologies including IBM Corp. MQSeries and the Microsoft Message Queue Server.

Since few software applications today provide native support for XML, Microsoft anticipates businesses and software companies implementing layers of adapters to enable their existing applications to participate in the first generation of BizTalk Framework interchanges. For many applications, these adapters take an existing function call, translate it into an XML document, and route the document to a target destination, whether it is a trading partner or another application within a corporate intranet.

Until applications have native support for XML, these types of BizTalk Framework interchanges will require layered software that transforms native data types into XML and then performs the XML document routing. The BizTalk Framework will also provide support for schemas describing the more complex interchanges involving multiple documents exchanged in a sequence. End-user companies have built these types of XML document transformers and routers in-house. Microsoft is developing a BizTalk Server that automates many of the functions required in a BizTalk Framework interchange. Software products potentially capable of supporting BizTalk Framework interchanges are available today from companies like webMethods and DataChannel Inc. The important point is that BizTalk Framework interchanges do not require any specific software product from any individual software vendor.

#### **4.3.3.1.2 BizTalk Server**

According to Microsoft® literature, “Microsoft® BizTalk™ Server 2000 is a standards based platform for developing and managing application integration within and between organizations. Utilizing XML as the common document format, it allows companies to integrate and manage end-to-end business processes regardless of operating system or location. BizTalk Server's foundation is its reliable and rules-enabled business document delivery, transformation, and tracking infrastructure. It enables trading partner integration, electronic procurement, B2B portals and extranets, as well as automating value chain processes. It provides the infrastructure and tools to enable e-commerce business communities. The foundation of the BizTalk Server is its rules based business document routing, transformation, and tracking infrastructure. This infrastructure enables companies to integrate, manage, and automate business processes by exchanging business documents (e.g., purchase orders, invoices) among applications within or across organizational boundaries.

According to Microsoft literature, “BizTalk Server 2000 includes:

- Graphical Development Tools - The BizTalk Editor and the BizTalk Mapper are included for developing and transforming XML schema and business documents.
- Reliable Document Interchange Engine - Supports content-based routing and multiple document types including XML, EDI (EDIFACT and X12), as well as custom and flat file formats.

- Reliable Document Interchange - Different organizations use many different types of data formats. BizTalk Server 2000 converts all data to XML with the XSL Transformation (XSLT) engine. It handles the any-to-any data conversion including formats such as well-formed XML, EDI (X12 and EDIFACT), XML-data or DTDs, and flat files. Multiple servers can be load balanced to ensure high performance.
- Intelligent Document Routing - Rules-based routing delivers documents to different people based on the specific values, such as the total amount of a purchase order. This built-in intelligence removes the need for human intervention by programmatically accounting for variables, making the process faster and more accurate.
- Fault-Tolerant Document Delivery - Business documents need to be reliably delivered, and BizTalk Server 2000 ensures this happens without fail. A secondary transmission protocol can be defined in case the maximum number of retries on the first is unsuccessful. If the secondary transport also fails, the document is added to a suspended queue for manual processing.
- Robust Security - Including support for public key infrastructure, digital signatures, and encryption.
- Application Adapters - Provide end-to-end integration with popular back-end business systems.

The BizTalk Server will provide a simple and scalable server product that will work with similar products and applications to facilitate the interchange of information that is encoded according to the BizTalk Framework. This server product is not available today. Specifications that allow other companies to write software that can interact with the BizTalk Server by properly manipulating the routing, security and Quality Of Service (QOS) tags are part of the BizTalk Framework Specification.

#### **4.3.3.2 BizTalk Process Methodology**

BizTalk Framework is a set of guidelines for how to publish schemas in XML and how to use XML messages to easily integrate software programs together in order to build new solutions. It is designed to use existing data models, solutions, and application infrastructure, and reformats it into XML for use in electronic commerce. The BizTalk Framework consists of a technical specification that defines a way to use XML in a consistent way, a code set that defines a small number of mandatory and optional XML tags, and the [www.biztalk.org](http://www.biztalk.org) Web portal. These three elements each combine to form the basis for achieving friction-free integration. The special XML tags, or codes, defined by the BizTalk Framework address issues that are common to all integration solutions. The BizTalk Framework was designed to allow developers to eliminate three elements found in EC implementations. These elements are transport selection, calling convention, and data format. The goals for the BizTalk Framework at the outset included reducing or eliminating these factors.

BizTalk Framework schemas, business documents and messages expressed in XML are registered and stored on the BizTalk.Org Web site. Any individual or organization can download the framework and use it to implement and submit XML schemas to the Web site. As

long as the schemas pass a verification test, they are valid BizTalk Framework schemas. The BizTalk.Org Web site will provide an automated submission and validation process. Individuals or organizations can freely use XML schemas from the BizTalk.Org Web site within their applications, as long as the schema is published for public use. Businesses will also have the option of publishing their schemas on the BizTalk.Org Web site in a secure area for private use between trading partners. A steering committee composed of software companies, end users and industry standards bodies will provide guidance on how the BizTalk.Org Web site is organized and managed.

According to the [www.biztalk.org](http://www.biztalk.org) Website, “The BizTalk Framework provides the following benefits:

- Road map for consistent XML implementations. The BizTalk Framework implements a set of rules that make it possible for a broad audience to adopt a common approach to using XML. Further, as companies move beyond data modeling using XML and start automating business processes, BizTalk Framework message elements define a core set of XML elements, attributes and tags that allow the development of rich message passing technology that is optimized to understand the BizTalk Framework. This is important because XML forms the basis for an on-the-wire contract that binds systems, eliminating the need to find a common API or implementation platform.
- Easier mapping across schemas. By formalizing the process of expressing business process interchanges in a consistent and extensible format, the BizTalk Framework makes it easier for Independent Software Vendors (ISVs) and developers to map from one business process to another, enabling faster adoption of electronic interchange in a wide variety of industries using open standards such as XML.
- Design target for software vendors. By establishing a critical mass of schemas implemented in a consistent format, the BizTalk Framework provides a clear design target for tools and infrastructure ISVs building the next generation of electronic commerce and application integration products.
- Framework for standards bodies. The BizTalk Framework provides a platform for migrating an existing set of industry interchange standards to XML. This is especially useful for the EDI community.
- Repository for BizTalk schemas. The BizTalk Framework Web site will be an interactive place where industry groups and developers can publish their schemas. The Web site will allow public and private publication based on the decision of the publishing organization. Once a BizTalk Framework schema is accepted and published, the repository will provide versioning and specialization support for BizTalk Framework schema adoption and alteration. The repository will support dynamic detection of schemas, processes and visualization maps connected to any given version of a BizTalk Framework schema.
- Showcases for best practices in developing XML interchanges. Many organizations involved in the standardization of business interchanges are more skilled in business process modeling than in systems programming and XML. These groups can turn to the BizTalk Framework Web site to discover best practices for implementing their own schema or to discover pre-existing XML schemas they can use in their applications.

Microsoft will natively support the BizTalk Framework in its product line and will publish XML schemas to the BizTalk Framework Web site for public use. Other software vendors supporting the BizTalk Framework have also made this commitment.”

#### **4.3.4 BizTalk Development Activities**

The following section provides an overview of key BizTalk development activities. In this section, both the implementation phase as well as current and planned future efforts of BizTalk are discussed.

##### **4.3.4.1 Implementation Phase**

BizTalk was announced in March 1999 and since this time Microsoft has developed a BizTalk Framework XML Tags Specification defining a common way to use XML to accomplish identification and routing and BizTalk Framework Guidelines which defines a set of design guidelines for the Microsoft BizTalk Framework documents. In addition, [www.biztalk.org](http://www.biztalk.org) has been created as a place for BizTalk users and developers to read information on the initiative, discuss development ideas and concerns, and download BizTalk related tools. Lastly, BizTalk Jumpstart kit was release in the last quarter of 1999 with the follow-up release of Microsoft BizTalk Server 2000 Technical Preview available for download only in the first quarter of 2000

##### **4.3.4.2 Current and Future Efforts**

Current BizTalk efforts seem to be focused on the development of the Microsoft® BizTalk™ Server 2000 which, according to the Microsoft Website, is currently scheduled for release in the fall of 2000.

#### **4.3.5 Challenges**

BizTalk appears to be a Microsoft driven effort based around their implementation of the BizTalk Server 2000. The BizTalk Server 2000 Readme file denotes that “It is strongly recommended that you do not use the FTP transport and receive functions for this release (Technical Preview download). FTP may not be supported for BizTalk Server 2000.”

According to the Microsoft Website BizTalk 2000 in its final release will use the “Windows DNA 2000 architecture. At the core of Windows DNA 2000 is Microsoft Windows 2000, the foundation layer upon which BizTalk Server 2000 resides.” This implies that to fully utilize all the capabilities of the BizTalk Server 2000, the user will be required to use Windows 2000 and possibly other Microsoft applications, such as databases, which are based upon the Windows DNA 2000 architecture.

The BizTalk Server 2000 is not required to be installed on both ends of a transaction, as long as the server is running on one end and the client application is running on the other. Microsoft, however, strongly encourages the installation of BizTalk Server 2000 at both ends of the transaction to fully realize the total capabilities of their product. It is unknown at this time what functional limitations this type of setup produces. Depending on the final price tag of the application, BizTalk Server 2000 requirements may not allow small businesses to afford the

ability to integrate BizTalk Server 2000 into their business procurement process. In addition, Microsoft highly recommends installation of portions of the application on multiple machines each running Windows 2000, again adding to the total cost of outfitting a small business with this capability.

#### 4.3.6 Summary

BizTalk is described by Microsoft as “a cross-platform e-commerce framework that is intended to make it easy for businesses to integrate applications and conduct business over the Internet with trading partners and customers. The BizTalk framework is composed of XML schema and industry standards that enable integration across industries and between business systems, regardless of platform, operating system or underlying technology. The newly created XML specification will provide streamlined, accelerated and easy-to-use business processes and eliminate current system boundaries, help companies create more online business, and increase the opportunity to communicate and cooperate with other companies.” Unfortunately, it appears that this attempt at accelerating the adoption of XML into today’s business seems little more than a marketing step to draw customers into using Microsoft products. The entire initiative has been conceived, set-up, run, and monitored by Microsoft. While currently unable to evaluate the BizTalk Server 2000 due out in the fall of 2000, it is hoped that BizTalk merges it’s selling points into RosettaNet or ebXML type XML initiatives and the community may find a single reference and knowledge point from which to develop their business.

#### 4.4 Common Business Library (xCBL 2.0)

In this section, we will briefly explain CommerceOne's Common Business Library (xCBL) 2.0 (see <http://www.commerceone.com/xml/cbl/index.html>), the functionality and applicability to electronic commerce applications, and the role it assumes in regard to new and existing XML standards and initiatives. xCBL 2.0 is the first open XML specification for the cross-industry exchange of business documents such as product descriptions, purchase orders, invoices, and shipping schedules. CommerceOne is an active participant in numerous XML standards bodies and industry initiatives including the World Wide Web Consortium, the IETF, CommerceNet's eCo Working Group, RosettaNet, OASIS, XML/EDI, ebXML, and BizTalk. XCBL 2.0 will be a key part of the BizTalk schema based repository.

XCBL 2.0 is a set of XML building blocks created to provide the schema document framework that is needed for robust, reusable, XML document exchange in electronic commerce. These building blocks were defined based on extensive research and collaboration with CommerceOne and the leading XML industry initiatives.

xCBL 2.0 represents more than two years of research and development by CommerceOne and Veo Systems, which was acquired by CommerceOne in January 1999. Veo was chosen in September 1997 by the U.S. Government's Advanced Technology Program (ATP) of the National Institute of Standards and Technology (NIST) to conduct research and development on XML foundations for electronic commerce. Because platform and application heterogeneity are facts, integration at such a scale would have to be at a semantic level where components connect and communicate through a shared language, vocabulary, and business concepts. Dr. Marty Tenenbaum, the founder of Veo and CommerceOne's Chief Scientist, foresaw the need for a

Common Business Library to enable companies to interconnect their business services over the Internet.

In a statement of support for xCBL Shirley Hurwitz, Program Manger of the ATP relates the following: “CommerceOne’s XML-based Common Business Library is an innovative framework for enabling interoperability among online trading communities. The ATP has been partly funding the underlying xCBL research since 1997 because we believed in its potential to have a major impact on electronic commerce and the nation’s economy.”

The goal of xCBL 2.0 is to provide an initial set of XML building blocks that companies can assemble and extend to quickly develop XML applications. Some of these building blocks come from well-established international standards such as ISO 8601 (date and time), ISO 31 (measures), and ISO 4217 (currencies). Other building blocks come from SIMPL-EDI, a project to create minimal EDIFACT transaction sets. The “standard” business documents in xCBL 2.0 are based on the building blocks and an analysis of similar documents emerging from the Open Buying on the Internet (OBI), RosettaNet, and Open Trading Protocol (OTP) initiatives, with the goal to harmonize them as much as possible.

According to CommerceOne, xCBL 2.0 will reportedly fit into the “core components” category of the ebXML initiative (see Section 4.3 of this paper). Ultimately, xCBL will become “ebXML compliant,” meaning that a transformation will be possible between xCBL and any ebXML-compliant set of business document data, whether in an XML format or in an EDI-based syntax.

xCBL 2.0 relates to other commerce specifications in that it is not a single standard, rather a collection of common business elements that underlie all EDI and Internet commerce protocols. Developed and modeled after EDI semantics such as X12 and UN/EDIFACT in order to preserve and extend the EDI investments of trading partners, xCBL 2.0 with its reusable components speed the implementation of standards and facilitate their interoperability by providing a common semantic framework. UN/CEFACT TMWG Chairman and ebXML Chair Klaus Dieter-Naujok stated that “xCBL shows that EDI and XML can co-exist and complement each other, unlike too many of the so-called ‘commerce XML standards’ that make no attempt to preserve two decades of EDI standards and implementation experience.”

Any company, large or small that is presently conducting electronic commerce or wanting to participate can utilize xCBL 2.0 to accelerate their XML based e-commerce efforts. xCBL 2.0 provides a transition path for companies wanting to move from EDI systems to open Internet-based commerce systems. Of special value to small companies wishing to transition from simple Web forms to more sophisticated XML e-commerce applications, xCBL 2.0 can help to accomplish this. In addition, companies who have previously chosen not to use EDI due to cost or other reasons can now participate in exchanging XML e-commerce documents and because xCBL 2.0 is not a proprietary effort, vendors can be assured that they are not choosing a closed solution. Thus, xCBL 2.0 provides the means for nearly every potential e-commerce trading partner to participate. xCBL 2.0 is the first XML specification for electronic commerce designed to take advantage of the expressive power of XML schemas as explained in the following section.

#### 4.4.1 Schemas versus DTDs

One of the most important aspects of xCBL and one that sets it apart from other e-commerce XML applications, is the decision to use XML schema languages rather than XML DTDs. While schemas are still an emerging technology, it was obvious to CommerceOne with experience in the EDI realm as well as elsewhere that DTDs were not sufficient for e-commerce data, which tended to be very strongly typed. A schema provides a way to do many of the basic declarations possible in XML, but makes the declarations easier to both read and write.

Another problem is that DTDs lacked the extensibility needed to allow users to describe their own data, while still using a standard language and set of tools. Additionally, they provide no mechanism for maintenance and system upgrades because they do not model inheritance in the same way as the object-oriented systems that process the documents they describe.

As a demonstration of its commitment to interoperability, xCBL is available in XML DTD form and in two different schema languages: Microsoft's XML Data Reduced (XDR) and CommerceOne's Schema for Object-oriented XML (SOX). SOX was developed to overcome the limitations of XML DTDs, which typically model the content of information elements just as text strings, with some weak numeric typing in certain structures. Electronic commerce applications need to be able to specify stronger semantic constraints to handle some strings as prices, part numbers, and other data types, and to be able to specify the inheritance relationships between standard documents and customized versions. SOX is a data description language built with XML and provides mechanisms for extending both the elements as well as user-defined data types, of which xCBL 2.0 can take full advantage. Additionally, once a standard W3C XML Schema Language has been approved, xCBL 2.0 will be reissued in that language. SOX, now in Version 2.0 can be retrieved from the W3C as a Note, but XSDL, the proposed W3C standard schema language, will probably replace SOX, Microsoft's XDR, and other XML schema languages in the future. As defined in the following sub-section, xCBL 2.0 will address error handling, wrapping and protocols.

#### 4.4.2 Error Handling, Wrappers and Protocols

xCBL 2.0 is designed so that documents can be used with any type of "messaging" wrapper, and transported using any transport protocol, but there are two emerging standards that are worth noting. The first of these is Microsoft's BizTalk; the second is the IETF's XML Messaging standard. The designers of xCBL are actively working on both initiatives to guarantee alignment with both of these standards.

xCBL documents such as the Invoice and Purchase Order define the structure of the data in business terms. However, when sending xCBL documents to another party errors can occur. These can be divided into four categories:

- Transport errors - the document never reached its destination or was corrupted on the way,
- Document errors - the document that was sent does not conform to the rules as defined in its DTD or the semantics that lie behind it,

- Technical server errors – the document could not be processed successfully because of a technical error of some kind at the server that received the document, or
- Process problems – these are not real “errors” but indicate instead that for some reason the document could not be processed to the anticipated or hoped for conclusion.

Each type of error needs to be handled in different ways. For example, transport errors are a function of the transport mechanism or protocol being used to carry a document. This could be for example, a MIME message in a Web page, a BizTalk wrapper, an Internet Open Trading Protocol message, an E-Mail or potentially anything that can transport the document from one place to another. Each method of “transport” has a different error handling approach, which is one of the main reasons why xCBL documents do not contain transport specific data.

Document errors can be reported simply by pointing to the offending part of the document and using a code to define the nature of the problem. Probably a software problem needs to be fixed by either one way or other of the parties involved.

Technical server errors can require that messages are resent or some sort of recovery at a server is made. One should note that these types of server errors typically lie behind the “front end” server such as an HTTP server, so the server response is not the most helpful. However, there needs to be some method of communicating back to the sender of a document as to what can be done to recover from the error.

Finally, process problems need to indicate what sort of alternative business process the sender of the document might take to recover from the unsuccessful processing of the original document and achieve a satisfactory business outcome. The following subsection will address the design principles of xCBL 2.0.

#### **4.4.3 Design Principles**

xCBL 2.0 was designed to model the information requirements of business-to-business electronic commerce. A first step in this direction was the identification of a small set of core documents that could be used to conduct the majority of business transactions. xCBL 2.0 provides schemas to represent the following business documents:

- Purchase Order
- Order Status Request
- Availability Check Request
- Price Check Request
- Invoice
- Pricing Catalog
- Purchase Order Response
- Order Status Result
- Availability Check Result
- Price Check Result
- Product Catalog

Each of these documents is constructed from a set of modules – XML building blocks that represent name and address, price, unit of measure, and so forth. xCBL’s extensible architecture allows trading partners to modify the business documents, adding elements as needed. The documents can support the business needs of both ad hoc trading communities and long-term enterprise trading relationships.

xCBL builds on information models from other sources, including the United Nations Standard Messages (UNSMs) in the international EDIFACT standard and the transaction sets of the U.S. X12 standard. Of course, with xCBL, XML syntax is used instead of EDIFACT or X12. Both the X12 transaction sets and EDIFACT messages have evolved over time to handle the information requirements of every conceivable business relationship. Because the standard messages contain vastly more information than typically necessary, trading partners generally exchange only a small subset of the messages, and xCBL 2.0 addresses the most important of these standard messages. In designing xCBL 2.0, two proposals for standard EDIFACT subsets were carefully studied: EANCOM and SIMPL-EDI. Next, we will look at architectural principles.

#### 4.4.4 Architectural Principles

It is fundamentally better to design document models that are not limited to a single method of transporting information between business partners. Unfortunately, many XML “standards” for electronic commerce are tightly coupled to HTTP. xCBL 2.0 will use the joint IETF/W3C digital signature standard to protect and insure the integrity of xCBL documents and data. This standard defines syntax and procedures for the computation, verification, and encoding of digital signatures using XML. Using this standard and xCBL 2.0 together will provide:

- Integrity to ensure that xCBL documents are not accidentally or deliberately altered without detection,
- Authenticity to enable the identity of the sender of the xCBL document to be accurately determined,
- Non-Repudiation so that you can be certain that the other party in a trade cannot reasonably later deny that the document did not exist, and
- Privacy when combined with data channel protection protocols such as SSL or TLS.

As a result it will be possible to send xCBL documents over insecure networks such as the Internet or via E-Mail without risk of them being altered.

xCBL 2.0 separates the contents of documents from information that specifies their routing or their role in document exchange. In contrast, EDI messages generally specify whether acknowledgments are expected, which documents are receiving a response, etc. xCBL transmits this type of information in the message header or message envelope.

Traditional XML modular architecture is followed with xCBL 2.0 with each business document having the following structure:

- A header module such as “InvoiceHdr” or “ProdCatHdr,”
- A set of core modules, and
- Optional attachments.

xCBL’s modular structure allows businesses to use standard documents or to customize them by:

- Specifying new codes or identifiers,
- Attaching files to a document, and
- Extending a document and appending additional data elements.

The simplest method of customizing a standard xCBL 2.0 document is to exploit a placeholder for “mutually defined” code lists that appear in many parts of xCBL 2.0. This allows a new code list or set of identifiers to be used instead of standard ones. This customization makes no changes to the schema for the document type, so any application that uses the standard XML instances could parse the customized instance without a problem and then pass the new value to the receiving application.

Documents can also be customized by the addition of attachments such as reports, design documents, or multimedia files. Because attachments use a pre-defined optional attachment element, they do not require changes to the document schema. Applications that expect standard instances are able to parse instances that point to attachments. Standard documents can be customized using schema extension capabilities of the XML schema language in which xCBL 2.0 is expressed. For example, a standard purchase order:

```
<elementtype name="PurchaseOrder">
```

Can be extended to meet specialized accounting needs of the Department of Defense, shown as:

```
<elementtype name="DefensePurchaseOrder">  
<extends name="PurchaseOrder">  
<model>  
<DefenseAccountingDisposition>
```

This allows the application code for handling the standard elements and structures to be reused. Applications that do not require this additional information can safely ignore it.

Every element and attribute in xCBL 2.0 has a “semantically meaningful” name consisting of one to four English words strung together without spaces. Each word begins with a capital letter. Many of the longest names are needed for attributes, which often are used to make narrow distinctions in the meaning of their associated elements. EDI semantics are notoriously overloaded, with the same element having multiple interpretations based on context or the value of attributes. Often words have to be invented from attributes with completely meaningless EDIFACT numerical identifiers.

Whenever an element or attribute is based on semantic foundations in EDIFACT, X12, or elsewhere, this mapping is recorded. It is expected that XSL style sheets or other mechanisms can be used to transform names back to their EDIFACT or X12 roots or to local preferences when XML messages are rendered for human consumption.

#### 4.4.5 Summary

In summary of the preceding pages we have introduced CommerceOne's Common Business Library (xCBL 2.0) as an XML specification of building blocks created to provide the schema document framework necessary for the exchange of business documents. We have shown how xCBL is envisioned as a solution to accommodate the need for a common business library for companies to build upon their XML applications and to interconnect their business services via the Internet. xCBL 2.0 is viewed as a means to provide EDI functionality to small-to-medium sized enterprises without the usual high costs involved with the implementation and maintenance of traditional EDI. Allowing documents to be used in vendor and transport protocol neutral applications, xCBL 2.0 can open a door to nearly every potential trading partner to participate in e-commerce exchange.

In the quest for functionality and extensibility, xCBL 2.0 was developed and modeled after already tested and proved EDI semantics such as X12, UN/EDIFACT, and SIMPL-EDI, with the capability to accommodate XML DTDs and in particular, XML Schemas. A set of schemas has been developed to represent standard business transactions such as the purchase order and invoice and can be modified to support business trading partner requirements. Requests for the addition of new document types are accepted by CommerceOne and upcoming releases of xCBL will include many new document types along with revisions and enhancements to existing types.

As the means to keep xCBL users "in the know." The free xCBL User's Group Newsletter is intended to supply technical information and news to users of the xCBL library, whether they are developers, managers, or integrators. Published on a monthly basis, it discusses the use of xCBL both within CommerceOne's products, and for use as a standard set of business documents, with any supporting software.

CommerceOne's purpose in developing xCBL 2.0 is to accelerate the adoption of XML based e-commerce, and xCBL 2.0 is available free of charge through the registries and repositories operated by XML.ORG, BizTalk.ORG, and others, as well as from CommerceOne. The vision for xCBL is to be the foundation of the component-based Internet.

While xCBL 2.0 strategy seems capable in measuring up to their claims as in:

- Being ebXML compliant,
- Provides a transition path from traditional EDI to open Internet-based commerce,
- Will take advantage of the W3C Schema Language,
- Guarantees alignment with Microsoft BizTalk and the IETF XML Messaging standards, and
- Accommodates the joint IETF/W3C Digital Signature standard.

Many of these claims cannot yet be substantiated due to the level of development in the emerging technologies mentioned above. With the collaboration of CommerceOne members and information technology consortia, xCBL is undoubtedly an open XML specification worth researching and keeping a watchful eye on.

## **4.5 OASIS/XML.Org- the Organization for the Advancement of Structured Information Standards**

This section, will briefly explain the structure of OASIS ([www.oasis-open.org](http://www.oasis-open.org)), it's objectives, XML-related activities, and supporting companies and member organizations involved primarily with XML. OASIS is a nonprofit, international consortium dedicated to accelerating the adoption of product-independent formats based on public standards. Previously known as SGML Open, OASIS was founded in 1993 and as the older name implies, much of its early activity reflected SGML's strong presence in the document and publishing community. The "structured information standards" in the expansion of the OASIS acronym currently refers to markup technologies such as: XML, SGML, and HTML.

Members of OASIS are providers, users, and specialists of the technologies that make structured information standards work in practice. Any company or organization that might benefit by representation in the consortium is eligible for membership, while OASIS provides an open forum where its members discuss market needs and directions, and recommends guidelines for product interoperability. The consortium creates, receives, coordinates, and disseminates information describing methodologies, technologies and implementations of the standards.

The work of OASIS complements that of standards bodies, focusing on making these standards easy to adopt, and the products practical to use in real world, open system applications. OASIS helps to apply structured information standards, not create more. Many members of OASIS are heavily involved with national, international, and industry-wide standards activity in which OASIS does not replace that activity, but embraces it and seeks to help achieve industry consensus in support of it. One such activity is the Electronic Business XML initiative (ebXML).

The ebXML is a joint effort of the US-based OASIS and The United Nations body for Trade Facilitation and Electronic Business (UN/CEFACT) to initiate a worldwide project to standardize XML business specifications. The Working Group's goal is to develop a technical framework which will enable XML to be utilized in a consistent manner for the exchange of all electronic business data, and lower the barrier of entry to facilitate trade with respect to Small to Medium-sized Enterprises (SMEs) and developing nations. Industry groups currently working on XML specifications have been invited to participate in the 18-month long project, which will be explained in further detail in Section 4.3 of this document.

OASIS does not attempt to replace development or activity, but entrusts others to embrace it and seeks to help achieve supportive industry consensus. OASIS is made up of an elite force of technology-minded members as noted in the following text.

### **4.5.1 OASIS Organization and Activities**

OASIS now has more than 100 member organizations and recent membership gains reflect this shift in emphasis from documents to transactions. A strong commitment on behalf of European members has been made in the hiring of an OASIS representative based in the United Kingdom, and it is expected that representatives in other parts of the world will be hired such as the Asia Pacific region. A record number of new members have joined OASIS in support of the

consortium's dedication to the application of XML. A few of the notable members of OASIS include those listed below.

- Boeing Aircraft
- Dun & Bradstreet
- Microsoft
- IBM Corporation
- Sabre
- Sun Microsystems
- Corel Corporation
- Oracle Corporation
- Graphic Communications Association
- Informix Software
- National Institute of Standards and Technology (NIST)
- Object Management Group (OMG)

A comprehensive list of members and participants is available from the OASIS-Website.

Laura Walker, executive director of OASIS elaborates as to why membership has significantly increased. It is clear the “wait-and-see” attitude toward XML is long gone. Companies are moving forward with real solutions and a strong commitment to keeping the standard open and accessible. As this surge of new sponsors indicates, OASIS membership encompasses all the major XML players – users, vendors and consultants alike. We look forward to the contributions all our new sponsors will make to the OASIS technical work and applaud their support of XML interoperability.”

It is noteworthy that the National Institute of Standards and Technology plays an active role within OASIS. A joint development effort between OASIS and NIST is the XML Conformance Subcommittee or Working Group, which provides a forum where XML vendors, content providers, and users can discuss issues that are pertinent to XML conformance. The objective of the Working Group is to develop tests to improve the quality of XML processors and determine if XML implementations and/or XML instances adhere to the XML 1.0 Recommendation.

Additionally, OASIS recently advised the North Atlantic Treaty Organization (NATO) on the impact of XML on information technology development and its potential for NATO's information systems. Of particular interest was the newly formed XML.ORG industry portal explained in the following subsection.

#### **4.5.1.1 XML.ORG**

One of the most exciting things to happen within OASIS recently was the formation of XML.ORG (see [www.xml.org](http://www.xml.org)), an industry Web portal, funded by a group of companies committed to establishing an open, vendor-neutral distributed system for enabling the use of XML in electronic commerce and other industry applications. XML.ORG is designed to provide a credible source of accurate and timely information about the application of XML in industrial and commercial settings. The portal is to also serve as a reference repository for XML specifications such as vocabularies, DTDs, schemas, and namespaces, XSL stylesheets and HTML pages.

Nine member organizations: IBM, Oracle, SAP, Sun Microsystems, CommerceOne, DataChannel, Documentum, GCA and SoftQuad were the initial sponsors of XML.ORG, but in actuality, it is a resource and benefit for all 100+ member organizations. XML.ORG is an

activity within OASIS, not a separate organization therefore all XML.ORG technical committees are actually OASIS technical committees. A large part of the focus of XML.ORG lies in the clearinghouse being developed from the registry and repository framework.

### The XML.ORG Clearinghouse

Currently, it's very hard to find detailed technical XML specifications and information about work being done in industry via a Web search. It is important to have an XML resource clearinghouse where you can go to access the latest DTDs and schemas and learn how they should be used. This clearinghouse must be available to you from your Web browser, but also for application software that uses the XML resources, and the XML.ORG information clearinghouse intends to do this.

The physical clearinghouse will be built using the OASIS/XML.ORG Registry and Repository architecture, a global Web of repositories linked via a master registry of the contents and meta-data, which is to be launched in early 2000. Repositories under the control of independent organizations will be compatible with the XML.ORG repository because they adhere to the API defined within the OASIS/XML.ORG Registry and Repository specification. Query searches of the master registry on the contents of all the repositories within the Web will be available. This repository will exist for the convenience of those who don't wish to maintain their own installation, and will be the end result of many OASIS members including the influence of the work being done within the XML/EDI ([www.xmledi.com](http://www.xmledi.com)) community, the Object Management Group (OMG) ([www.omg.org](http://www.omg.org)) and others. OASIS and the OMG have exchanged memberships in order to more easily take part in, and advantage of one another's technical work. Next, we will look at an explanation of registries and repositories.

**Registry and Repository Explained:** Registry is a mechanism whereby relevant documents and meta-data about them can be registered (via a registry authority) such that a pointer to their location, and all their meta-data, can be retrieved as a result of a query. A Repository is a location or set of distributed locations where documents pointed at by a registry reside, and from which they can be retrieved by conventional (HTTP, FTP, SMTP, etc.) means, perhaps with an additional authentication/permissions layer.

Often within SGML, XML and other forum people ask whether there is a DTD for some subject area or functional purpose, and the number of such queries will grow when XML is widely adopted. As XML comes into use on the Web, DTDs, schemas, style sheets, and reusable public text will be referred to by identifier, rather than being packaged with actual documents. It will be critical for one to be able to retrieve the referred-to entities, and in the Web context, it is preferable to be able to do this automatically. It is vital for users to be able to locate DTDs and schemas for the document types they want to create by referencing an interface to meta-data about those DTDs and schemas.

Part of the mission of OASIS is to be an organization in which member companies can come together and create XML industry standards. In a process somewhat similar to that in the W3C, interested parties produce a briefing package of what they hope to accomplish in a specified time-frame. Once they get approval from the OASIS board to proceed, the technical work

begins, perhaps with input from work already done within member companies. The goal is to eventually reach the status of XML.ORG Recommendation. Compliance to real, open standards rather than a single company's XML vision is at the core of XML.ORG.

Additionally, it is planned for XML.ORG to have industry-by-industry descriptions of the major development work on XML specifications. For example, the financial industry page will discuss the significance and status of the Financial products Markup Language XML (FpML), based on a markup language for the Financial Information eXchange (FIXML) protocol, and the S.W.I.F.T. XML specifications. Technical articles written about XML specifications by people in the industries actually doing the development will also be part of the repository.

“The need for an XML registry has been recognized by a number of organizations,” noted Jon Bosak, long-time OASIS supporter and the original instigator of XML. “The problem has been how to build and maintain a site at the necessary level of service without putting it under the control of one dominant industry player. OASIS/XML.ORG solves that problem by providing an established non-profit organization that can be trusted to operate a site funded by the big companies that need this service in order to make open e-business really work.”

It is interesting to note that Jon Bosak, often called the “XML Father” resigned his position from W3C processes to concentrate on his involvement with OASIS. Another activity of OASIS is their hosting of the XML Cover Pages, with Robin Cover as the managing editor mentioned in the following paragraphs.

#### **4.5.1.2 The XML Cover Pages**

The XML Cover Pages, which are sponsored by three OASIS members, ISOGEN International, Sun Microsystems, and webMethods offer new sponsorship opportunities for what is widely regarded as the most comprehensive on-line reference work for XML and its parent, SGML. Formerly known as the SGML/XML Web Page, the XML Cover Pages feature an extensive reference collection of more than 2,400 documents on the application of markup language standards. More than 80,000 people visit this site ([www.oasis-open.org/cover](http://www.oasis-open.org/cover)) each month, and many rely on the “What’s New” column for daily updates on XML resources and industry initiatives.

The XML Cover Pages provide a comprehensive index of links to on-line XML tutorials and introductions, descriptions of XML user groups, industry consortia, case studies, detailed conference, workshop and seminar listings, and categorized descriptions of XML software. Additionally, it provides contact information for developers and service providers, technical reference materials for XML implementers and programmers, answers to frequently-asked-questions and information on standards related to XML.

“The XML Cover Pages serve as a pre-competitive resource for XML development and support,” explains Laura Walker, executive director of OASIS. “The site also offers assistance to users who are evaluating the merits of XML as an enabling technology, helping them explore its potential for their information management and publishing needs.” Another activity within OASIS is the work being done with Health Level Seven (HL7) as stated in the following paragraphs.

### **4.5.1.3 OASIS and HL7**

In February 2000, OASIS announced their exchange of sponsor memberships with Health Level Seven, Inc. in a move that is expected to further XML application and interoperability in the healthcare industry. This reciprocal membership opens communication between the cross-industry efforts of OASIS, and the industry-vertical XML development work of HL7, which has made great strides in implementing XML for clinical patient and healthcare services. Both groups are international in their focus.

The partnership will allow HL7 and its members to keep current on XML development, share with those applying it in other industries, plus it will give the OASIS community a chance to access schemas being developed by HL7 to see how XML is being applied in the healthcare industry.

### **4.5.2 Summary**

To summarize the preceding pages we have shown some of the current activities within OASIS and the work being done by its participating member companies and organizations regarding XML such as the ebXML initiative, XML.ORG, the Cover pages, and OASIS' affiliation with HL7. It is apparent that OASIS is taking a bold stance in the effort to utilize the knowledge base of its members, specifically XML.ORG and the registry/repository work being developed.

OASIS is indeed living up to its claim in being “dedicated to accelerating the adoption of product-independent formats based on public standards.” It would be advisable for anyone with XML prospective goals to watch closely, listen and learn from leading edge technological organizations such as OASIS and its sponsoring members.

## **4.6 Open Applications Group (OAG)**

This section explains the mission, vision and work of the Open Applications Group, Inc. (OAGI). The OAG ([www.openapplications.org](http://www.openapplications.org)) is a non-profit consortium of leading enterprise application software developers focusing on best practices and process based XML content for e-business and application integration. As the largest publisher of XML based content for business software interoperability in the world, the OAG also builds and publishes the detail specifications necessary to use the XML content as well as publishing a common middleware API specification that has been endorsed by several major middleware vendors. The focus of the OAG is primarily associated with their two specifications; the Open Applications Group Integration Specification (OAGIS), and the Open Applications Group Common Middleware API Specification (OAMAS). Members have extensive experience in building these industry consensus based frameworks for business software application interoperability, and also have developed a repeatable process for quickly developing high quality business content and XML representations of that content.

In the past traditional EDI was used to craft inter-enterprise communications between legacy systems of which many smaller companies were unable to afford, but today we have the OAG's interoperability standards. However, not to be confused as a replacement of technical message

formats such as ASC X12 or UN/EDIFACT, OAG specifications address merely message content, not the message format technology. Once these interoperability standards are implemented, vendors will have access to a standard plug-and-play infrastructure for inter-enterprise transactions providing affordability to small companies, and an opportunity to extend the traditional benefits of EDI to a wider group of companies.

The OAG was formed in February 1995 by the leading worldwide enterprise software vendors. Each member funded the organization and submitted volunteers to the various design teams set up as the foundation organization. To date nearly fifty members comprise the OAG including those listed below with their objectives as discussed in the following subsection.

- AT&T
- Ford Motor Company
- Lockheed-Martin
- Microsoft
- PeopleSoft, Inc.
- Bluestone Software
- IBM Manufacturing Solutions
- Lucent Technologies
- Netfish Technologies
- WebMethods
- Compaq
- J.D. Edwards & Company
- Mercator (formerly TSI)
- Oracle Corporation
- XML Solutions

#### 4.6.1 OAGIS

The OAG pooled the collective technical and applications development resources of its member companies to define sets of common specifications based on business content in order to meet the requirements for enterprise solutions. The first mission for the OAG teams was to establish a common model that all of the specifications could be written to. The second step was to define the business scope that the specifications would initially include. Next, the teams began the difficult task of defining the business interface data and process requirements, and gain agreement among the membership to these specifications. The third step was the introduction of these specifications to the customer. In January 1996, Release 1 of the initial specifications of the OAGIS were approved by OAG members and the specification model contains:

- An application architecture
- Business software component definitions
- Component integration scenario diagrams
- Detail definitions of the APIs necessary to integrate business software components
- A full data dictionary describing the individual elements of the APIs

With customer satisfaction being key to the success of application integration, the OAG established three customer-focused objectives, which reflect the commitment of its members to maintaining interoperability of enterprise applications from multiple sources. These objectives include:

- Specifications – Members agree to adhere to a common set of specifications that achieve production-level integration across the principal business functions of the enterprise.
- Software – Members commit to the implementation and support of the OAG specifications in their products.

- Customer Satisfaction – Members encourage customers, consultants, and integrators to use compliant specification and software to create reference implementations for customer validation and real-world usage.

The efforts to strive for a “plug and play” solution to promote fast and cost-effective e-business and easily integrate their Business to Business (B2B) and Application to Application (A2A) software components for enterprise and supply chain functions are accomplished by leveraging XML. Best practices in integration technology and architecture, and by providing an impartial forum for all interested parties to work together to accomplish their common goals are also strategic elements of the OAG’s mission and key to their vision as explained next.

#### **4.6.2 OAG Vision**

The vision of the membership of the OAG is to drive for a solution that enables an organization to assemble their application portfolio, as they need to support the business, with a minimum of time and cost. This vision to make plug and play business software a reality may best be described by discussing the way a laptop computer will accept a new PC Card with comparatively little effort.

The same manufacturer does not manufacture most plug-in PC cards and laptop computers, yet it is a relatively painless task to integrate the two. Let’s look at the analogy and the roles of each of the three items in this scenario:

##### **The Laptop Computer:**

- Designed for components
- Has an exposed document API

##### **The PC Card:**

- The card manufacturer has built the card to hook up to the common API that the computer has exposed.
- The card manufacturer has built a software driver to enable the PC Card to integrate with the computer.

##### **The Operating System:**

- The operating system has a built in mechanism for looking at the PC Card port and identifying when something is plugged in. At this point, even though the operating system may not have the specific driver required, all the user needs to do is load the driver from some type of media (i.e., floppy disk, CD ROM, download).
- The software driver must be configured for any unique behavior that may be required.

Imagine if you could buy two software applications, plug in a driver, and then do the final configuration for your unique requirements! The OAG believes that with all of the stakeholders in the IT community working together in adopting a common, best practices based model for interoperability this kind of solution is possible and all would benefit in the following ways:

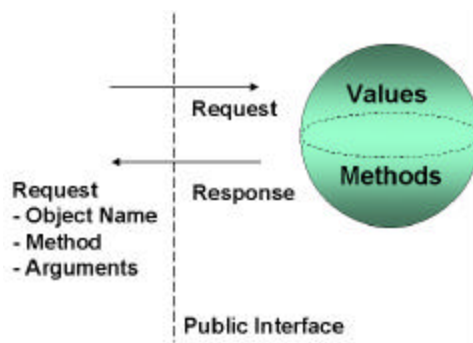
- End-users and vendors alike will enjoy a model that requires reduced time, cost and risk to integrate legacy or purchased applications because the interfaces will be exposed, documented, and commonly supported.
- Customers have an easier, less risky transition from existing applications to new applications with near “plug and play” integration.
- Vendors can provide improved customer service to customers since integration between applications will be built to a common model and therefore not have the unknown issues associated with unique solutions.
- The common model established by OAG enables the user community to adopt a single interfacing approach for all applications supported rather than separate ones for each vendor they implement.
- The OAG can provide a forum for each of the four stakeholders as defined by Customers, Application Vendors, Technology Vendors, and Systems Integrators to discuss their needs and issues, and be heard as a unified voice.
- The OAG common model enables a single mapping strategy for all multi-vendor implementations in the enterprise making support and maintenance easier as technology changes.

In order to develop this rich specification model, the members of the OAG have developed a recipe, or process for building this specification. This repeatable process enables the team members to consistently design integration for business software components, and this process includes:

- The identification of the integration scenario required.
- The definition of the business software components necessary to complete the integration scenario.
- The definition of granularity of the business software components involved in the integration scenario.
- The development of a detailed integration scenario diagram.
- The definition of the business process, mapping of those processes, and the reconciliation necessary to define the relationships between components.
- The definition of the detailed data mapping required for communication between business software components and the reconciliation needed to map data elements between components.
- Development of a common data dictionary to create a common ground for business software components to communicate.
- The use of a set of guidelines for defining the flows between business software components. These guidelines walk the team through the issues in defining the interoperability between business software components and includes the following:
  1. *Data synchronization,*
  2. *Validation,*
  3. *Transaction processing flows,*
  4. *Inquiry,*
  5. *Reporting, and*
  6. *Security and authentication.*

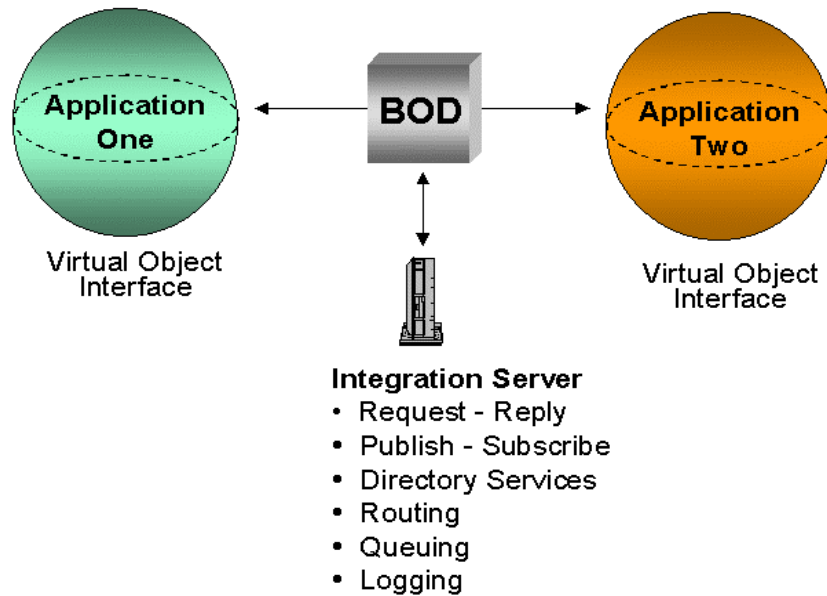
The defined scenarios and the supporting specifications are associated with planning, managing, and executing the business functions of an enterprise, not the databases or spreadsheets that support these functions. It is this focus on content, not on technology, that is the key to understanding the OAG's efforts. In the next subsections, we will explain a virtual object model and the business object document architecture.

Consider the generally accepted approach to accessing an object. One invokes an object by sending it a message with an object name, a method, and a set of arguments. The object processes the request and responds to the originator of the message. This model encapsulates the private implementation details of the object and enables communication through a public interface. This is the conceptual approach to interoperability the Open Applications Group, Inc. (OAGI) is taking.



**Figure 4.6.2-1 Virtual Object Model Design**

The OAGI is building a content based virtual business object model that enables an enterprise business application to build a virtual object wrapper around itself through the use of OAGI compliant APIs. This interoperability is achieved with object oriented advantages without the requirement to implement a software application in a specific object oriented technology.



**Figure 4.6.2-2 Virtual Object Model Architecture**

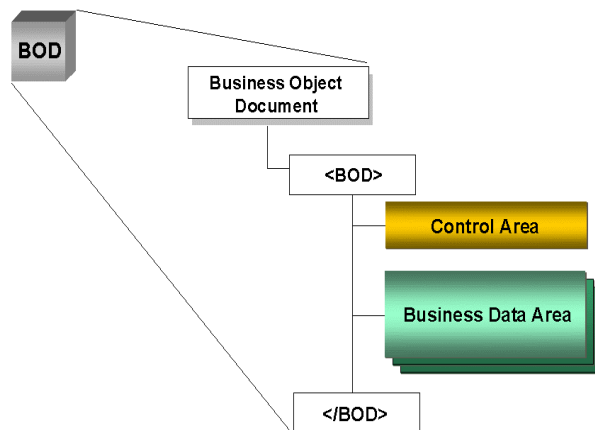
To communicate with a business software component in this model, events are communicated through the integration backbone in the form of an OAGI compliant Business Object Document (BOD) to a virtual object interface. The integration servers provide services such as publish and subscribe, request and reply, transport mechanisms, data mapping tools, integration routing and logging capabilities.

#### **4.6.3 The Business Object Document Architecture**

When the Open Applications Group members designed the mechanism to define the APIs necessary to build their model, they had the foresight to determine that a fixed length mechanism was not flexible enough to accommodate the various needs of communicating between business software components. As a result of this thought process, the members built a self-describing mechanism called a Business Object Document that uses meta-data to describe itself to other software components. The BOD itself is not an object. A business application architecture or container is used to convey the communication and the necessary data to fulfill and carry out the requested business event. The BOD is made up of:

- An implied interoperability model,
- Implied behavior,
- Defined behavior, and
- Data.

Because it is part of a larger model that is fully described in the OAGIS, the Business Object Document is understood by the receiving application and can be processed accordingly. The receiving mechanism and the underlying specifics of how the request is processed are irrelevant to the requesting application.



**Figure 4.6.3-1 Business Object Document Architecture**

The meta-data that enables the BOD to be self-describing is actually data that describes data and enables a flexible mechanism that will describe itself to another component and will ensure that only the information necessary for accomplishing the task is sent. This architecture provides a model that is faster to develop, easier to support, and ensures higher performance for the end user.

The Business Object Document is an application architecture used to execute the virtual object interface. The Business Object Document contains the framework necessary to convey its' two primary components, the Business Service Request and the Business Data Area as shown in the figure above. Each Business Service Request (BSR) contains a unique verb/noun combination such as POST JOURNAL or SYNC ITEM that drives the contents of the Business Data Area (BDA). This common semantic model of communication is similar to the process of providing translators for all the participants in a United Nations debate. There, everyone speaks in his or her own language, but everyone also hears in his or her own language because of the translation that is built into the process.

The Business Object Document and its contents, the Business Service Request and Business Data Area, do essentially the same thing, except they go one step further. They also normalize the semantics, or the meaning of the dialog, not just the words, so there is no misunderstanding in the communication process. The architecture applied by the OAG is very object oriented but does not require classical "object-oriented" technologies to be implemented thus providing a path to the future by supporting newer architectures as effectively as it supports existing architectures and technologies.

#### **4.6.3.1 OAGIS 6.0 and XML**

Since XML is database neutral, operating system neutral, and device neutral, it is an effective tool for defining heterogeneous interoperability and also in complete alignment with the OAG's stated technology strategy, which is to be technology aware, but not technology specific. The OAG has done extensive prototyping with XML to successfully validate its applicability for business software and has worked with emerging software tools and associated vendors to ensure

high quality in the implementation of XML, addresses supply-chain integration standards, and provides explanatory material for developers in OAGIS Release 6.0. The content of OAGIS 6.0 has been made machine-readable in the form of XML DTDs for all currently defined OAGI Business Object Documents and is one of the largest collections of standardized XML DTDs in support of ERP applications in existence. The integration scenarios supported by OAGIS 6.0 now include:

- Asset Care
- Financials
- Manufacturing
- Online Bidding
- Project Accounting
- Sales Force Automation
- Credit Management
- Human Resources
- Manufacturing Execution
- Online Catalogs
- Plant Data Collection
- Supply Chain Execution
- Engineering Change
- Logistics
- Production Routing
- Order Management
- Web Enabled Purchasing
- Warehouse Management

In a strategic relationship with OASIS, the Organization for the Advancement of Structured Information Standards (see Section 4.2 of this document), the OAGI XML Business Object Documents will be made available on XML.org, the open, vendor-neutral industry portal hosted by OASIS. The OAGI design guidelines for XML development also fit nicely with the BizTalk Framework and the effort seeks to insure convergence and acceleration of adoption of the OAGIS standard by providing easy integration with the BizTalk Framework-compatible schemas across multiple industries. James Utschneider, director of industry and BizTalk frameworks in Microsoft's Business Solutions Group stated, "A major goal of Microsoft's BizTalk Framework initiatives is to facilitate an open process for working with leading industry standards group like the OAGI to help accelerate the adoption of XML."

Aimed at delivering Business-to-Business (B2B) interoperability between leading business applications using OAGI standards, the OAGI Customer Council has issued the OAGI Vendor Challenge - an effort to encourage vendors to deliver e-commerce solutions that are interoperable, standards-based, and can be implemented in the near term. The end user companies that issued the challenge are including products that implement OAGI standards in their plans to implement B2B e-commerce in their enterprises.

The adoption of XML as the data description language in leading Enterprise Resource Planning (ERP) applications may make the work of the OAG more relevant to the industry and bring a degree of interoperability to shuttered ERP systems. Although ERP vendors and middleware developer have embraced XML for describing data in their suites, the OAG specification calls for use of XML in conjunction with the Business Object Document model to link disparate applications.

The OAG is working with SAP, AG, and PeopleSoft, in addition to middleware vendors and others to push the adoption of the OAGIS and coordinate XML support, according to David Connelly, president and chief technology officer at OAG. Until now, the expected adoption of OAG standards was met with skepticism because of the difficulty of getting competing vendors to agree on both technology and business process definitions. SAP, which is migrating toward XML in R/3 is still offering it Business APIs (BAPIs) as the main means for third-party integration. According to Guenther Tolkmitt, senior vice president for marketing at SAP

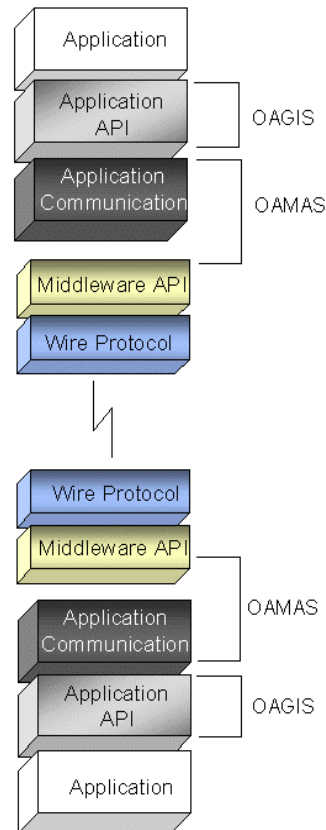
America in Philadelphia, SAP users can use either the OAG's BOD standard or SAP's BAPI interfaces with XML as the underlying communications protocol.

In addition, Mercator Software (formerly TSI Software) has announced participation in utilizing the OAGI standards and states that Mercator offers built in capabilities to easily transform documents in the OAGI XML standard into any other electronic document format used by trading partners for Business-to-Business (B2B) commerce. "The next phase of B2B integration is to enable all the various B2B interfaces to work with each other," stated Dave Power, vice president of marketing at Mercator. "We're excited to participate in the OAGI vendor challenge because it will help focus customers and vendors on the any-to-any data transformation challenge required for success in B2B commerce."

With the formation of Customer Interoperability Council made up of leading end users, members will work to promote adoption of standards based application integration technology. The OAGI Interoperability Council will focus on development of industry specific BODs that define inter-application message formats and the deployment of enterprise integration frameworks based on the OAGIS, XML and transactions sent over middleware which conform to the Open Applications Middleware API Specification (OAMAS) explained in the following subsection.

#### **4.6.4 OAMAS – Open Application Middleware API Specification**

The software industry and their customers have struggled for years with the need for better interoperability of pre-built software components. A great deal of work has been done on this problem, but that work has focused almost entirely on the technology (i.e., middleware) part of the problem. An entire class of software has even been created to address these issues.



**Figure 4.6.4-1: OAGIS/OAMAS Relationship**

Further, the application software interoperability efforts to date have focused almost entirely on enterprise infrastructure such as databases, development tools, and frameworks or on personal productivity tools such as word processors, spreadsheets, and E-Mail. Now the industry is on the road to even more ambitious efforts distributing applications across LANs, WANs, and the most distributed environment we have today, the Internet. With all of these remarkable efforts underway, a fundamental gap still exists in the quest for enterprise business applications interoperability. The link across the gap is the business content to technical transport mechanism communication. The Open Applications Group Interoperability Specification (OAGIS) defines the common business interoperability content model. OAMAS defines the tie from that common business content model to a common technical interoperability mechanism.

The OAG recognizes that technology, and particularly the middleware segment is a key piece to achieve the overall goals of the interoperability effort and is relying on middleware transport mechanisms to provide necessary infrastructure to enable the goal of heterogeneous business application interoperability. Since the BOD architecture has been developed to work with any middleware transport mechanism or architecture, this provides a wide range of choices for customers. However, this variety of choices can lead to problems such as duplicate work, incomplete solutions, and multiple middleware APIs stand as barriers to more easily integrating Enterprise Business Applications.

Having a consistent model for connecting to all of the middleware mechanisms as well as having a consistent model for how they behave will eliminate this redundant work in the industry and enable each of the IT industry stakeholders to better focus on their respective specialties. In turn, this provides the best model for customers to build and implement the most effective solutions for their organizations more quickly. The OAG and the constituency it represents require a common single middleware API to connect Enterprise Business Application software components and are interested in working with organizations that are attempting to address this need.

#### **4.6.5 Summary**

The OAG is determinedly working to achieve dramatically easier business software integration for B2B, both legacy and packaged Application-to-Application (A2A), and outside, across and down the virtual Enterprise. With specifications, software, and customer satisfaction being key to the success of application integration, the OAG's objective in striving for a "plug and play" solution has been met in the form of their Business Object Document or BOD. The gap that exists in the pursuit of business applications interoperability has been the communication between the technical transport mechanism and the business content to which an easy solution has not been met until apparently now - with the OAG's specifications OAGIS and OAMAS.

Staking their claim to being the largest publisher with the richest set of XML-based business messages or DTDs in the world, the OAG has set out to go the farthest towards defining the 'digital dial tone' organizations require to do business in the emerging electronic commerce world. In an association with Microsoft's BizTalk and the XML.org repository sponsored by OASIS the OAG hopes to further promote the adoption of these business transaction schemas across multiple industries to help customers and independent software vendors realize the immediate benefits of standards-based XML integration within their e-commerce infrastructure.

Only time will reveal the impact to traditional EDI Standards such as X12 or UN/EDIFACT by the BOD business object content and process model for interoperability will have. It is the intent of the OAG that all middleware transport mechanisms will be usable with their business object document architecture, however little information regarding EDI has yet to be addressed on the subject. Additionally, no mention has been noted by the OAG of any interaction with other industry initiatives such as RosettaNet or ebXML. Can one assume that the specifications of the OAG are indeed the 'white knight' of interoperability for business integration or are they yet another building block in the still immature network kingdom of e-commerce?

#### **4.7 eCo Framework**

The eCo Framework Project is an initiative of CommerceNet, an industry consortium with over 500 members, with Commerce One as the primary corporate sponsor. It does not require implementing new standards for a company's e-commerce systems, nor does it compete with transaction protocols or business semantic languages.

Over 30 member organizations, including Commerce One, Hewlett-Packard, IBM, Intel, Microsoft, RosettaNet, Sun Microsystems, and others created eCo based on the real-world e-commerce interoperability problems they face. Participation by CommerceNet and Commerce

One is partly funded by a grant from the U.S. Department of Commerce (NIST) Advanced Technology Program to Veo Systems (acquired by Commerce One), CommerceNet, BusinessBots, and Tesseract Information Systems (now renamed Cadabra). The eCo Specification, designed by industry for industry, is the result of this work.

With full eCo compliance, a prospective trading partner can learn all that is required to interoperate with an organization in almost any market environment by examining the eCo documents on its website. Early adopters of the eCo specification will be able to quickly expand their global trading resources for competitive advantage.

The eCo Architectural Specification presents information about an e-commerce system in seven essential categories, or layers. The eCo Semantic Specification provides a sample set of business documents that can be used inside the eCo framework. They can be used As-Is, or extended and modified to meet specific needs. Their use is not mandatory. Following is a brief description of each layer and what it does.

1. **Network Layer.** Provides a way to categorize and locate markets or communities of commerce on a network. The layer consists of a set of interfaces that can be used to find markets and relate those markets to a set of defined market types.
2. **Market Layer.** Allows a set of businesses to group together through a common portal or access point. By participating in an eCo Market Environment, a business can offer its goods or services in a shared context with other related businesses. The eCo Market Layer is conceptually similar to the physical markets in which businesses often group together.
3. **Business Layer.** Provides identifying information about members of a trading community and lists the services, they offer or consume. This layer can represent a single individual, a business, or a business unit of a larger organization.
4. **Service Layer.** Represents that part of an e-commerce system that is responsible for providing meta-data about business services and the exchange of commercial documents. "Services" in the eCo Specification are defined as interfaces to a business process. Each Service offered by a business provides the ability for a trading partner to interact with that business in some way.
5. **Interaction Layer.** Interactions represent the fundamental building blocks from which Services are built.
6. **Document Layer.** Documents represent a physical encapsulation of information items. Documents are in the form of XML, with Document Type Definitions (DTDs) and XML Schemas (DTDs as instances with other information) according to the W3C recommendations.
7. **Data Element Layer.** As the fundamental markup elements within a document, data elements serve to encapsulate data or code to be used in a particular interaction.

Each layer of an eCo-compliant e-commerce system presents information about itself. By examining this information, others can:

- *Locate the system,*
- *Understand what it is for,*
- *Recognize what market(s) it participates in,*
- *Identify protocols the system uses to communicate,*
- *Discover what documents the system uses to conduct business, and*
- *Learn how to interoperate with the system.*

In Summary, the eCo Framework is the electronic evolution of the traditional Trading Partner Agreement. User's create an XML file in their root directory of their Webserver, thus allowing potential partners to peruse their specifications for performing business transactions. The electronic document contains information from a companies address, phone number, E-Mail, and point of contact to the products and services it offers. It identifies how their e-commerce system operates so that another cyber company can determine if their system is compatible or configurable to quickly and cheaply do business. Simply put, eCo provides a common basis for two or more parties to negotiate an understanding of how they will do business.

#### **4.8 Commerce XML (cXML)**

cXML ([www.cxml.org](http://www.cxml.org)) is a Business-to-Business e-commerce standard that supports supplier content and catalog models including buyer-managed, supplier-managed, and Internet marketplaces. This effort is mainly backed by Ariba and Microsoft. cXML began as a collaborative effort among 40+ companies looking to reduce the costs of on-line business. This standardized methodology is supposed to allow participating companies, and others who implement the cXML framework, to constantly improve and streamline electronic commerce.

Version 1.1 of the cXML standard includes a set of Document Type Definitions (DTD) for the XML specification. cXML works as a meta-language that defines necessary information about a product. It will be used to standardize the exchange of catalog content and to define request/response processes for secure electronic transactions over the Internet. Notable processes include purchase orders, change orders, acknowledgments, status updates, ship notifications and payment transactions.

With previous versions of cXML, there was no declared central location for cXML DTDs, so cXML parsers could not automatically retrieve them. Now, DTDs for all versions of cXML are available at consistent locations on [cxml.org](http://cxml.org). For best performance, cXML clients should not fetch DTDs each time they parse cXML documents. Instead, they should cache them locally. After populating a URL, there should be no need to change that location. DTDs should never be changed in-place; instead, new branches will be added.

In summary, although the cXML standard is generally limited to procurement via electronic catalog systems, it was included in this report for completeness sake. Since this standard is

limited to Ariba catalogs and procurement functions, this area does not have the broad applicability of some of the frameworks like RosettaNet, ebXML, or BizTalk.

## 5.0 DOD RELATED EFFORTS

The DoD and Federal Government have several different projects that are (formally or informally) investigating the use of XML as it applies to the various functional areas with DoD. The functional areas of application vary widely from the application of XML to IETMs, to in-theatre communications for global command, control, and communications activities, DoD logistics business operations, to weapon system acquisition and life-cycle support, etc. The following list identifies some of the XML related activities that have been identified as (direct and indirect) result of our research for this report:

- Federal CIO Council XML Working Group
- XML Registry Project
- XML/EDI Standards Industry Profile and CONOPS (DRID 48)
- DoD's Center for Information Technology Standards
- DoD EDI Standards Management Committee (EDISMC)
- DISA DoD XML Guidelines
- GCCS XML Text Messaging (USMTF)
- Air Force XML User's Group (IETM related)
- NIST/OASIS Conformance Testing

The two project areas receiving a lot of attention recently are the XML Registry Project and the Federal CIO Council XML Working Group. The following two sub-sections briefly describe each of these projects.

### 5.1 DOD XML Registry Project

The XML Registry Project is operating by Dr. Glenda Hayes of MITRE. This project uses the term “registry” to apply to both registry and repository. The COE Data Emporium ([http://diides.ncr.disa.mil/xmlreg/namespace\\_list.cfr](http://diides.ncr.disa.mil/xmlreg/namespace_list.cfr)) provides for a common site to publish Namespaces for use within the DoD community. According to the XML registry, a DII COE Namespace must have a sponsor, have a Point of Contact, be willing to make its communal definitions visible, be willing to finance/staff Namespace administration, be chartered by the COE Chief Engineer, and involve specific COE system implementations. Current DoD Namespaces include:

1. *Aerospace Operations,*
2. *COE Enterprise,*
3. *Combat Support,*
4. *General Military Intelligence,*
5. *Ground Operations,*
6. *Messages,*
7. *Meteorological and Oceanographic, and*
8. *Tracks and Reports.*

The XML Registry is one piece of the COE Data Emporium (<http://diides.ncr.disa.mil/xmlreg>) and is provided for under the Semi-Structured Data and Meta-data (SSD-MD)

([http://spider.osfl.disa.mil/dii/aog\\_twg/twg/ssdmd/ssd-md\\_page.html](http://spider.osfl.disa.mil/dii/aog_twg/twg/ssdmd/ssd-md_page.html)) sub-panel of the Data Access Technical Working Group. This sub-panel's charter, dated November 1998, provides that "this SubPanel will support the DII Architecture Oversight Group (AOG) in the area of 'semi-structured data and meta-data by providing a forum for identifying related efforts, coordinating development efforts, identifying requirements, resolving issues, and introducing new segments into the COE.'" The subpanel is co-chaired by Defense Information Systems Agency (DISA) and U.S. Army Communications Electronics Command.

The XML Registry provides users with sets of XML tags and Document Type Definitions (DTDs)/Document Content Definitions (DCDs) submitted by DoD users and approved by the COE Chief Engineer and appointed Community of Interest (COI) Point of Contacts. According to the Data Emporium website, a COI is "a collection of people, agencies, activities, and system builders who share an interest in a particular problem domain or practical application." The XML Registry "constitutes guidance in the generation and use of XML within the COE v4.x data environment and is the authoritative source for approved XML data and meta-data components." The user interface for the Registry allows users to view, in either a tree/hierarchy structure or tabular format, the components of the available Entities and DTDs/DCDs as well as submits new data for approval. It also provides users with a search capability to browse current tags and their attributes for their potential use. If a user does not find tag-sets applicable to their process they may propose tags to a COI for acceptance. Finally, the Registry allows the user to retrieve tag-sets that are found to be of use in their process.

In summary, the main thrust of the "XML Registry" work is to provide visibility and awareness of XML data elements in use within various functional areas within DoD. The utility of providing this awareness is to ease the job of application integrators and system interfaces. It is very important to note that commercial next generation e-commerce frameworks based on XML are building registry and repository functionality into their frameworks, which have a different application and utility than the current DoD XML Registry. Furthermore, the concept of having a single XML Registry for all of DoD's functional areas is not scalable and would be extremely difficult and complex to manage.

## 5.2 Federal CIO Council XML Working Group

This is a newly formed group that recently held its initial (formational) meeting June 14<sup>th</sup>, 2000 at GSA's Central Office 18th&F St. NW DC Room 6009. The group is co-chaired by Marion Royal and Owen Amber of GSA. The Federal CIO Council's XML Working Group has four main thrust areas, which include the following:

1. *Develop XML Best practices and Recommended Standards,*
2. *Develop Partnerships with Key Industry and Public Groups Developing XML Standards and Specifications,*
3. *Develop with Existing Federal "Vertical" Communities to accelerate the delivery of XML benefits, and*
4. *Conduct "Results-Oriented" Education and Outreach.*

The agenda for the initial meeting was as follows:

1. *Introduction of Working Group's Charter*
2. *Self-Introductions and expressions of interests*
3. *Glenda Hayes, Mitre, XML registry for DoD's Common Operating Environment*
4. *Discussion of membership rules (e.g., State, local, and nongovernmental)*
5. *Virtual logistics: a) intranets.com site, b) listserv, c) xml.gov domain hosting, and d) other*
6. *Brainstorming on how the group might make the most effective contributions*
7. *Schedule and logistics for subsequent meetings*

This meeting helped stimulated awareness and discovery of what various agencies and departments are doing with respect to XML. Additionally, the meeting helped stimulate communication among various 'arms' within DoD that was not aware of each other. At this meeting, it was suggested that each respective branch CIO should be given the opportunity appoint someone responsible for attending future meetings. Also, there was a good dialog between the Dr. Glenda Hayes (XML Registry) and DoD's XML/EDI (transactional e-business) attendees on why storing EC/EDI/XML data in this single registry is not a good idea. Furthermore, it was decided to make the meetings open for the time being. The group's charter will expire September 30, 2002. It has been decided that the group will be monthly. The agenda at the initial meeting was as follows:

- 1) Update on Virtual Logistical Support
  - a) Listserv and Forums
  - b) xml.gov
  
- 2) Strategies and tasks addressing the four activities specified in the Working Group's charter:
  - a) XML Best Practices and Recommended Standards
  - b) Partnerships with Key Industry and Public Groups
  - c) Partnerships with Existing Communities of Interest within the Federal Government
  - d) Results-Oriented Education and Outreach

In summary, this committee has been created to help shed light on, and stimulate education and awareness of, the various new and existing XML initiatives not only within DoD but across the entire Federal Government. The Website for the Federal CIO Council XML Working Group is as follows: <http://xmlwg.intranets.com>.

## 6.0 SUMMARY AND RECOMMENDATIONS FOR DOD

EDI is still alive, but is changing, for example: although VANs carried about 95 percent of all EDI volume in 1997, this figure is predicted to drop to less than 50 percent by 2002 as more traffic is carried over the Internet. The value of EDI transactions in the U.S. was about \$2.7 billion in 1997, and is projected to grow to \$3.8 billion by 2002. Previous industry estimates, including the federal government, had placed the U.S. EDI figure as low as \$250 million.

Clearly, EDI is still alive, and clearly, the XML groundswell is about to create a tidal wave in the e-business arena, therefore DoD must be positioned and ready in order to survive. With all the hype surrounding XML, it is difficult to separate fact from fiction. XML technologies have progress beyond the embryonic phase into the early adoption phase, however e-business framework specifications are still in development. The following timeline depicts our predictions for the rise of XML and the decline of EDI:

Time	EDI	XML
• 1997-98	Explore the use of XML	XML Language (W3C) Formal Recommendation
• 1999	XML/EDI pilot systems	XML & EDI Hybridization
• 2000	Decrease in VAN traffic, Increase in Internet EDI traffic	Development of XML Framework Specifications for next-generation business interchange framework
• 2001	Decreased growth of EDI	XML Ubiquity
• 2002	No growth of EDI	Next-generation business interchange framework pilots
• 2003 +	Decline of EDI	Maturity of next-generation business interchange framework

**Figure 6.0-1 XML/EDI Timeline**

With frameworks like BizTalk, xCBL, and ebXML both striving to provide a smooth migration path from traditional EDI to XML-enabled e-business, we are hopeful that the cost and complexity of this migration to XML (when the time comes) will be reduced to utilizing standard business process models and registry/repositories, some semantic mapping, and adopting new communication transports. Although this migration might sound daunting to some, we are hopeful that these new and emerging tools and technologies will be mature enough in the near to mid-term to simplify the migration process, however DoD needs to get more involved in the development and maintenance of the new framework specifications.

DoD is similar to other industries total national defense spending in 1999 was approximately \$364.5 billion, while DoD's budget for the same year was approximately \$252.6 billion. Considering that industries such as transportation, clothing and shoes, and motor vehicle and parts are \$255.0, \$306.3, and \$316.1 billion dollar industries respectively, DoD is similar in "dollar size" to these industries. Although DoD is labeled as a single large and complex enterprise, they are however comprised of many sub-enterprises. DoD should behave as industry with respect to development and maintenance of new industry standard framework specifications for XML e-business. DoD IT standardization efforts need to move away from cumbersome DoD peculiar frameworks, in lieu of these industry standard framework specifications. DoD needs to

have clearly organized and coordinated approach developing this “Standards Team” to ensure this team will have the capacity and agility to contribute intellectually to the standardization efforts.

As DoD ponders how to embrace and extend the XML family of specifications and enabling technologies, it is important to look within the DoD enterprise and ask the following questions:

1. *Do we, DoD, care about XML governance, or are we content to let the standards you work with be defined by big corporations?*
2. *Do we, the DoD, consider ourselves a special case that necessitates unique standards and specifications above & beyond what industry uses?*
3. *Have we, the DoD, taken stock of our current and future system needs and requirements with respect to XML and XML/EDI?*

While joint Federal and DoD efforts like the newly formed Federal Working Group are certainly positive signs that the government is making progress in focusing resources to improve planning and awareness of XML applications and related efforts, more meetings and support is needed to keep pace with the rapid advancement of this Internet information technology. In addition, DoD needs to also consider the following additional considerations in planning to embrace this emerging area:

1. **Change management** - dealing with people that are reluctant to change to protect their turf,
2. **Standards management** - developing a committee/organization for awareness, adoption, embracing, extending standards, and
3. **Prioritize the current systems targeted for migration** - develop a migration plan of actions and milestones that can keep in harmony with the rapid advancement of the commercially used Internet and Web information technologies.

**REFERENCES**

1. Department of Defense (DoD) Electronic Business/Electronic Commerce (EB/EC) Strategic Plan, May 1999
2. World Wide Web Consortium (W3C), <http://www.w3.org>
3. U.S. Bureau of Economic Analysis website, <http://www.bea.doc.gov/bea/dn/dpga.txt>
4. ebXML Organization's website, <http://www.ebXML.org>
5. ManTech's XML/EDI Central Website, <http://www.dcnicn.com/xmledicentral>
6. Alan Kotok, Director of Education and Information Resources, Data Interchange Standards Association (DISA)
7. DISA, [www.disa.org](http://www.disa.org)
8. William Kammerer, FORESIGHT Corp.
9. Planet IT
10. ASC X12, [www.x12.org](http://www.x12.org)
11. UN/CEFACT, [www.cefact.org](http://www.cefact.org)
12. OASIS.org
13. InfoWorld.com
14. Standardscouncil.org
15. ebXML Requirements Specifications Working Draft v 0.60
16. ebXML Transport Routing and Packaging Overview and Requirements v 0.9
17. Infoworld.com
18. Ecnet.com
19. Sis.pitt.edu
20. BizTalk, <http://www.biztalk.org>
21. BizTalk Server, <http://www.microsoft.com/biztalkserver>
22. [www.openapplications.org](http://www.openapplications.org) (OAGI Website)
23. Open Applications Group whitepapers:  
    'Plug and Play Business Software Integration',  
    'OAMAS – Open Applications Group Common Middleware API Specification'
24. OASIS – The XML Cover Pages, <http://www.oasis-open.org/cover>
25. Article by Ted Smalley Bowen "OAG pushes XML for application integration"
26. CommerceOne.com
27. eCo Framework, <http://eco.commerce.net/>
28. XML-Signature Requirements W3C Working Draft October 14, 1999, <http://www.w3.org/TR/1999/WD-xmlsig-requirements-19991014.html>
29. XML-Signature Syntax and Processing W3C Working Draft May 10, 2000, <http://www.w3.org/TR/2000/WD-xmlsig-core-20000510/>
30. <http://www.cxml.org/home/>
31. DoD XML Registry, <http://diides.ncr.disa.mil/xmlreg>

**APPENDIX A: GLOSSARY OF TERMS**

**Accredited Standards  
Committee (ASC) X12**

The committee was chartered by ANSI in 1979 to develop uniform standards for the electronic interchange of business documents. Accredited Standards Committee X12 consists of U.S. industry and Government members who develop Electronic Data Interchange (EDI) standards for submission to ANSI for subsequent approval as a United States Standard or to the UN/Electronic Commerce Europe (ECE) for approval and submission of UN/EDIFACT international standards.

**American National Standards  
Institute (ANSI)**

A private, non-profit membership organization that coordinates the development and approval of voluntary consensus standards in the United States.

**American Standard Code for  
Information Interchange  
(ASCII)**

A standard character set developed to enable efficient data exchange and compatibility among different computer platforms and peripherals. ASCII is a seven bit code with an eighth bit used for parity. The term is used to describe the format for transmission and for storage.

**Basic Semantic Unit (BSU)**

A BSU is a “semantically pure” data element. Perhaps the best way to explain this is by example. Consider a product code. The Product Code identifies a particular class of object. There are many synonyms: item number, part number, assembly code, raw material code, etc., and there can be several semantic contexts: customer's product code, supplier's product code, manufacturer's product code, etc. All the synonyms, even though they convey different flavors of product code, in fact represent exactly the same thing in Information Technology terms - an identification for a specific class of objects.

**Data Element**

A unit of data, which in a certain context, is considered indivisible. UN/EDIFACT: a unit of data for which the identification, description, and value representation have been specified. (ISO 9735)

**Data Segment**

A data segment is a group of related data elements in a transaction set. Each segment has a unique segment identifier, a combination of two or three uppercase letters and/or digits that serves as a name for the segment, and occupies the first character positions of the segment. A segment is equivalent to a data record in a database.

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<b>Document Content Definition (DCD)</b>	Microsoft's initial attempt creating a replacement for DTDs using XML syntax to describe the document structure and semantics.
<b>DoD EB/EC</b>	The interchange and processing of information via electronic techniques for accomplishing transactions based upon the application of commercial standards and practices. Further, an integral part of implementing EB/EC is the application of business process improvement or reengineering to streamline business processes prior to the incorporation of technologies facilitating the electronic exchange of business information.
<b>EDI</b>	Transactions that are structured in a highly standardized way that facilitates use over machine-to-machine interfaces with no human intervention.
<b>Electronic Commerce (EC)</b>	A concept and implementation that includes a range of enabling technologies supporting the timely digital exchange of business information and includes but is not limited to Electronic Data Interchange (EDI), electronic mail, bar-coding, electronic funds transfer, electronic bulletin boards, electronic security technologies (e.g., public key encryption), and electronic catalogs.
<b>Electronic Data Interchange (EDI)</b>	Exchange of formation from one computer system to another without human intervention.
<b>Format</b>	The organization, plan, type, or style of an EC/EDI object.
<b>Framework</b>	<p>A structured set of standards used to integrate quasi-autonomous organizational modules into an integrated enterprise. A Framework comprises three architectures:</p> <ul style="list-style-type: none"><li>• Process Architecture - that defines the business processes of the integrated enterprise.</li><li>• Information Technology Architecture - that defines the information technology used within the enterprise.</li><li>• Control Architecture - that defines the functional, technical, and data standards controlling the process and information technology architectures of the enterprise.</li></ul>

<b>Identifier</b>	A character or group of characters used to identify or name an item of data and possibly to indicate certain properties of that data. (ISO 9735)
<b>Implementation Convention (IC)</b>	An agreement between trading partners on how they will interpret the meaning of data elements in an EDI transaction set or message.
<b>Interchange</b>	Communication between partners in the form of a structured set of messages and service segments starting with an interchange control header and ending with an interchange control trailer. (ISO 9735)
<b>International Organization for Standardization (ISO)</b>	An international organization with representatives from member countries that develops and approves international standards. The International Organization for Standardization, based in Geneva, is a federation of national standards organizations.
<b>ISO 9735</b>	International standard issued by ISO, which reproduces the UN/EDIFACT Syntax Rules as agreed by the Working Party on Facilitation of International Trade Procedures (WP.4).
<b>Mandatory</b>	A statement in a segment or message directory that specifies that a segment, a data element, a composite data element, or a component data element must be used. (ISO 9735)
<b>Message</b>	An ordered series of characters intended to convey information. UN/EDIFACT: a set of segments in the order specified in a message directory, starting with the message header and ending with the message trailer. (ISO 9735) Equivalent to a transaction set.
<b>Object</b>	An object is something of which one takes cognizance. The object taxonomy is an extensible, systematized, hierarchical structure that functions as an aid in associating, classifying, defining, distinguishing, identifying, and ordering objects. (ISO 1179)
<b>Property</b>	A property is defined as that which identifies a quality specifically in the constitution of (or found in) the behavior of a species or type of thing by virtue of that thing's true or essential nature. (ISO 11179)

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<b>Property</b>	The human perception of a single characteristic of an object in the real world. One of the concepts, which is linked to a data element.
<b>Qualifier</b>	A data element whose value shall be expressed as a code that gives specific meaning to the function of another data element or a segment. (ISO 9735)
<b>Repeating Segment</b>	A segment that may repeat in a message as specified in the relevant message type specification. (ISO 9735)
<b>Segment</b>	A predefined and identified set of functionally related data element values that compose an X12 transaction set or an UN/EDIFACT message.
<b>Semantic Unit</b>	The smallest unique and repeatable functional, physical, or conceptual unit of meaning that may be applied within a particular domain.
<b>Semantics</b>	Pertains to the meaning of the information contained within a data structure, independent of the structure itself, such that the conversion from one structure to another would not change the meaning of the data. In this paper, the discussion focuses on what meaning can be inferred by the placement of information in the structure of EDI data.
<b>Structure</b>	The manner in which elements are organized or interrelated.
<b>Syntax</b>	The data pattern and/or structure relative to an EC/EDI object.
<b>Syntax Rules</b>	Rules governing the structure of an interchange and its functional groups, messages, segments, and data elements. (ISO 9735)
<b>Trading Partner</b>	An organizational entity (Government, private sector, association, small, or large business) that has a commercial relationship with another entity.
<b>Trading Partner Agreement (TPA)</b>	A legal document between two trading partners that defines general EDI procedures, terms, and conditions, and the EDI transaction sets that will be used.

**Transaction Set**

ANSI X12 complete business document such as an invoice, a purchase order, or a remittance advice.

**UN/EDIFACT**

United Nations rules for Electronic Data Interchange for Administration, Commerce, and Transport. They comprise a set of standards, directories, and guidelines for the electronic interchange of structured data, and in particular, that related to trade in goods or services, between independent computerized information systems. Recommended within the framework of the United Nations, the rules are approved and published by the UN/ECE in the United Nations Trade Data Interchange Directory (UNTDID) and are maintained under agreed procedures. UNTDID includes:

- The UN/EDIFACT Application Level Syntax Rules (ISO 9735)
- The UN/EDIFACT Message Design Guidelines (MDG)
- The UN/EDIFACT Syntax Implementation Guidelines (SIG)
- The UN/EDIFACT Data Elements Directory (EDED), a subset of the United Nations Trade Data Element Dictionary (UNTDED)
- The UN/EDIFACT Code List (EDCL)
- The UN/EDIFACT Composite Data Elements Directory (EDCD)
- The UN/EDIFACT Segments Directory (EDSD)
- The UN/EDIFACT United Nations Standard Message (UNSM) Directory
- EDIFACT Message Directory (EDMD)
- Uniform rules of Conduct for the Interchange of trade Data by teletransmission (UNCID)
- Explanatory material

**Unit of Functionality**

A logical grouping of information representing a particular semantic function (i.e., a unit of business functionality).

## **APPENDIX B: LIST OF ACRONYMS**

<b>A2A</b>	Application-to-Application
<b>AD</b>	Area Director
<b>AFDEC</b>	Association of Franchised Distributors of Electronic Components
<b>AMD</b>	Advanced Micro Devices
<b>ANSI</b>	American National Standards Institute
<b>AOG</b>	Architecture Oversight Group
<b>API</b>	Application Program Interface
<b>ASC X12</b>	Accredited Standards Committee
<b>ASCII</b>	American Standards Code for Information Interchange
<b>ATP</b>	Advanced Technology Program
<b>B2B</b>	Business-to-Business
<b>BAPI</b>	Business API
<b>BASDA</b>	Business and Accounting Software Developers Association
<b>BDA</b>	Business Data Area
<b>BOD</b>	Business Object Document
<b>BSR</b>	Business Service Request
<b>BSU</b>	Basic Semantic Unit
<b>CALS</b>	Continuous Acquisition & Life-cycle Support
<b>CD ROM</b>	Compact Disc Read Only Memory
<b>CEO</b>	Chief Executive Officer
<b>CERN</b>	European Laboratory for Particle Physics
<b>CIO</b>	Chief Information Officer
<b>COE</b>	Common Operating Environment
<b>COI</b>	Community of Interest
<b>CONOPS</b>	Concept of Operations
<b>COTS</b>	Commercial Off-the-Shelf
<b>CTC</b>	Concurrent Technologies Corporation
<b>CWMI</b>	Common Warehouse Metadata Interchange
<b>cXML</b>	commerce XML
<b>DARPA</b>	United States Defense Advanced Research Project Agency
<b>DCD</b>	Document Content Definition
<b>DED</b>	Data Element Dictionary
<b>DII COE</b>	Defense Information Infrastructure Common Operating Environment
<b>DISA</b>	Data Interchange Standards Association
<b>DISA</b>	Defense Information Systems Agency
<b>DLMSO</b>	Defense Logistics Management Standards Office
<b>DoD</b>	Department of Defense
<b>DOM</b>	Document Object Model
<b>DRID</b>	Department of Defense Reform Initiative Directive
<b>DSSSL</b>	Document Style Semantics and Specification Language
<b>DTD</b>	Document Type Definition
<b>DUNS</b>	Data Universal Numbering System
<b>ebXML</b>	electronic business XML
<b>EC</b>	Electronic Commerce
<b>ECOSOC</b>	Economic and Social Council

<b>EDI</b>	Electronic Data Interchange
<b>EDIA</b>	Electronic Data Interchange Association
<b>EDIINT</b>	EDI-Internet Integration
<b>EDISMC</b>	Electronic Data Interchange Standards Management Committee
<b>EIDX</b>	Electronics Industry Data Exchange
<b>ERP</b>	Enterprise Resource Planning
<b>EWG</b>	EDIFACT Working Group
<b>FIXML</b>	Financial Information eXchange Markup Language
<b>FO</b>	Formatting Object
<b>FpML</b>	Financial Products Markup Language
<b>FTP</b>	File Transfer Protocol
<b>GCA</b>	Graphic Communications Association
<b>GCCS</b>	Global Command Control System
<b>GENCOD</b>	EAN - Article Numbering Association (France) - European Article Number
<b>GSA</b>	General Services Administration
<b>GTDI</b>	Guidelines for Trade Data Interchange
<b>GTIN</b>	Global Trade Item Number
<b>HL7</b>	Health Level Seven
<b>HR-XML</b>	Human Resources XML
<b>HTML</b>	Hyper Text Markup Language
<b>HTTP</b>	Hyper Text Transfer Protocol
<b>HyTIME</b>	Hypermedia Time-based Structuring Language
<b>I/O</b>	Input/Output
<b>IAB</b>	Internet Architecture Board
<b>IC</b>	Implementation Convention
<b>ID</b>	Identification
<b>IDEF</b>	Integration Definition
<b>IESG</b>	Internet Engineering Steering Group
<b>IETF</b>	Internet Engineering Task Force
<b>IETM</b>	Interactive Electronic Technical Manuals
<b>INRIA</b>	The French National Institute for Research in Computer Science and Control
<b>IP</b>	Internet Protocol
<b>ISO</b>	International Organization for Standardization
<b>ISOC</b>	Internet Society
<b>ISV</b>	Independent Software Vendor
<b>IT</b>	Information Technology
<b>ITAA</b>	International Transactional Analysis Association
<b>JDBC</b>	Java Data Base Connectivity
<b>JIPDEC</b>	Japan Information Processing Development Corporation
<b>LAN</b>	Local Area Network
<b>LCS</b>	Laboratory for Computer Science
<b>LLC</b>	Limited Liability Corporation
<b>MIME</b>	Multipurpose Internet Mail Extensions
<b>MIT</b>	Massachusetts Institute of Technology
<b>MIT LCS</b>	Massachusetts Institute of Technology Lab for Computer Science
<b>NATO</b>	North Atlantic Treaty Organization

<b>NEDA</b>	National Electronics Distributors Association
<b>NEMI</b>	National Electronics Manufacturing Initiative
<b>NIST</b>	National Institute of Standards and Technology
<b>OAGI</b>	Open Applications Group, Inc.
<b>OAGIS</b>	Open Applications Group Integration Specification
<b>OAMAS</b>	Open Applications Group Common Middleware API Specification
<b>OASIS</b>	Organization for the Advancement of Structured Information Standards
<b>OBI</b>	Open Buying Initiative
<b>OMG</b>	Object Management Group
<b>OSI</b>	Open Systems Interconnect
<b>OTA</b>	Open Travel Alliance
<b>OTP</b>	Open Trading Protocol
<b>PAEB</b>	Pan American EDIFACT Board
<b>PC</b>	Personal Computer
<b>PIP</b>	Partner Interface Process
<b>QOS</b>	Quality of Service
<b>QTR</b>	Quarter
<b>RDF</b>	Resource Description Format
<b>REDX</b>	Retail Enterprise Data in XML
<b>RFC</b>	Request for Comment
<b>S.W.I.F.T.</b>	Society for Worldwide Interbank Financial Telecommunications
<b>AICS</b>	Science Applications International Corporation
<b>SGML</b>	Standard Generalized Markup Language
<b>SIIA</b>	Software and Information Industry Association
<b>SIMPL-EDI</b>	Simplified subset UN/EDIFACT EDI Message Standard
<b>SITG</b>	Strategic Implementation Task Group
<b>SKU</b>	Stock Keeping Unit
<b>SME</b>	Small-to-Medium sized Enterprise
<b>SMTP</b>	Simple Mail Transfer Protocol
<b>SOAP</b>	Simple Object Access Protocol
<b>SOX</b>	Schema for Object-oriented XML
<b>SSD-MD</b>	Semi-Structured Data and Meta Data
<b>SSL</b>	Secure Sockets Layer
<b>TBD</b>	To Be Determined
<b>TDCC</b>	Transportation Data Coordination Committee
<b>TLS</b>	Transport Layer Security
<b>TMWG</b>	Techniques and Methodologies Working Group
<b>TPA</b>	Trading Partner Agreement
<b>TTI</b>	Technology Transfer Institute
<b>UCS</b>	Universal Character Set
<b>UML</b>	Unified Modeling Language
<b>UN</b>	United Nations
<b>UN/CEFACT</b>	United Nations Centre for Facilitation of Procedures and Practices for Administration, Commerce and Transport
<b>UNECE</b>	United Nations Economic Commission for Europe

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<b>UN/EDIFACT</b>	United Nations Electronic Data Interchange for Administration, Commerce and Transport
<b>UN-JEDI</b>	United Nations Joint EDI
<b>UNSM</b>	United Nations Standard Message
<b>UNSPSC</b>	UN: Standard Products and Services Code
<b>URI</b>	Uniform Resource Identifier
<b>URL</b>	Uniform Resource Locator
<b>USMTF</b>	United States Message Text Format
<b>UTF</b>	UCS Transformation Format
<b>VAN</b>	Value-Added Network
<b>W3C</b>	World Wide Web Consortium
<b>WAN</b>	Wide Area Network
<b>WFMC</b>	Work Flow Management Consortium
<b>WIDL</b>	Web Interface Definition Language
<b>Windows DNA</b>	Windows Distributed InterNet Applications Architecture
<b>WP</b>	Working Party
<b>xCBL</b>	eXtensible Common Business Library
<b>XDR</b>	XML-data Reduced
<b>XHTML</b>	Extensible Hyper Text Markup Language
<b>Xlink</b>	XML Linking Language
<b>XLL</b>	eXtensible Linking Language
<b>XMI</b>	XML Metadata Interchange
<b>XML</b>	eXtensible Markup Language
<b>XML RPC</b>	XML Remote Procedure Call
<b>XPath</b>	XML Path Language
<b>XPointer</b>	XML Pointer Language
<b>XSDL</b>	XML Schema Definition Language
<b>XSL</b>	eXtensible Style Language
<b>XSLT</b>	eXtensible Style Language Transformation