Standards Required to Support XML-Based B2B Integration

A conceptual model for understanding XML convergence

Companies across all industries are realizing the fundamental benefits of using the Internet to integrate their supply chains. The potential to reduce inventory, improve time-to-market, reduce transaction costs and conduct business with a broader network of supply chain partners has direct, measurable benefits to a company's bottom line.

Because of the benefits that result from supply chain integration, companies are exploring open, XML-based standards that help remove the formidable barriers associated with developing a common business language and process methodology for Internet-based collaboration, communication and commerce.

Many private companies and industry organizations today are proposing a wide array of standards for creating this common e-business language -- so many, in fact, that it is becoming increasingly difficult to differentiate among the multitude of vertical and horizontal industry standards. There is currently no way of easily identifying the e-business standards challenge each standards organization strives to resolve. Perhaps more important, there is no mechanism for standards bodies to identify where their efforts may be duplicative and where they may be complementary.

RosettaNet, an industry consortium and standards organization representing the needs of the Information Technology (IT), Electronic Components (EC), and Semiconductor Manufacturing (SM) industries, has surveyed the XML–related standards space and, as a service to the industry, has developed a conceptual model that enables the comparison of horizontal (universal) and vertical (supply chain- or business model-specific) XML standards efforts. Using a model that identifies nine distinct components required to provide a total e-business process, RosettaNet's goal is to bring clarity to various industry efforts. It is possible to identify efforts that are complementary as well as areas where possible overlap -- and thus convergence opportunities exist.

The conceptual model was developed with the input from many industry and technology organizations and respected thought leaders. RosettaNet acknowledges that there may be differing views or alternative perspectives to the model.

Basic Components Required to Support XML-Based E-Business Processes

There are four basic XML-related components needed to conduct e-business within a single supply chain environment:
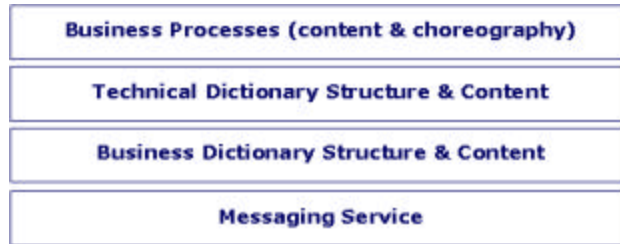

Figure 1:
Basic Components Required to Support XML-Based E-Business Processes

At the foundation is the messaging service, which specifies how the information for an e-business transaction is physically packaged, transferred and routed securely between trading partners and trading networks. Ideally, trading partners use the same messaging service protocol to share information regardless of supply chain. Once a common messaging service is defined, trading partners must agree upon a common set of business and technical dictionary components and conventions for the content of the business message being sent. Lastly, the business and technical content exchanged between trading partners logically forms a complete business process, which in turn, specifies the structure and format of the business content of a message. It also defines the dialog or message-exchange choreography that trading entities must engage in to complete a particular business process or activity.

Full Component Set Required to Support XML-Based E-Business Process Interoperability Between Supply Chains

Although interoperability within a supply chain is an important goal, interoperability *between* supply chains is equally important. A company rarely interacts only within a single supply chain, but rather must connect with several supply chains as product offerings and business dictate. To support the highly specialized needs of a given supply chain, and at the same time optimize interoperability between supply chains, RosettaNet recognizes the need for both horizontal and vertical XML-based components. In developing its model, RosettaNet has endeavored to identify components that are ideally universal (i.e. may be used uniformly across all supply chains) as well as those that are supply chain- or business model-specific (i.e. must be unique to meet specialized requirements). This paper provides an overview and details the model from the foundation up through the architecture.
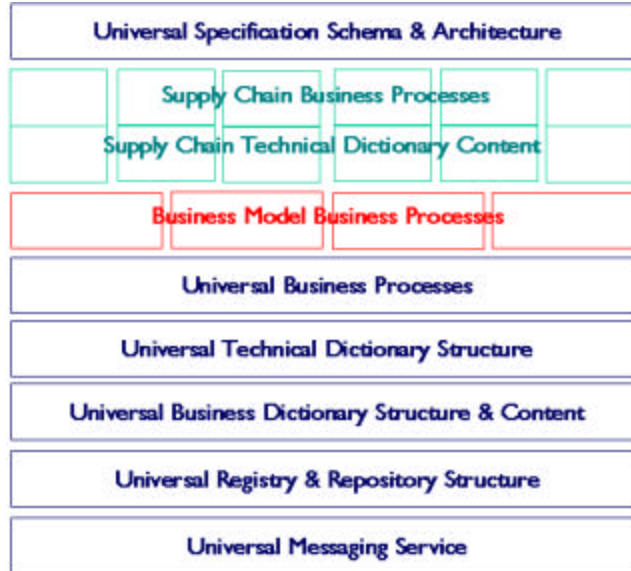
Figure 2:
Full Component Set Required to Support XML-Based E-Business Process
Interoperability Within and Between Supply Chains

Universal Messaging Service

As noted earlier, the messaging service is the foundational component that specifies how a business message is to be packaged, transferred and routed between trading partners and trading networks. The messaging service component is also referred to as the TRP, or Transfer, Routing and Packaging.

At the business process component level of the model, a set of business content is defined. The business content can then be packaged, transferred and securely routed securely with digital signatures in a standard, commonly accepted way when sent to a company's trading partner.

Universal Registry & Repository Structure

Registries and repositories serve an important function in e-business. They are most easily thought of as electronic versions of the "white, green, and yellow pages" for business. A commonly used registry and repository structure allows any company to register the attributes of their e-business environment: who they are, how to find them, and the types of business relationships they can support. It is a structured way for companies to discover partners, determine their capabilities, and then begin a business relationship in a plug-and-play way.

Trading Partner Agreements (TPAs), which specify the terms and conditions of a trading partner relationship, are also considered part of the Universal Registry & Repository Structure within this model.

The Universal Registry & Repository Structure, therefore, specifies the structure of the registries and repositories that trading entities can access to discover each other's capabilities and services electronically.

Universal Business Dictionary Structure & Content

The Universal Business Dictionary Structure & Content specifies structure, and is also the aggregation of all content fields, elements, constraints, code lists and objects used within electronic business processes. It describes all of the business content, attributes and relationships between elements that exist in all business documents.

Field descriptors for a price and availability query, for example, would be: product quantity, product identification, global currency code, and monetary amount. Each of these descriptors contain, among other things, a data type value (whether it is a string or integer) and a minimum and maximum value, where at least one choice may be mandatory. All of this information is structured and stored in a universal business dictionary standard.

Universal Technical Dictionary Structure

This component manages the structure for defining form, fit and function of any product or service, regardless of the industry. Specifically, the Universal Technical Dictionary Structure specifies the structure of the specialized technical dictionary or dictionaries used to obtain commonly used domain-specific terminology and accepted values. The pre-defined structure is used as the basis for defining supply chain-specific technical dictionary content (i.e. form, fit, and function attributes).

Universal Business Processes

Universal Business Processes contain the minimum amount of specificity required to support core business processes across geographies, business models and supply chains. For example, in almost any industry, it is common for a company to purchase a product or service from a supplier. In that exchange, a purchaser typically asks a supplier for information regarding product price and availability, places an order, and then asks for an acknowledgement of that order. Across industries, supply chains, regions, and business models, a relatively simple purchasing business process could be defined that might support the majority of the world's B2B purchasing transactions.

For trading partners to complete a transaction on-line, business process standards should specify both the structure and format of the business content of a message (also referred to as a payload) as well as the message exchange choreography (also referred to as dialog).

Business Model Business Processes

Specific business models influence business processes. The Business Model Business Processes component specifies business process definitions for a particular business model. For example, the manufacturing processes and informational requirements of a manufacturer of discrete products (computers) may differ significantly from those of a process-based (semiconductor) manufacturer. Build-to-Order models often have different business processes and information requirements as compared to Build-to-Inventory

models. Often, there may be a range of business models used within a supply chain, and it is common to see the same business models being used across several industries.

For trading partners to complete a transaction online, business process standards should specify both the structure and format of the business content of a message as well as the message exchange choreography.

Supply Chain Technical Dictionary Content

To support many B2B e-business processes, a supply chain must agree on a common set of attributes that describe the form, fit and function of each product within its supply chain. An agreed upon technical dictionary is particularly important for business processes attempting to automate the update of electronic catalogs and support of end-user product-based parametric searches over the Internet. When describing a disk drive, for example, the computer industry must agree upon a common set of attributes that can be used consistently by any company that manufactures disk drives (e.g., capacity, access speed, form factor, electrical current, etc.) Whenever a disk drive manufacturer introduces a new product, it then must describe it in terms of the attributes as prescribed by the supply chain's technical dictionary.

Supply Chain Business Processes

The Supply Chain Business Processes component identifies the business process that is unique to a particular industry or supply chain. For example, the business process and informational needs in the computer supply chain are quite different than those of a pharmaceutical, clothing, or book-publishing supply chains. Each industry or supply chain has different ways of designing, forecasting, ordering, manufacturing and distributing their products. Most of these differentiating factors are concrete and non-debatable.

For trading partners to complete a transaction online, business process standards should specify both the structure and format of the business content of a message as well as the message exchange choreography.

Universal Specification Schema & Architecture

The top component describes the complete overarching architecture of the universal e-business process, including how universal components relate to supply chain- and business model-specific components. The Universal Specification Schema & Architecture represents the interactions between all of the components in the model.

RosettaNet's Convergence Strategy

In developing this conceptual model, RosettaNet evaluated its own standards activities and determined where its efforts fit within it. Although RosettaNet's goal has always been to develop XML-based e-business processes to support the unique needs of the IT, EC and SM supply chains, at the time of its formation, no universal or horizontal components existed upon which to build supply chain and business model process standards. As a result, RosettaNet built its own version of the necessary horizontal components (e.g., messaging service, business dictionary, and architecture) in support of its end goal.

Over the past year a number of universal, XML-based standards initiatives have materialized and are in various stages of development and acceptance.

RosettaNet seeks to leverage its leadership role within the e-business standards space and its significant production implementation experience to reduce confusion and bring clarity around the various B2B initiatives in the marketplace. Working closely with B2B standards groups that have complementary goals, RosettaNet seeks to support, converge, or migrate to complementary horizontal standards initiatives that have the greatest potential for universal acceptance.

RosettaNet believes such convergence efforts will both contribute to greater supply chain interoperability and allow RosettaNet to concentrate its efforts on the business process requirements unique to the high-technology supply chain and the various business models used within it. Working closely with other standards organizations, RosettaNet will ensure that its standards efforts are compatible with accepted universal, horizontal standards. In areas where a universally accepted horizontal component does not exist, RosettaNet will continue its work in that area to ensure an integrated, XML-based business process solution for the high-technology industry.

Companies directly benefit from more widely accepted and interoperable B2B standards by being able to implement solutions more cost effectively. RosettaNet seeks to ensure that lower-cost implementation solutions are made available for small- to medium-sized enterprises around the world as a result of its convergence strategy.

Current Solutions for RosettaNet Supported Supply Chains

In the absence of proven, universally accepted horizontal standards, RosettaNet developed a number of horizontal components in order to provide a robust, complete solution for its supply chains. Today, RosettaNet has standards efforts in each of the following areas:

Universal Messaging Service: RosettaNet developed the messaging services component, called the RosettaNet Implementation Framework Core Specifications, to supports its production implementations.

Universal Registry & Repository Structure: RosettaNet does not have any unique efforts in this area.

Universal Business Dictionary Structure & Content: RosettaNet has defined a universal business dictionary, called the RosettaNet Business Dictionary, that is being used across the IT, EC, and SM supply chains.

<u>Universal Technical Dictionary Structure:</u> RosettaNet, working with Si2, has developed a universal technical dictionary structure for use by the high technology industry.

<u>Universal Business Processes</u>: RosettaNet is in the process of developing universal business processes that could be used across a wide range of supply chains.

<u>Business Model Business Processes:</u> RosettaNet is developing a number of business model-specific business processes commonly used in the high technology industry. RosettaNet is also working with the National Electronic Manufacturing Initiative (NEMI), and this joint effort will enhance the development of manufacturing business model business processes.

<u>Supply Chain Technical Dictionary Content:</u> RosettaNet, in conjunction with Si2, International Electrotechnical Commission (IEC) and Japan Electronics and Information Technology Industries Association (JEITA), has developed technical dictionary content, called the RosettaNet Technical Dictionary, which supports the IT, EC, and SM industries.

<u>Supply Chain Business Processes:</u> RosettaNet is currently the only organization focused on supply chain business processes, which are called Partner Interface Processes™ (PIPs™). Many of RosettaNet's PIPs are already in production between trading partners in the IT, EC, and SM supply chains.

<u>Universal Specification Schema & Architecture:</u> RosettaNet has developed a universal specification schema and architecture to support its efforts.

Short-Term Plan for RosettaNet-Supported Supply Chains

RosettaNet has developed a forward-looking view of what will happen over the next 12-18 months in the e-business standards space for IT, EC, and SM supply chains. RosettaNet will continue its XML standards efforts in all current component areas to support the 2001 production implementation goals of its vertical supply chains. At the same time, RosettaNet will develop a plan to support horizontal XML standards, which appear to be universally accepted and proven.

<u>Universal Messaging Service:</u> The messaging service standards from RosettaNet, ebXML, and BizTalk™ Framework are expected to be in production. It is expected RosettaNet PIPs will be able to run over all of three of these messaging services protocols.

<u>Universal Registry & Repository Structure:</u> RosettaNet will support UDDI in the electronic registration and discovery of trading partner relationships. RosettaNet will monitor the progress of the Registry and Repository Specification under development by the ebXML Initiative and support it if it becomes widely accepted.

<u>Universal Business Dictionary Structure & Content:</u> RosettaNet will continue the maintenance and enhancements in this area, while seeking to understand the viability of the Core Components Specification under the ebXML Initiative.

<u>Universal Technical Dictionary Structure:</u> RosettaNet, working with its Partners such as Si2, will continue its efforts around the technical dictionary structure.

<u>Universal Business Processes:</u> RosettaNet expects to develop a deep understanding of which business processes can be defined in a universally implementable way based on its global and supply chain experience. RosettaNet will also monitor the progress of the

Business Process Specifications under the ebXML Initiative to assess their progress and ultimate acceptance as universal business process standards.

Business Model Business Processes: RosettaNet will continue its business model business process standards development activities.

Supply Chain Technical Dictionary: RosettaNet will continue to enhance its technical dictionary content with IEC and JEITA in support of the IT, EC, and SM supply chains.

Supply Chain Business Processes: RosettaNet will continue to lead in the development and implementation of business process standards specifications to the IT, EC, and SM supply chains.

Universal Specification Schema & Architecture: RosettaNet will further its development of this top tier component. Additionally, RosettaNet intends to monitor the progress of the Specification Schema and Architecture Specification under the ebXML Initiative and will likely adopt and extend it to support its supply chains should it become universally accepted.

Summary

Supply chain integration requires both horizontal and vertical XML standards in order to support both business process complexity as well as interoperability goals between supply chains. RosettaNet has developed a conceptual model for identifying the components of business process that allows for the direct comparison of all XML-based standards. Although many XML standards initiatives are complementary, the sheer number of standards initiatives has created confusion among end users. RosettaNet will continue to play a role in several components of the e-business process, but expects to converge efforts with other horizontal standards organizations.

Glossary

authXML -- Authentication and Authorization Information in XML
BPML -- Business Process Modeling Language
BPMI -- Business Process Management Initiative
BTP -- Business Transaction Protocol
cXML -- Commercial Extensible Mark-up Language
ebXML-– e-business XML Initiative
ECIX -- Electronic Component Information Exchange
IEC -- International Electrotechnical Commission
JEITA -- Japan Electronics and Information Technology Industries Association
NEMI -- National Electronic Manufacturing Initiative
OAG -- Open Applications Group
OASIS -- Organization for Advancement of Structured Information Standards
OBI -- Open Buying on the Internet
S2ML -- Security Services Mark-up Language
Si2 -- Silicon Integrated Initiative
SOAP -- Simple Object Access Protocol
TpAML -- Trading Partner Agreement Mark-up Language
UDDI -- Universal Description Discovery and Integration
UCC -- Uniform Code Council
UN –- United Nations
VFIIP -- Virtual Factory Information Interchange Project
W3C -- World Wide Web Consortium
XAML -- Transaction Authority Mark-up Language
XCBL -- XML Common Business Library

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