

# Business process integration through XML

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## **Abstract:**

*Business to Business (B2B) e-commerce is driving a new generation of Internet applications that will use XML as a model for sharing documents and information between organizations. Sophisticated B2B applications can dramatically automate business transactions and processes between organizations only if the business systems and data that drive the processes are integrated between the trading partners. While XML can greatly alleviate incompatibility between disparate applications, B2B applications can only automate business processes if there is an ability to describe collaborative workflows across organizations as well as providing data interoperability. This paper describes a system which can use XML document standards with an associated workflow engine for integrating business processes as well as applications and data via XML.*

## **What is an e-business strategy?**

The Internet economy is driving companies worldwide to come up with an effective e-business strategy. They are trying to answer questions such as: **What does it mean to be an Internet company?**, **How can we leverage the Internet in our business?**, and **What opportunities does the Internet offer to improve our unique business model?**

In an attempt to take advantage of the Internet, most companies make a headlong rush to put up a web-front end application to handle customers. This could mean opening up a web store-front, putting marketing materials and pricing information on the web, or providing technical support over the Internet. While this can grow revenue incrementally by selling direct to end users and eliminating channel middlemen, or by opening up a global channel with little effort, this is a very limited view of what an e-business strategy can offer.

Another simplified view of an e-business strategy involves migrating business communications to the Internet, taking advantage of the reduced costs of communication. Where companies once sent business documents via fax, mail, or over EDI value-added network, they can now send documents cheaply and efficiently electronically over the Internet. It's now commonplace to receive a purchase order or invoice via email as companies look to lower business costs by moving EDI transmission to the Internet.

An effective e-business strategy should not be limited to presenting a corporate web-front-end to the world, or as a lower-cost communication mechanism. An effective e-business strategy will consider a company's business processes and how they can be improved and automated by the instant and global communication mechanism the Internet offers.

The most common business process that companies first automate is their procurement process. There has been a great deal of enthusiasm in the trade press and on Wall St. around B2B (business-to-business) procurement portals, designed to ease the way in which companies purchase materials. This can lead to faster, more efficient markets and reduced material costs, but it still does not address automation of the procurement process, which can lead to dramatically more efficient operations. By themselves, B2B portals

do nothing to determine **when** materials should be ordered to optimize inventory and delivery, or how an entire supply-chain can be coordinated and optimized for maximum efficiency.

True process improvements can only be achieved through automation, which implies the integration of business applications and data with the Internet and with the systems of the company's trading partners. True end-to-end process integration can offer more efficiency in virtually any business process ranging from procurement, to logistics coordination, to customer service, to development and engineering processes, and virtually any other aspect of business dialog between two entities. Improved efficiency in these core business processes leads to faster cycle times, reduced overhead, more competitive offerings, and increased visibility into business drivers. Companies that can implement this e-business vision are saving tens of millions of dollars per year that directly contributes to the bottom-line results of the corporation.

Unfortunately, very few companies have made any attempt at integrating a meaningful business application with their Internet front-end. According to analysts at META Group, this includes some of the leaders in e-commerce such as Dell and Amazon.com. When web orders are received, there is often no automated connection from the web front-end to the order entry system. Orders are re-keyed manually into the order entry system. Additionally, there is no integration between the order entry system and the material planning system so that an effective procurement process can be automated based on incoming orders.

The notion of shorter cycle times can be directly translated into bottom-line revenue for nearly all companies. The time it takes to plan, order, build, inventory, deliver, and invoice a particular product causes incremental costs as the cycle lengthens. Effective supply-chain process management can optimize this cycle, measurably reduce inventories and help build exactly the products that the market demands at any given time. Wherever there are manual tasks in the product cycle, there is opportunity for overhead costs, delays, and errors, all of which can contribute to longer cycle times.

Automating the supply chain process is therefore one of the primary areas advanced e-business companies are looking to apply process automation. This implies integrating business applications which manage pipeline and manufacturing processes. The first step in effective process integration may be to integrate disparate business applications internally and optimize operations within the enterprise before linking processes with trading partners (suppliers and distribution channels).

When business process integration is ultimately achieved across an entire supply chain, or between a manufacturer and its distribution channels, the financial return dwarfs the gains realized by setting up a disjoint web front-end. The difference between the two approaches can mean taking a leadership position in the industry due to significant competitive advantage.

Take, for example, the two cases of K-Mart and Wal-Mart. Both made the decision to adopt EDI for their business communication early on, but only one made the additional effort to align their business applications and processes around the electronic information being exchanged. The net result is that one company grew by every measure of success to have a market capitalization of over ten times the other. Internet-oriented communication and process integration provide even greater opportunity which companies must now decide how to leverage. Only when enterprise business applications and processes are aligned with web applications can a company truly consider itself to have a competitive e-business strategy.

## **Challenges to implementing an e-business strategy**

Unfortunately, there are numerous challenges to implementing an effective e-business strategy. Many are largely technical. A vast majority are not. Some of the challenges that companies must overcome to become e-business leaders are:

- Lack of in-house skills to implement e-business solutions

Limited trust in trading partner relationships

Poor understanding of existing processes or inability to articulate and automate them

Cultural obstacles, such as internal organization, lethargy and indecision

Antiquated business systems that integrate poorly and are expensive to extend

Eventually, external factors drive companies to overcome the non-technical problems. Events such as a competitor taking a leadership position as a result of their e-business strategy, or a major trading partner dictating that a continued relationship hinges on conducting e-business. Fortunately, once there is sufficient motivation, whether proactive or reactive, and once the business processes are understood to a level that they can be addressed, the technical challenges are often the easiest to overcome.

The first technical challenge that an e-business solution must address to support end-to-end process integration is the heterogeneity of diverse systems across a trading community. There are countless business applications, data formats, and points of integration that increase process integration complexity exponentially.

The next technical challenge is the connectivity between businesses, or the communication and messaging infrastructure that has to be designed for a mission-critical environment, scalable to large numbers of transactions and trading partners, and robust enough to integrate with the core business applications.

The final major technical challenge is representing, implementing and tracking the automated workflows and processes that are established between the trading partners. There may be hard to quantify business intelligence that drives some of these processes. There may be specific processes unique to individual trading partners that have to be accommodated. There is almost certainly going to be a wide range of process steps that have to be understood and represented, not only within an organization, but communicated to trading partners as companies “open up” their processes to enable effective communication and service delivery.

An effective e-business solution must address these fundamental technical challenges of interoperability, communication and process management while delivering a secure, scalable and reliable solution suitable for running a company’s most critical core business processes.

## **The current state of e-business communication**

E-business is not something new. Since the early advent of EDI in the late 1960s, companies have been moving business information and documents electronically. Today EDI still accounts for a bulk of B2B transactions and has proven itself very reliable and capable for specific processes in a range of vertical industries, including transportation, grocery and retail, to name a few.

The comparatively high costs of EDI, including ongoing networking charges, and high deployment costs have led many businesses to turn to an Internet EDI strategy in order to take advantage of a more cost-effective network. The Internet has also proliferated the use of e-mail, which is also used as an effective means of business communication.

The problem with EDI and email is that they do very little to improve and automate business processes to effect real business change. While EDI is able to automate many fundamental business transactions such as a purchase order, or an invoice, the technology is very message centric, as opposed to understanding a more complicated business “dialog” or process flow.

To add intelligence and automation to the business process, companies began deploying ERP applications that could handle customer information, material planning forecasts, pricing information, and so on. These systems could now automatically initialize a procurement process and rely on the EDI system for the message exchange.

Unfortunately, the net result in large corporations was a number of poorly integrated stove-piped business applications that severely limited the ability to improve processes enterprise-wide, or across departments. There still had to be manual processes in place to move information from manufacturing to accounting, for example. The hope of aligning and integrating business systems between companies was seemingly an overwhelming task.

The need for internal process improvements and the integration of ERP systems gave rise to EAI (Enterprise Application Integration) solutions. These products provide an internal messaging system that connects applications together so they can share information. The messages are often automatically generated by defined process workflows or event conditions.

From the early successes of internal application integration and the business drivers of the Internet economy to companies to more tightly integrate their processes, the next wave of business communication centers around cross-enterprise application integration, collaborative workflows, and sophisticated business process dialogs. Unfortunately many of the earlier successful technologies have been found to be lacking across company boundaries. Whereas one company can decide to adopt a proprietary messaging technology to integrate its applications internally, it is unreasonable to expect many, if any, trading partners to commit to identical messaging solutions, and certainly not if integrating with multiple partners means adopting multiple infrastructures.

### **XML to the rescue**

By the late 1990s, the XML (eXtensible Markup Language) emerged to uniquely address, for the first time, many of these cross-enterprise application integration issues. XML was designed to be an application-independent way of representing organized or structured data. It has now been nearly universally adopted as a common, intermediate representation language for sending data, application information, or structured documents like EDI messages over the Internet.

XML promises to revolutionize Internet applications much the same way that Java did in the mid-1990s. Whereas Java is a way of making applications platform independent, which was a boon to deploying distributed web applications, XML gives users a way of representing their data in an application-independent way, promising to unite business users with increasingly sophisticated information no matter what environment they happen to be using.

XML and Java are even more ideally suited as complementary technologies than is apparent at first glance. Both are object-oriented, making it very easy to write component-based software that can operate on XML data objects, essentially automating the handling of information sent in XML. Both are very flexible in that they can be extended to suit virtually any environment, any application, and easily integrate with any external system. More and more, XML developers are taking advantage of the flexibility of XML to communicate more than just business data, such as describing workflows, process state information, and collaborative business processes. Sharing this level of information between companies was not possible with earlier technologies like EDI or EAI.

## The emerging standards for XML business to business communication

While XML is the ideal conduit for sharing business and workflow information, it is still a language in which a business vocabulary needs to be defined between trading partners. For XML messages to be interpreted by other companies, both partners need to agree on a common XML-based B2B standard, which will define the document formats, allowable information, and process descriptions. There are a few such standards that are specific to vertical industries or other like-minded groups.

Adherence to a common standard is not always necessary, but it can increase the number of trading partners a company can easily integrate with and it may help define the base process definitions that will be created between the companies. A sampling of the important XML protocols or standards are described below:

**RosettaNet** (<http://www.rosettanet.org>) – A B2B, process-oriented standard that arose in the IT (information technology) and EC (electronic component) industries to manage supply-chain and distribution issues. RosettaNet defines high-level business processes such as a new product introduction or inventory management, and breaks them up into specific process flows called PIP (Partner Interface Processes), which are exchanged and managed between the trading partners. Compared with other XML standards, the RosettaNet community has done an excellent job of creating a complete standard by defining standard processes and an implementation framework in which transactions are exchanged. Other industries beyond the initial two may well look to RosettaNet and either extend its focus or use it as a model for success.

**BizTalk** (<http://www.biztalk.org>) - 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. Instead, it is a community of standards users, with the goal of driving the rapid, consistent adoption of XML to enable electronic commerce and application integration. They are defining the BizTalk Framework™, 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 rich new solutions.

**XML-EDI Group** (<http://www.xmledi.org>) – A combination of XML and EDI called XML/EDI, will provide a complete framework of different technologies to create a format that is usable by applications as well as humans (XML, EDI, Templates, Agents, Repository).

**ebXML** (<http://www.ebxml.org>) - A joint project of the United Nations body for Trade Facilitation and Electronic Business, and OASIS, the Organization for the Advancement of Structured Information Standards to develop a framework for using XML to exchange business data.

## The Netfish solution for e-business process integration

The Netfish XDI™ system is the industry's first B2B integration solution that automates complex business processes, such as materials planning and forecasting, resulting in more efficient operations and greatly reduced operating costs. Netfish XDI is the only solution that truly delivers on the fundamental pieces of a viable XML-based B2B integration server:

- A robust, secure, scalable communication and B2B messaging system

- An extensible process management and workflow engine

- A set of flexible adapters to integrate with a wide range of business applications and data

- Process modeling and analysis tools to optimize B2B processes

## Trading partner management tools to quickly integrate with new partners

Netfish customers, such as Cisco Systems, Sun Microsystems, Logitech and the Government's GSA (General Services Administration) are able to save millions of dollars per year by automating procurement, distribution, logistics, and catalog operations with their business partners. To fully automate and improve these business processes, Netfish provides a seamless solution for integrating business applications and data between companies over the Internet. The Netfish XDI system combines a complete set of application adapters, a robust XML messaging and communication infrastructure, and a powerful workflow and process management engine to create collaborative workflows between organizations and automate cross-enterprise business transactions.

Netfish, however, does not lock users into a particular B2B communication model. Netfish XDI is designed to be a company's all-in-one B2B solution, enabling process integration with both XML-capable partners, as well as EDI-oriented partners. The XDI system creates a single hub within an organization for all types of transactions and workflows. Other solutions require an all-or-nothing approach to XML or other process integration model, limiting trading partner integration.

The Netfish XDI system supports all major B2B industry standards, such as RosettaNet, the BizTalk Framework, cXML (commerce XML) , CommerceNet's eCo and major EDI standards in XML, so it can communicate with any other open B2B XML solution. Common or proprietary software is never needed at both ends.

The Netfish system includes the XDI Server, XDI Client and the XDI Developer suite. The XDI Server orchestrates business processes with a multitude of suppliers running the lightweight XDI Client or other B2B/EDI software. Electronic documents are routed to each trading partner's site for approval, notification, or to update business data in the partner's business system. The Netfish XDI Developer suite converts business documents and data into XML for transacting with business partners.

The Netfish system is a 100% Java application, designed for extensibility, scalability, fault-tolerance and mission-critical failover in a high-volume B2B transaction environment. These benefits translate into a more tightly integrated and automated value-chain, dramatically improving efficiency and reducing operating costs in vital business functions.

### **Case study: process improvements for strategic procurement**

**The following case study is a hypothetical, but representative example of how a company can more tightly integrate its business processes and applications with those of its suppliers and extended trading community to deliver competitive advantage and bottom-line benefits to the corporation.**

ACME, Inc. produces high-speed networking add-in cards for desktop workstations and servers. Due to the large number of distributors, OEMs and international resellers, their production schedules can vary widely month to month. Two years ago they moved their manufacturing data and production schedules to an ERP system. They now have rapid access to inventory levels, production schedules, and product bills of material. Initially they had problems integrating their manufacturing data with their order entry system which had to be converted from an existing sales database, but they have since integrated the applications through adapters provided by an EAI vendor and a message broker that coordinates data between the two systems.

When incoming orders signify a production ramp in order to meet demand, ACME has to go through an extensive procurement process to bring in the components required for assembly of its product. Material

forecast reports are printed off by purchasing agents, who check prices with authorized vendors. Purchase orders for the required amount of each component are issued via email based on web forms set up by ACME and accessible over the web by its suppliers. For a manufacturing run of 10,000 boards, the material costs can vary from \$650,000 to \$715,000.

ACME is looking to improve its procurement process with its vendors and automate nearly all of the labor-intensive aspects of its business communication. They are hoping to eliminate the need to rekey inventory information into web forms and are looking for a way to shorten turn-around times by automating their supplier's ability to process purchase orders and allow them to provide more immediate access to delivery schedules and cost information. Because ACME purchases components from over 1500 suppliers who each have their own inventory and production applications, it has been difficult to coordinate business information across the supply chain and seek the level of process integration desired.

ACME turned to Netfish Technologies to replace the business-to-business communication system based around web-forms with an XML messaging and workflow system. Netfish adapters seamlessly connect to the ACME material planning system and can automatically trigger a workflow process when alerted of incoming sales orders. Part of the process is to determine what quantity of each component needs to be ordered, and to automatically generate quote messages to request latest pricing information.

ACME has provided Netfish XDI Client software to each of its suppliers, so that when they receive requests for quotes, a workflow process immediately extracts the appropriate information from the supplier's price catalog and sends it back to ACME. Netfish application adapters provided to the supplier can integrate the ACME XML messages with the suppliers price catalog so no human processing costs or delays are involved. Pricing information is generally collected and aggregated within a few hours, allowing for purchase orders to be generated within a day. The purchase order process now consists of XML messages being delivered by ACME to mailboxes in the XDI Client at the supplier. Each PO is automatically extracted, compared with earlier pricing information provided to ACME, and verified for consistency. An acknowledgement is sent to ACME within a few seconds and an advance ship notice is generated while the suppliers' inventory system is decremented in anticipation of delivery. Turning around the whole PO by the supplier takes minutes rather than days, and now has become a lights-out operation, even handling orders on weekends and holidays, providing optimal service to ACME.

The cost of generating a purchase order by ACME has gone down from roughly \$5 via a web form, to under \$.10 via an automated XML message. The turn around times for the procurement process has dropped from typically 10 days to less than a day, improving accuracy of forecasts and days cash outstanding. With shorter cycle times, less safety stock is required and consequently there is less scrap material at the end of each quarter. ACME is also getting better prices from its suppliers by helping to automate their operations, including better terms on invoicing, while ensuring the COGS are the lowest possible. The resulting implementation saves ACME over \$8 million a year in production and material costs.

The key to the ACME installation is coordinating business processes with its supply chain, by integrating the Netfish XML Server's messaging and communication infrastructure with its own internal material planning systems. This automates the quote and procurement process by moving the data between companies and applications in XML, avoiding rekeying information, and automating the processing of the messages through customized workflow procedures set up at ACME and all of its suppliers.

## **Conclusion**

Companies seeking to improve efficiency and profitability will increasingly use business-to-business integration to work more closely with trading partners. The widespread adoption of XML as a common data language is giving B2B integration the critical mass it needs for rapid growth. B2B standards built on XML will accelerate this adoption and tightly integrate companies within specific vertical industries and around common well-defined business processes.

Netfish recognizes this next generation in business-to-business process integration and has built a single system designed for all of a company's B2B process integration and communication needs. It is a single system that includes the messaging communication infrastructure, the business data integration components, as well as the workflow and process management element.

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**Robert Skinstad** — Co-founder of Itec, a company focusing on B2B solutions with new technology such as EJB and XML. Responsible for e-commerce solutions within Enator (now TietoEnator) the 6:th largest solution provider in Europe. Helped companies to take new technology into a business value. Developed training for managers and worked as a mentor for managers.