

What's XML got to do with it?

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The eXtensible Markup Language (XML) is...

...an open and flexible standard for storing and exchanging information between enterprise applications and between businesses.

Applications have always been able to store situation-specific data in file artifacts, to be substituted and called upon for action as the user or the process demands. Over many years and significant improvements in compression, computing languages and application functionality vendors have implemented ever-more complex formats.

The lack of interoperability between file formats has been the bane of enterprises since the advent of the second application ever written. The problem is one of context, not just getting the data elements correct. For example, a customer record in a typical file or relational database record might look like this:

Figure 1 - Typical non-XML customer file with no context.

```
John,Robert,101 W. McDermott Dr,Allen,Texas,75013,2145478020,9727270894
```

Separated from the data logic, this file only contains 71 characters, but we can easily confuse first name with last name, city with streets, telephone with fax numbers. Efficiency in the past was more important than interoperability.

XML changes everything. With XML, the context or meaning of the data is stored along with the data. Sure it takes more characters to say the same thing, but the receiving application no longer can be confused about which is the telephone number and which is the fax number.

Figure 2 - Typical XML customer file with context included.

```
<Customer_record>
  <name>
    <name_first>John</name_first>
    <name_last>Robert</name_last>
  </name>
  <address>
    <street_address>101 W. McDermott Dr</street_address>
    <city>Allen</city>
    <state>Texas</state>
    <zip>75013</zip>
  </address>
  <telephone>
    <business>2145478020</business>
    <fax>9727270894</fax>
  </telephone>
</Customer_record>
```

Just by looking at this file, you can easily see that XML is considerably more verbose than our no-context example in figure 1. The file grew to 307 characters, a 450% increase. This may seem outrageous when compared to the industry priorities of two decades ago, but in today's information economy, processing power, compression technologies and bandwidth are all plentiful, inexpensive and high performance. The expensive resource is now human resources. Today, the increase in automatic interoperability is worth more than message efficiency.

So, using XML makes it clear which data element is the last name, which is the first name and so on. Any application can correctly and repeatably interpret the data and the meaning or context of the data in an XML-compliant file.

This feature is a significant advantage for XML.

So, why does XML matter?

People like XML. XML has gained considerable industry momentum in four years:

- XML leverages well-understood standards which have been around since the mid 1980s and has been a W3C Recommendation since 1998.
- Virtually every applications software vendor in every software industry category have committed to XML interfaces for their products.
- Major software developers - IBM and Microsoft for example - have developed new frameworks, tools, protocols and development environments that exploit XML features to accelerate the construction of new XML-based applications.
- Software components such as XML parsers and XML style sheet transformers are readily available under public licenses.
- There are over sixty industry working groups that bring technology professionals from competitors together with vendors to study and define industry-specific message conversions from EDI to XML, new messages and the higher order issue of business process.
- People can read XML even though there are tools that simplify its presentation.
- XML itself has become a cornerstone of even newer standards such as Web Services.

At the root of this momentum is the compelling need for people and their supporting applications to work together - sharing the same information or the same process.

XML improves interoperability in tightly-integrated systems. Each of the applications within an enterprise can be considered to be nodes in a tightly-coupled system - financial, ERP and sales force automation applications for example are interdependent units that need to rely on common data for prices, costs, customers, orders, inventory, product codes, deadlines and so on. What makes them tightly-coupled is the simplicity of point-to-point implementation, common ownership, the shared goals of the organization and the shared private network connecting the applications to their enterprise users. For example, the source of a message is considered a known and trusted entity. Issues of security and performance are well within the control domain of the information technology department.

Historically there have only been a few ways to make two applications interwork. One way was to purchase Enterprise Applications Integration software and have systems integration professionals link the two at the data level, at the message level or at the user interface level. This approach has been available only to the largest corporations with substantial budgets. Small or mid-sized companies could not afford this solution.

An alternative method is to purchase a comprehensive enterprise suite. Oracle and SAP for example, offer functionality across a range of application categories - finance, sales, human resources etc - with common support and implied product interworking in much the same way that Microsoft created and marketed an integrated suite of desktop applications as Microsoft Office.

Neither of these methods received particularly broad market acceptance. EAI implementations are expensive - typically costing millions of dollars. On the other hand, the enterprise suite involves huge political capital convincing one department to accept less-than-market-leading capability for the sake of the entire implementation.

XML offers a better alternative through the exchange of both data and data context, but it depends on applications having XML interfaces. Simple message interactions ought to be easily leveraged for an integration solution when both applications can exchange a common XML message format. To exploit this discontinuity, startup companies with new categories of integration appliances are emerging that perform static routing of documents or transform documents from one XML dialect or popular structured data format to another. These devices will be useful in simple, small-scale integration initiatives. As well, this is the target for Microsoft's Biztalk server - using XML to create mid-market integration solutions.

XML accelerates interoperability in loosely-connected networks. Trading networks are loosely-connected networks with nodes that lack the intimacy found in tightly-integrated networks. Trading networks, such as those formed between suppliers and customers are loosely-coupled. They share common processes (business processes such as the purchasing process) and have synergistic business objectives but are not necessarily point-to-point, do not share ownership, information technology policies or management priorities.

Furthermore, unlike enterprise application environments, trading networks can involve hundreds or thousands of participant application nodes that require a broad range of services in order to communicate:

Trading networks reduce transaction cost. Studies by VCML.net and others have shown EDI reduces process costs from \$120 to \$1.20 per transaction. Trading networks consistently:

- Eliminate data entry steps
- Reduce errors and
- Accelerate transaction outcomes.

These process improvements reduce costs, improve customer satisfaction and reduce working capital demands of the business.

1. **Routing services** - given a business document, determine the appropriate business partner to receive the object, resolve the partner's identity to a specific address, locate and route the object to that partner;

2. **Transformation services** - given a business document and a partner destination, adapt that business document to a format known to be used by the target partner;

3. **Automation services** - determine the context and process state transition for a business document

that is one step in a larger business process or re-order those documents that are out of the sequence that the application expects; and

4. **Negotiated authority** - unlike an internal IT department or eMarketplace, there is no central authority to specify or demand compliance with formats, frequencies, priorities or process details. Most trading networks need to negotiate their interactions and the meaning of their messages.

Today, most trading networks are based on Electronic Data Interchange (EDI) messages and practices - technologies that were first developed more than twenty years ago. EDI offers a well-understood model of standardized message formats with high reliability and security, but EDI comes with a price: mapping messages between applications can cost up to \$300,000 per partner and take as long as nine months to implement. For that reason, users have typically reserved EDI for only their tier 1 trading partners.

XML is *more* than just for applications...

What if the Internet were made up of inexpensive, high performance network devices that could route documents in their native XML instead of in IP? Some of the services required for

trading networks are provided today by application software or middleware. This is parallel to a time, 15-years ago when IP routing functionality was available only as UNIX workstation services. Two Stanford professors developed specialized routers that abstracted the routing functionality into a specialized device to form Cisco Systems. These specialized devices enabled the construction of scalable and adaptive networks including the Internet, a feat that could not be achieved by general purpose workstations.

Similarly, there are many indications that an entirely new breed of appliance is emerging that can emulate the deployment ease and flexibility of IP routers but are designed for business-to-business interactions that require XML services. These new products will route XML documents, transform XML documents between various XML dialects, be the XML proxy or Web Services gateway for non-XML equipped applications and otherwise abstract business process logic from applications to the network.

Being state-fully aware of inter-business process makes this new category of product an important step forward for eBusinesses. Taking advantage of the context-sensitivity of XML opens a new door for managing seemingly unmanageable problems of scale, control and flexibility in inter-business interactions.

As well, borrowing a distributed peer-to-peer network approach from the Internet means that these new products can create highly resilient, low cost and rapid deployments - something that traditional approaches to trading networks and inter-business process management do not allow. Reuse, sharing and just-in-time are three design principles that these new categories of products will create.

With these features, solutions for pressing inter-business issues can be created:

- Expanding a trading network to include tier 2 and 3 suppliers - reduces transaction processing costs, reduces errors and improves business velocity
- Being easily added to customers trading networks as a tier 2 or tier 3 supplier - reduces cost, reduces errors and improves business velocity
- The migration to XML of trading networks, at a timetable independent of the back office applications' XML capabilities improves flexibility and resiliency, creating capabilities for new customer or partner services
- As a concentrating platform for an EAI implementation capable of supporting the timetable and formats of customers doing EDI with the corporation today
- Web Services-enabling EDI feed from customers

... and many more.

Abstracting business logic to the network gives many more enterprises the opportunity to solve inter-business problems that have been largely ignored up to now because these were not central features of the applications that contained the core business logic. Standards-based special-purpose platforms derived from XML technologies will diffuse more rapidly throughout industry than enterprise applications software can evolve to support the kind of scale, diversity and ambiguity that networking technologies have addressed so well in the past. For these reasons, network appliances will be able to specially exploit the advantages of XML.

Networks can enable powerful services leveraging information in XML form. Although EDI is widely utilized (Giga estimates that 88% of the Fortune 500 use EDI for their tier 1 partners), expanding the benefits of trading networks to tier 2 and tier 3 partners can only be fully realized with significant improvement in agility, flexibility and scalability for these reasons:

1. **The numbers of permutation defy control.** There is a myriad of formats, methodologies and release versions that partners use to produce and process documents. Although there are efforts to standardize formats around XML in at least sixty different industry working groups, at least one of them has undergone seven revisions in the past two years and since

users will not migrate to the new standard all at once, the number of permutations possible will consistently overwhelm IT departments that try to control them. In addition, manual maintenance of the correlation between growing list of partners and the formats used by them for various business documents will be a major source of administration error and concern for IT departments, particularly as trading networks scale.

2. **Routing outside the firm poses special problems.** Within the confines of an intranet, the routing between applications can be controlled, engineered and managed. In the public domain, however, there are several complexities that need resolution. For example, there is a need to dynamically discover partners from among a very large number of businesses and be able to route objects to them. The network will locate the partner and resolve their name to a routable address using databases maintained by different service providers and industry consortia. More sophisticated network intelligence is required to perform such routing chores than those typically available inside conventional intranets.
3. **Each business, each process is unique.** While there are several models and templates to describe the most commonly used business processes, each business has its own idiosyncratic way that they execute their process, both within the company and with their partners. In many cases, businesses execute the same business process differently with different partners.

XML accelerates the benefits of trading networks

Trading networks are largely responsible for a number of important business benefits, particularly:

- **Reducing the cost of doing business.** Most companies organize their supply chain into three distinct tiers, sorted by number of transactions from the largest to the smallest - tier 1 partners typically represents 60% of transactions by number of transactions (and usually about that number by dollar volume too). Tier 2 partners often address the next 20% of transaction and are more numerous than tier 1 partners. Tier 3 partners are all other partners. As shown in the inset box above, totally manual transaction systems, for any sizable firm in healthcare, manufacturing or high technology industries cost \$120 per transaction. If tier 1 partners participate in a trading network, the average cost per transaction, across the company falls to \$48. And by extending the interaction base to tier 1 and tier 2 partners, average cost falls to \$17 - an 86% reduction. As well, automated interactions reduce errors and the time and expense of correcting them.
- **Accelerate business velocity.** Engaging partners with orders, confirmations, advanced notices and invoices that travel at the speed of light is an important step in eliminating the process latency typically found in manual partner interactions. Faster interactions facilitate faster business outcomes - sales, revenue, inventory turns and so on.
- **Enhance customer satisfaction and loyalty.** Although standard interactions are the industry ideal, there are advantages in going beyond the EDI-defined message sets or the process definitions of RosettaNet to deliver 'sticky' services to partners. Popular innovations by web leaders like eBay can be easily emulated as instant bidding services with your suppliers. "I have this need. How badly do you want this business?" for example. Or the popular Fedex.com service where customers input their shipment identifiers to track the status of their shipment. These advances in convenience lead to lower prices for supplied products and higher levels of customer satisfaction and loyalty.

XML plays an important role as a catalyst for moving business logic into the network. It is clear that the next frontier for competitive advantage will come from those firms capable of leveraging the resources of their partners, customers and suppliers. This area is a high priority

for CIOs because the best opportunities for cost reduction, improved business velocity and customer loyalty now lie where the customers, partners and suppliers are.

About the author.

Peter Brockmann is the President and co-founder of A4 Networks Corporation. He has 16 years experience in process engineering, marketing and executive management in the automotive, telecom and communications equipment industries. Brockmann has a Bachelor of Engineering Science from the University of Western Ontario and a Masters in Business Administration from McMaster University. A4 Networks Corporation specializes in inter-business process automation.

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