



Appendix E: Case Studies

Table of Contents

1.1	OVERVIEW	2
1.2	XML VOCABULARY EFFORTS	3
1.2.1	Overview.....	3
1.2.1	Case Study: <i>Chemical eStandards</i>	3
1.2.2	Case Study: <i>Interactive Financial eXchange (IFX)</i>	6
1.2.3	Case Study: <i>CatXML</i>	9
1.3	XML EDUCATION INITIATIVES	11
1.3.1	Overview.....	11
1.3.2	Case Study: <i>Schools Interoperability Framework (SIF)</i>	11
1.3.3	Case Study: <i>IMS Global Learning Consortium</i>	13
1.4	B2B DISTRIBUTED TRANSACTIONS	16
1.4.1	Overview.....	16
1.4.2	Case Study: <i>Visa International</i>	16
1.4.3	Case Study: <i>Korala Associate Limited and Fujitsu</i>	18
1.5	B2C PORTAL INTEGRATION.....	21
1.5.1	Overview.....	21
1.5.2	Case Study: <i>Vizzavi (Vodaphone)</i>	22
1.6	B2B MARKETPLACE/EXCHANGE	24
1.6.1	Overview.....	24
1.6.2	Case Study: <i>ChemConnect</i>	25
1.6.3	Case Study: <i>Covisint Inc</i>	27
1.7	INTERNAL APPLICATION TO APPLICATION - EAI	30
1.7.1	Overview.....	30
1.7.2	Case study: <i>EnergyAustralia</i>	31
1.8	INTERNAL DATA QUALITY	33
1.8.1	Overview.....	33
1.8.2	Case study: <i>Osaka Securities Exchange Company Limited</i>	33
1.9	GOVERNMENT - G2B ENTERPRISE INITIATIVES:	35
1.9.1	Overview.....	35
1.9.2	Case study: <i>IRS.gov</i>	35
1.9.3	Case study: <i>Department of Navy</i>	38



Case Studies

1.1 Overview

These case studies are intended as a reference for FSA to see how other companies and government agencies are currently leveraging XML to improve business processes. Where applicable, FSA may follow these examples to establish its XML strategy and technical architecture.

The Case Studies Section provide industry proven practices for XML usage in the following areas:

- XML Vocabulary Efforts
- XML Education Initiatives
- B2B Distributed Transactions
- B2C Portal Integration
- B2B Marketplace/Exchange
- Internal Data Quality
- G2B Enterprise Initiatives



1.2 XML Vocabulary Efforts

1.2.1 Overview

In the context of B2B system integration, all business partners must agree on the information models that define the language for task-oriented communication. The information models include the data structure for XML documents that are exchanged, as well as the process models that are required to complete complex business transactions. An XML vocabulary is comprised of exactly that, an agreed upon XML element set and corresponding data models (schemas, DTDs, etc.). XML vocabularies are traditionally created for:

- A specific problem domain (chemical markup, financial services, catalogue XML)
- Business or technical domain for a vertical market or industry
- A specific set of users
- A defined set of functions and requirements

These vocabularies lay the groundwork for incorporating XML across an enterprise. They establish the standards for business integration for trading partners, which allow the companies to communicate and exchange data, yet must offer the flexibility for gradual implementation.

Governance models play an important role in ensuring proper management of XML vocabularies, particularly when elements and schemas will be used across various business partners or members of a B2B marketplace or exchange. Management of the specification methodology (i.e., element tag syntax, schema design) should be designated to a specific governing working group.

There are hundreds of publicly available XML vocabularies across industries, businesses and research groups. Because of this availability and flexibility, many companies choose to adopt, modify, or merge existing vocabularies for their own use. The following case studies outline the methodology behind creating XML vocabularies for the Chemical eStandards, Interactive Financial eXchange (IFX), and CatXML.

1.2.1 Case Study: Chemical eStandards

Summary Points

- Chemical Industry - business-to-business data exchange
- Existing marketplace was hampered by multiple, proprietary connections
- XML-based Chem e-Standards are free, open message specifications
- Standard message format has jump-started expansion of the marketplace

Background



In a collaborative effort to address the lack of accepted standards in the chemical e-marketplaces, BASF, Dow, and DuPont worked together to jumpstart the development of open eStandards for business-to-business data exchange in the chemical industry. Without a standard approach to these connections, multiple solutions were created, resulting in inefficiencies in electronic marketplace for both the supplier and customer. The group asked Accenture to help define and publish the Chem eStandards, a set of free, open transaction messages based on the XML e-commerce communication standard.

Chem eStandards serve as a method of supporting new and evolving business-to-business, business-to-marketplace, and marketplace-to-marketplace electronic commerce activities. They are necessary for the chemical industry to maximize the efficiencies and effectiveness of the emerging e-marketplaces, reduce transactional costs, and take advantage of potential e-business gains. For example, by not having to support multiple interface standards, e-marketplace participants will be able to minimize transactional costs.

The effort's intent was to proactively define global data interchange standards by leveraging the work in other industries using XML. By delivering open, non-proprietary standards with unrestricted access and no licensing fee, the chemical industry will benefit in adopting these e-standards as it will reduce the cost of implementation and enable e-business gains to be more fully realized

After the Chem eStandards were created, it was important to find an organization that would assume responsibility for ongoing maintenance and support in a single organized location. These standards are now supported by the Chemical Industry Data Exchange (CIDX). The initial 47 messages CIDX published were intended to substantially reduce the number of unique data mappings required between systems, but the greatest benefits lie in their adoption and usage across the chemical industry.

Governance Structure

The CIDX Board of Directors is responsible for the strategic direction, governance, approval and oversight of the annual business plan and operating budget, and other duties as necessary to carry on the work and protect the property of CIDX. The Operating Management Team, which answers to the board of directors, consists of five elected, appointed or volunteered representatives of the CIDX membership. Under the direction of the Executive Director, the OMT is responsible for leading and managing CIDX operations under the five core management areas. These CIDX management divisions consist of working teams comprised of CIDX members. The overall governance structure appears below:



Board of Directors				
Operating Management Team				
<i>Industry Needs Driven</i>	<i>Guidelines and Standards</i>	<i>Adoption and Implementation</i>	<i>Convergence and Architecture</i>	<i>Operations</i>
Global Coordination Team	Collaborative Planning, Replenishment & Forecasting	Implementation Support	Convergence & Architecture Committee	Secretariat Services
European Outreach Team	Business Process Group Liaison Project Team	ERP Mapping Team	Trading Industries Team	Systems Support
Latin America Outreach Team	Orders-to-Cash Business Process Project Team	Vendor Participation Team	CIDX Standards Development	Meeting Planning
Connectivity Metrics Project Team	Guidelines & Standards Enhancements & Maintenance		Product Classification Team	Communications
	Repository Management			

Specification Methodology

This Chemical Industry eStandard identifies what XML data will be exchanged for a specific set of business transactions that may be implemented within a marketplace. The overall goal of the eStandards initiative was to:

- Closely align itself to approaches taken by other XML standards across vertical industries
- Ease the use of reading and using the eStandard
- Better leverage XML capabilities and syntax
- Organize the data in a logical manor

In order to achieve these goals, the eStandard initiative used RosettaNet as its basis for data structure and message elements definitions. RosettaNet is a consortium of major Information Technology, Electronic Components, Semiconductor Manufacturing and telecommunications companies working to create and implement industry-wide, open e-business process standards, specifically in the area of supply chain integration. Use of a common header and a body message structure was chosen according to the RosettaNet format enveloping structure. For element definitions, the initiative chose to adopt RosettaNet element names and data structures where there was a match between a RosettaNet message and the eStandard.



XML Syntax

Elements

When new element names were required, the group followed the following RosettaNet naming convention:

- Creating element names comprised of one to several words
- Using letters only; no underscores, hyphens or other non-letter characters
- Using singular tense
- Avoiding abbreviations and acronyms
- Not using numbers in names (e.g., AddressLine1, AddressLine2, etc.)
- Where possible elements are specified to have values based on industry standard code sources (ex. ISO 8601 or ANSI ASC X12 335).

One very important feature of the eStandard initiative was to ensure that all message elements are part of a common data dictionary with eStandard level scope. There are no elements that are private to a particular message.

Attributes

The group also decided that most message elements should not have attributes, preferring instead to define attribute information as element information. Elements should be used where the data being delivered is “persistent”. They found that attributes should only be used where they are considered to modify an element, such as the Version tag for the overall message, or Type for TelephoneNumber (which may be work number, mobile, etc.). The few attributes, that were actually created, were to follow the same naming convention as the elements.

1.2.2 Case Study: Interactive Financial eXchange (IFX)

Summary Points

- Financial Services Industry - business-to-consumer data services
- IFX represents a consolidation of the OFX and Gold specifications
- Consolidation will naturally happen as standards mature
- Business use-case centered modeling of messages is key

Background

The Interactive Financial eXchange (IFX) Specification provides a robust and scalable framework for the exchange of financial data and instructions. The IFX Specification has been developed as a cooperative industry effort among major Financial Institutions, Service Providers, and information technology vendors to these institutions and their customers in the small business and consumer markets. This specification builds on previous industry



experience, including the OFX and Gold specifications that are currently implemented by major Financial Institutions and Service Providers to enable the electronic exchange of financial data between them and their customers. The IFX standards are currently widely used in consumer financial services such as download of account statements and bill presentment and payment.

The Interactive Financial eXchange (IFX) is a mature, well-designed XML-based, financial messaging protocol, built by financial industry and technology leaders incorporating decades of combined experience and best of breed design principles. The specifications cover both the formats of business messages as well as message transport.

The goal for IFX is two fold:

- To use real business use cases and develop content that is meaningful and useful to the financial services industry.
- To create a strong, flexible, open architecture that will support extending the protocol in an efficient, interoperable manner.

Governance Structure

The IFX Forum is comprised of a Steering Committee, an Architecture Committee and Work groups. The Steering Committee acts as the executive body of the IFX Forum Board of Directors. It provides the leadership, structure and process for the development, promotion, use and adoption of the IFX business requirements and message specifications. The Architecture Committee seeks to ensure the development of a family of IFX specifications that are consistent, extensible, easy to implement and efficient in their implementation and operation. It works to ensure consistency in the interactive financial work between and among various industries. Participation on the Architecture Committee requires a 25% resource and time commitment by members. IFX Working Groups facilitate development of business requirements around ideas and concepts for integration into the IFX specification. All members in the working groups must be approved by the steering committee, and any concepts created must adhere to the guidelines provided by the architecture committee.

Steering Committee	
<i>Architecture Committee</i>	<i>Working Groups</i>
	Electronic Business Process Work Group
	Business Banking Work Group
	ATM/POS Work Group
	Web Services Work Group

Specification Methodology



Core component Dictionary

In addition to the IFX Framework, the foundation of the IFX Specification includes a set of common objects, or core components, that can be used across multiple types of financial services. This facilitates the implementation of cross service applications.

For example, with a common definition for a "customer" that is used across both Payment and Bill Presentment services, multiple types of applications can leverage off of one standard to utilize that piece of data. A financial institution that wishes to offer multiple services that may be located in different business units can take advantage of the common object definition to unify the disparate systems.

XML Syntax

IFX groups data items into aggregates with several levels of nesting, as opposed to a relational structure with pointers. In addition it allows for the use of multiple data types and constraints: (i.e., minimum and maximum lengths, cardinality, code lists). The IFX specification uses DTDs versus schemas.

Elements

- The key rule of IFX syntax is that each tag is either an element or an aggregate. Data is contained between the element start tag and its respective end tag.
- Empty-element tags are not allowed in the IFX XML implementation.
- This IFX definition differs slightly from the World Wide Web Consortium (W3C) XML definition of element in that an IFX element must contain data, but may *not* contain other elements. A W3C XML element containing other elements is defined in IFX as an *aggregate*.
- An aggregate tag begins a sequence of enclosed elements or inner aggregates, which must end with a matching tag.
- IFX naming conventions are upper camel case.

Attributes

- The IFX Forum uses only elements, and does support attributes. The forum favors this format for data tags over other XML optimizations that use attributes.

Namespaces

- IFX chose to enhance extensibility through XML namespaces – XML namespaces complement the extensibility mechanism defined in the core component specification.

Message Transport

- IFX is protocol neutral. While IFX XML will probably use HTTP in most situations, FTP or SMTP, or any number of queuing systems can be used as message transport protocols as well.



- Likewise, while IFX / HTTP(S) / TCP / IP will probably be the most common stack used for communication of IFX messages, other stacks may be used as well (for example, IFX / MQ / SNA).

1.2.3 Case Study: CatXML

Summary Points

- Government (DOD) Services – standardization of catalog information
- Catalog system (EMALL) consolidates procurement across four branches of the armed forces
- Technology enabling for small businesses with minimal resources
- Use of standards like XML lowers barriers for entry into the marketplace
- Registry and Repository utilized to maximize effectiveness of data sharing

Background

CatXML is a public, open framework developed originally for the US Government Defense Logistics Agency EMALL project, as a means of standardizing online catalogue information. The EMALL project was designed to offer the four branches of the armed forces a single procurement system for common parts and supplies. The DLA EMALL requirements were targeted at creating a framework that enabled small businesses working with the Army, Navy, Air force, and Marines, with minimal business resources, a means of allowing for simplified business integration.

From this single project the concept of a catalogue specific XML vocabulary created the opportunity for broader cross industry implementation. The ultimate goal became creating a standard that would facilitate multiple catalogue management plans, real-time information exchange, end-to-end transaction integration via the Internet, and complete interoperability with back office systems.

Thus far XML Global, the XML Fund, and a selection of commerce partners have deployed a first implementation of CatXML utilizing the GoXML information repository system. The strength of the CatXML design is the ability to support any legacy information structure, while simultaneously providing a dynamic output format. In addition, because the CatXML architecture supports a distributed query information grid model, it avoids performance bottlenecks, allowing small trading partners the ability to expose an open interface to a broad selection of online Internet marketplaces.

The most recent version of CatXML, incorporated emerging XML technologies such as dynamic schema methods, open specifications from ebXML, and catalogue interchange formats from the Open Applications Group (OAG).

Specification Methodology



Core component Dictionary

CatXML uses the established ebXML core component dictionary as its basis for element and aggregate definitions. A core component is a common or “general” building block that basically can be used across several business sectors. It is therefore context free, and is valuable even in a more specific vocabulary such as CatXML

XML Syntax

Because CatXML utilizes the established ebXML vocabulary, its XML syntax follows the same guidelines defined as those described in ebXML.



1.3 XML Education Initiatives

1.3.1 Overview

Several initiatives presently exist that encourage XML usage as a basis for the adoption of distributed learning environments in education. Proper development of these environments ensures that instructional and administrative solutions will work together effectively, while creating environments for students that reach beyond the narrowed scope of learning from texts.

Two example organizations that are working towards establishing these standards include the Schools Interoperability Framework (SIF) and the IMS Global Learning Consortium. SIF is tasked with developing an industry-supported technical XML blueprint for K-12 software that ensures that learning and administrative software applications work together. While SIF concentrates primarily on developing standards in XML, IMS develops and promotes open specifications beyond the narrowed scope of XML standardization. The various IMS specifications contribute to the creation of online distributed learning activities including researching educational content, tracking and reporting learner progress, and exchanging student records and information between disparate systems.

1.3.2 Case Study: Schools Interoperability Framework (SIF)

Summary Points:

- Allows for disparate applications to interact and share data seamlessly.
- Leverages existing participant network infrastructures.
- Uses an established governance/compliance process to ensure proper implementation.

Background:

The Schools Interoperability Framework (SIF) is a non-profit membership organization comprised of software vendors, school districts, state departments of education and other organizations, that are tasked with developing an open specification for ensuring that K-12 instructional and administrative software applications work together more effectively. SIF is essentially an industry-supported technical XML blueprint for K-12 software that allows for disparate applications to interact and share data seamlessly.

Presently schools are facing a challenge in deploying technology because of a lack of interoperability. Applications used by K-12 schools and their districts are disparate closed systems or systems that only allow access through proprietary interfaces and data formats. These issues have contributed to:



- Isolated and inaccessible applications and data
- Redundant data entry
- Increased support costs due to disorganized applications
- Costly and inefficient data reporting

Governance Structure

There are presently 12 working groups contributing to the SIF Framework. Each of these groups is defined within version 1.1 of the Specification and is tasked with defining data elements for a specific data subset, or managing a specific area of the framework. These working groups are listed below:

Framework Management Working Groups

- Compliance Working Group
- Customer Involvement, Requirements, Communications & Accords (CIRCA) Working Group
- Marketing Working Group
- Data Warehouse Working Group
- Infrastructure Working Group

Data Element Definition Working Groups

- Food Services Working Group
- Grade Book Working Group
- Human Resources & Financials Working Group
- Instructional Services Working Group
- Library Automation Working Group
- Instructional Services Working Group
- Student Information Systems Working Group
- Transportation and Geographic Information Working Group

Compliance Working Group - SIF Compliance

SIF Compliance is a formal program used by SIF to verify that software programs adhere to the rules and definitions defined by the SIF Implementation Specification. SIF contracted the Open Group, an international certification organization, to serve as the SIF Certification Authority.

The SIF Compliance Program includes formal testing and validation to ensure that software applications properly implement the SIF specification. A software program that successfully completes the program will be able to display the 'SIF Compliant' logo on its package, website and in promotional literature. The logo is the primary indication that the software program has



been thoroughly tested and certified to properly communicate and share information with other "SIF Compliant" software programs

Implementation

Rather than have each application developer create a separate connection to every other application, SIF has defined a set of rules and definitions to share data within a logical grouping of applications, which is termed an SIF zone. Within an SIF zone, software application agents communicate with each other through a Zone Integration Server (ZIS). Each zone uses a ZIS as its central communication hub, where each application has an Agent that acts as an intermediary between the application and the ZIS. Data is shared between applications through a series of standardized messages, queries and events written in XML and sent via Internet protocols. The ZIS is also responsible for registering all agents, maintaining access control and security, and managing XML message routing. Version 1.1 of the SIF Specification is the first phase in XML tag definition for SIF messages.

Benefits

Use of the SIF Framework offers many benefits that include, among others:

- Streamlined data entry
- Increased data accuracy
- Staff resource refocus to service delivery rather than data input
- Reduction in resource 'down time' (e.g., library closing) which contributes to increased instructional opportunities.
- Improved timeliness of service to students, families and staff
- Immediate flows of information to other agents
- Leveraged Internet and LAN/WAN infrastructure and connectivity
- Choice of authentication methods and encryption strengths
- Reduced maintenance
 - Simplified support of standard interfaces
 - Reduction of redundant data and data entry

1.3.3 Case Study: IMS Global Learning Consortium

Summary Points

- IMS XML meta-data information model promotes interoperability between disparate systems to promote online distributed learning activities.
- Meta-data specification was created by combining the work of several technical consortiums
- IMS Specification work is ongoing. In February of 2003 a digital repository framework was released.



Background

The IMS Global Learning Consortium, Inc. (IMS) develops and promotes open specifications for the creation of online distributed learning activities including researching educational content, tracking and reporting learner progress, and exchanging student records and information between disparate systems. The IMS consortium has two key goals:

- 1) To define the technical specifications for interoperability of applications and services in distributed learning
- 2) To support the incorporation of the IMS specifications into products and services worldwide.

IMS promotes the widespread adoption of specifications that allow distributed learning environments and applications from multiple developers to interoperate. IMS is an international consortium comprised of members from educational, commercial, and government organizations.

IMS Meta-data Specifications

In 1997, The IMS Project, part of the non-profit EDUCAUSE consortium of US institutions of higher education and their vendor partners, began developing specifications for learning content meta-data. Similarly in 1997, groups within the National Institute for Standards and Technology (NIST) and the IEEE Learning Technology Standards Committee (LTSC) began similar projects. Soon after the NIST effort merged with the IMS effort, IMS began collaborating with the ARIADNE Project, a European Project with an active meta-data definition effort.

In 1998, IMS and ARIADNE submitted a joint proposal and specification to IEEE, which formed the basis for the current IEEE Learning Object Meta-data (LOM) base document. IMS endorsed the IEEE document in the US, UK, Europe, Australia, and Singapore during 1999 as the IMS Learning Resource Meta-Data Information Model.

Since the publication of the Information Model two other meta-data specifications have been completed, the *IMS Meta-data Best Practice and Implementation Guide* and the *IMS Learning Resource XML Binding Specification*:

- The *IMS Learning Resource Meta-data Information Model* describes the names, definitions, organization, and constraints of the IMS meta-data elements. These meta-data elements can be used, re-used or referenced during technology-supported learning. Examples of these learning applications include computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, web-based learning systems and collaborative learning environments.



Data Strategy Enterprise-Wide XML Framework XML Framework Strategic Assessment and Enterprise Vision

- The *IMS Meta-data Best Practice and Implementation Guide* identifies a minimum set of IEEE meta-data elements called the “IMS Core” and provides general guidance about how an application may use the “Core” and “Extended” meta-data elements.
- The *IMS Learning Resource XML Binding Specification* provides a sample XML representation and document type declaration (DTD) of a conforming meta-data record to assist developers with their meta-data implementations.

Governance

IMS gathers requirements for its various specifications through meetings, focus groups, and other international sources to establish the critical aspects of interoperability in the learning markets. Based on these requirements, IMS develops draft specifications that outline the way software must be built in order to meet the established requirements and to support international use. Once the specifications are finalized internally and have been validated through interoperability trials that involve both contributing members and developers network participants, the draft specification is formally approved by the IMS Technical Board and then released to the public. Once the technical board approves their release, IMS specifications are then made available to the general public, regardless of whether or not they are members of IMS.



1.4 *B2B Distributed Transactions*

1.4.1 Overview

Over time, organizations have made a substantial investment in their information systems and packaged applications. These architectures are typically comprised of disconnected and disparate information technology infrastructures, residing on different hardware platforms, and utilizing a variety of data methods and communications formats, that were never intended or designed to communicate externally with systems of other companies. To enable the emerging B2B business model, isolated systems and applications must be integrated not only within an enterprise, but also externally with strategic business partners and customers.

B2B distributed transactions are business events that occur between two or more business partners with disparate systems and distinct networks. Because XML offers a way to “self-describe” data, business partners can readily specify the semantics of the encapsulated data in a form that the receiver of the data can easily interpret, so long as the receiver has access to the same XML vocabulary. By standardizing the way organizations represent information, and incorporating those standards across all systems, a common approach can be adopted by anyone wishing to exchange data. Thus If XML is coupled with business process or transaction abstraction then true business-to-business collaboration can be enabled in real-time. Systems that support distributed transactions can update database records in real-time at the moment of a business transaction, like a bank ATM machine that must immediately record a cash withdrawal or a Web site for a retailer that must immediately reduce the amount of available inventory to reflect an order.

Examples of distributed transactions include web services, which allow organizations to communicate and exchange data without intimate knowledge of each other’s IT systems, behind the firewall. The following case studies examine the application of distributed transactions for customer service and ATM operations.

1.4.2 Case Study: Visa International

Summary Points

- XML is a natural fit for distributed transactions – ease of message description
- Specifications are evolving (e.g., SOAP) to minimize development curve
- For Visa, XML was the messaging standard that B2B transactions utilized to achieve a new level of customer service
- Visa had to make an investment of time and money to move merchants along the adoption curve – this should be expected and planned for

Background



In an effort to facilitate transaction processing, Visa International built an application that would itemize charges to Visa corporate cards for easier customer processing and, as a benefit to Visa, provide more detailed information about its corporate customers' spending habits. For easier client processing, the application would allow the corporate customer to electronically transmit the itemized charges to the correct cost centers. In turn, the itemized charges would provide more detail into the spending habits of the client and businesses frequented.

Visa XML Invoice Specification

To capture customer spending information properly, Visa needed to identify necessary data elements and determine a method of categorizing the information. They chose developing data standards in XML. By identifying specific data elements (e.g., hotel charge, hotel tax, state tax, meal charge, etc.), Visa was able to generate its own XML vocabulary that could be incorporated across the enterprise. After extensive design and analysis, the framework was created and the generic vocabulary was termed Visa XML Invoice Specification.

Implementation

Visa was able to identify business partners to whom it would need to market the vocabulary by analyzing the element tags created. Visa spent time and money promoting the use of the XML specification to merchants and customers. Although some reluctance was experienced at first, eventually more than 2,000 companies downloaded the specification. Use of the XML vocabulary also required Visa to invest in training for merchants and customers, in order to ensure proper XML integration.

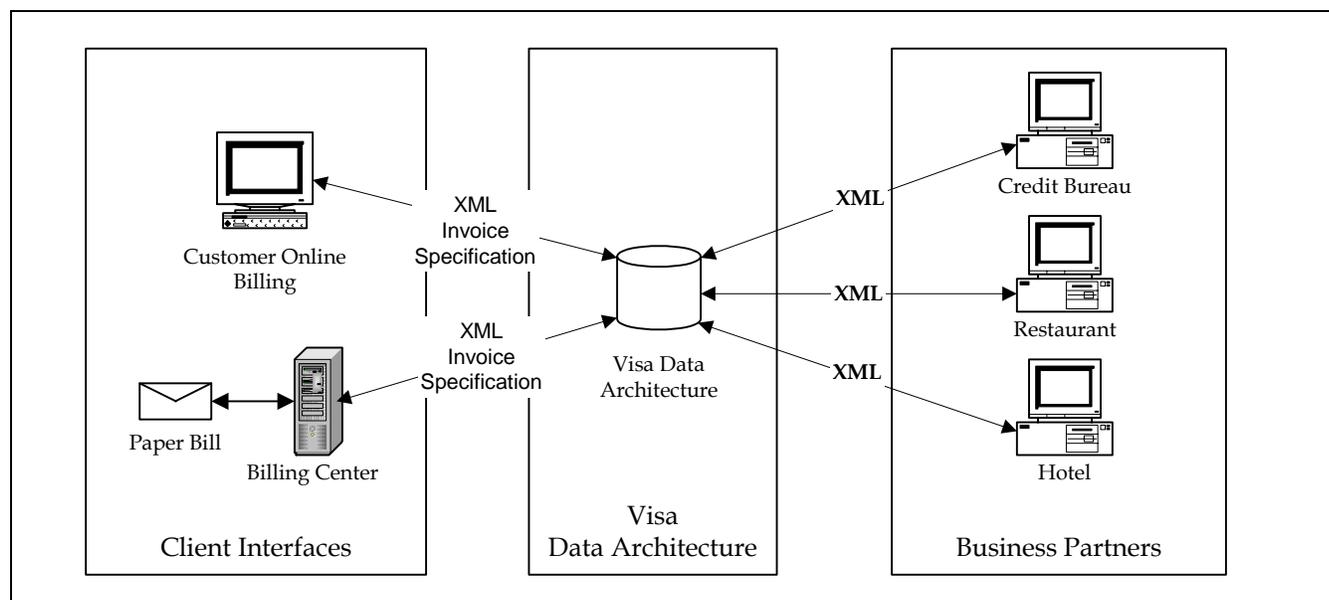


Figure 1: Visa International - XML Architecture



Benefits

By creating an enterprise wide implementation of the XML vocabulary, and encouraging its use among business partners, the application was successfully able to itemize customer billing as well as provide the organization with necessary information about client spending. Thus through the implementation of an XML standard, Visa was able to design and create, and implement a major customer relationship initiative that better serves the customer's needs and allows for improved customer service.

In addition, by analyzing the results of the standardized data, Visa will be able to gain a better understanding of the client's spending habits, which will in turn facilitate marketing to customers in the future. The generated XML vocabulary can also be used as a basis for future IT applications that require business-to-business distributed transactions and application integration.

1.4.3 Case Study: Korala Associate Limited and Fujitsu

Summary Points

- XML utilized to standardize ATM transaction messages
- XML's flexibility allows it to serve multiple streams of data – bank transactions (if necessary), and content such as weather reports
- Leveraging existing standards (IFX) minimized development efforts and supported open interoperability, both important considerations given the ubiquity of ATMs

Background

Korala Associate Limited (KAL) and Fujitsu have worked in coalition to develop both bank and external gateway server ATMs that are web services enabled. By seamlessly connecting ATMs to the Internet, web services, which use XML and SOAP protocols, facilitate B2B transactions from banks to trading partners.

By implementing SOAP and XML technology as a Bank's ATM protocol, ATMs can support web services that allow for a seamless connection to the Internet. The benefits of a web services enabled ATM can be seen in an example as simple as visiting an ATM while on vacation. From a web services enabled ATM, one can not only check his or her balance, but also access sightseeing information sites and weather information, to help decide where and when to go. One can also access hotel reservation and insurance company sites to make and pay for bookings and insurance arrangements. Because Fujitsu's EAI software also provides various connecting adapters, that support existing protocols for the bank's mission critical system, data exchange between mainframes and an ATM Switch can be performed by changing the data to the original protocol.



Interactive Financial eXchange (IFX) Forum

In order to develop these services, Fujitsu and KAL joined the Interactive Financial eXchange Forum, which has established an XML framework for the electronic business-to-business exchange of data among financial service institutions. KAL used IFX XML standards to develop Kalignite as middleware for ATMs while Fujitsu developed the ATM series 8000 and Interstage CollaborationRing EAI software. By leveraging the two together an XML enabled ATM was developed. IFX standards are described in more detail in section 3.3.2.2 Case Study: Interactive Financial eXchange Standards above.

Implementation

Because it is both expensive and time consuming to replace all existing ATMs and external servers at once, immediate widespread implementation of the web services enabled ATM would be difficult. However because of various connecting adapters provided by Fujitsu’s Interstage CollaborationRing EAI software, the new ATM and ATM switch can coexist with existing ATMs and external servers, making immediate implementation unnecessary. This makes it possible to gradually and easily add new ATMs and ATM Switches, without changing the entire existing system, and allows for strategic technology migration and the reduction of the overall development cost and time period.

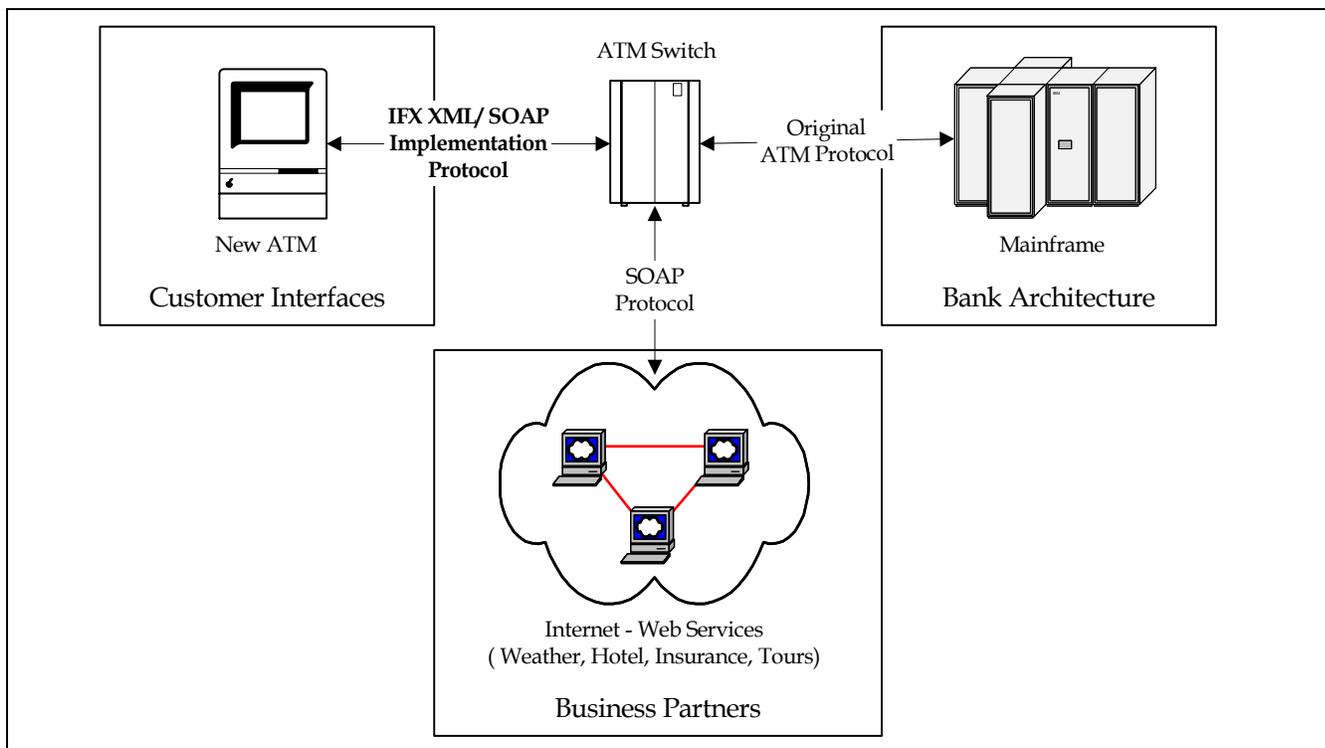


Figure 2: Korala Technical Architecture



Benefits

Web services enabled ATMs offer customers benefits well beyond typical ATM banking functionality, and provide a means of integration between the banking industry and its business partners from across different industries, from one single point of communication. The use of XML as the basic building block for web services is vital to meeting the overall business process and integration goals of each bank and its business partners. By using the IFX standards as the framework for the XML architecture, Korala was able to leverage existing standards, which minimized development efforts and supported open interoperability between ATMs. In addition, because of the flexibility provided by the EAI software, the ability to gradually implement the new systems staggered the overall costs, as well as the implementation schedule.



1.5 B2C Portal Integration

1.5.1 Overview

Business-to-Consumer or Business-to-Employee integration facilitates business transactions and information presentation between business partners, customers and employees. Portals are a key means of allowing for this integration.

Portals provide a centralized platform for instant access to relevant information and applications. Enterprise portals deliver the capability to access information and aggregate disparate applications, back-end systems, services and content (both static and dynamic). Ranging from internal self-service and knowledge management portals to external B2B catalogs, portals help to perform critical operational tasks by providing user access control, personalization and a common user interface. By finding information or executing transactions through a portal instead of by accessing multiple legacy systems, employees and customers are able to more efficiently perform business functions.

The latest portal products can be integrated with enterprise applications such as ERP, CRM and electronic procurement. As a result, companies are deploying portals to support strategic business initiatives and using them as tools for managing enterprise applications. Portals can help businesses get more out of enterprise systems by hiding complexity from technologically inexperienced end users.

Businesses who have deployed portals also report that the technology helps them to manage applications and data centrally. For example though the data presented through the portal is different for every customer in every business unit, all the customers use the core applications to access what they need. Distributing documents through the portal also ensures that information is accessible to everyone. The IS department, in turn, becomes an in-house application service provider.

XML plays a major role in much of the functionality offered by a portal. XML can render content to the presentation layer, using XSLT. Yet it also facilitates transactions between disparate systems that communicate and make transactions via the portal. Similarly XML is flexible enough to render information in various presentation formats, which is important for enterprise portals that offer PDA and cell phone access. The following case examines an initiative that used XML as part of its portal implementation.



1.5.2 Case Study: Vizzavi (Vodafone)

Summary Points

- A B2C portal may want to push information in many presentation formats (Web, e-Mail, WAP devices)
- Because XML is presentation-agnostic, it is ideal for moving data across multiple presentation channels
- Existing technologies (XSLT) are available to speed development of presentation layer coding

Background

In March 2000, Libertel-Vodafone made the strategic decision to launch a new portal and ISP business for its mobile technology. The firm's goals were to offer the capability to shop online, to personalize content, to receive alerts (via SMA and e-mail, voice messages, and in future releases internet TV), and to offer customer relationship management functionality, Web push and Wireless Application Protocol (WAP) push, all in a single, seamlessly integrated, personalized internet offering. The portal venture was originally termed Vizzavi, but has since been renamed Vodafone.

Implementation

The Vizzavi portal implemented an XML framework that encompassed several key areas of the Portal's architecture, namely for the Presentation layer, Application-to Application integration and Business-to-Business integration:

The presentation layer uses XML and XSL for rendering information to PDAs, WAP-enabled and voice devices. The WAP protocol is the leading standard for information services on wireless terminals like digital mobile phones. WML is used to create pages that can be displayed in a WAP browser. XSL formats the messages into a WML template based on the user's browser. The number of WML templates is based on the granularity or browser support. Java Server Pages create the XML files and BEA's XML transformation software handles the transformation process.

Application-to-Application integration uses XML for exchanging information from the system's Content Management and Delivery System to the Alert system. The alert system takes the content from XML and formats the message for the intended delivery vehicle. The delivery vehicle could be SMS, e-mail, and voice messages.

Business-to-Business integration uses XML to communicate with third-party providers, namely through the use of web services. These web services enable such functionality as Instant Messaging, e Cards, searching capability, and shopping.

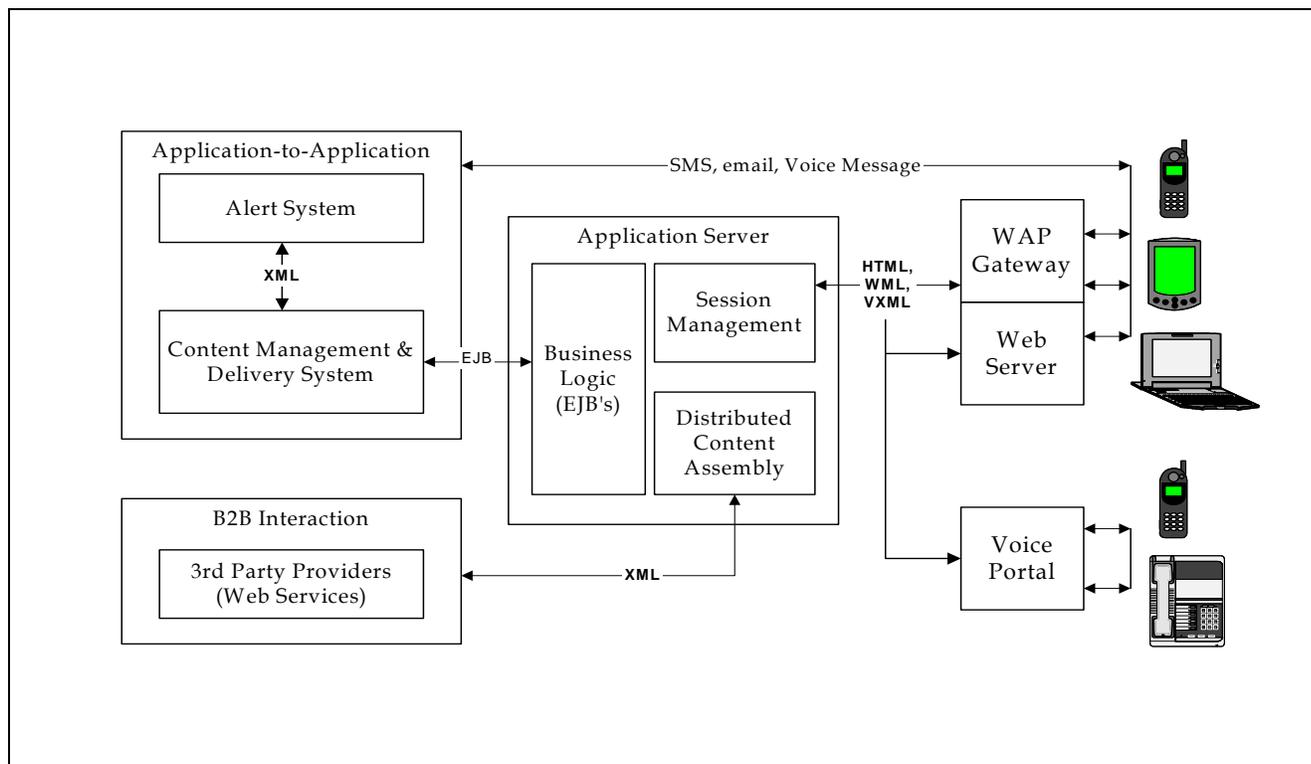


Figure 3: Vizzavi Application Architecture

Benefits

The Vizzavi portal was initially launched for 30,000 pilot users selected from the Libertel-Vodafone customer base. Soon after the successful release it became fully accessible to the general public with a combined average of 6,800 registrations recorded every day in the UK and the Netherlands. Vizzavi has begun expanding across Europe. In time, it expects to have a potential customer base of 80 million.

Because XML is presentation-agnostic, it allows the B2C portal to push information in many presentation formats (Web, e-Mail, WAP devices) for customer access via a variety of devices. This allows the portal to reach a greater client base and allows for customer usage virtually anywhere and anytime. XML and XSLT create flexibility to make changes by speeding development of presentation layer coding. Web services offer customers the ability to shop at the Online Store, search the Internet, send eCards and text messages, all via the portal, by integrating the application server layer with 3rd party systems using XML.



1.6 B2B Marketplace/Exchange

1.6.1 Overview

At its most basic, a B2B exchange, also termed a marketplace, is a website where businesses can buy from and sell to each other using a common technology medium. Many exchanges also offer additional benefits, such as payment or logistics services that help members complete a transaction. Exchanges may also support community activities, such as distributing industry news, sponsoring online discussions and providing research on customer demand or industry forecasts for components and raw materials.

Public exchanges are owned by industry consortia or independent investors and have their own boards of directors. Though each exchange sets its own rules, they are generally open, for a fee, to any company that wants to use them. Private exchanges are run by a single company, and allow that company to do business exclusively with established suppliers and customers.

Public exchanges can be a good venue in which to find low prices or identify new customers. They have also become a popular way for a company to unload excess inventory. Common types of transactions on public exchanges include purchasing through requests for quotations, buying through catalogs and auctions.

Businesses that use private exchanges prefer them for the closer online relationships they can have with preferred customers and suppliers. Many companies believe that private exchanges are more secure, because data about their trades are at less risk of being exposed to competitors if there's a security breach. Businesses use private exchanges to trade proprietary information like supplier performance metrics and sales forecasts in addition to orders and invoices. Companies also use private exchanges to establish central control over purchasing through contracts with established suppliers.

The primary obstacle to successful participation in an e-marketplace, is standardization and integration. Visitors are faced with e-marketplace vendors that use proprietary disparate systems for data exchange that attempt to promote the adoption of, and ensure loyalty to, their standard. If a business chooses to participate in several online marketplaces the challenge arises about how to exchange business information with each marketplace when it uses different standards. When companies have to publish business information and data dynamically, update the content, and then integrate it with various business flow applications, using more than one standard, advancing their e-business position proves to be difficult. In addition, maintaining catalog information online should more than simply market products, it should be connected to back end office systems, such as accounting and inventory management, regardless of the backend.

With the rapidly increasing acceptance of XML as the standard for e-business, many of these challenges can be overcome. XML can, not only, render data for presentation on the



marketplace site, it can also be transformed using XSLT into a different representation of an XML document. Similarly, if a single XML vocabulary has been established for the exchange, the disparate systems can interchange data freely. Presently several XML vocabularies are used for e-marketplace B2B exchanges. XML vocabularies include CatXML, IFX and CIDX.

The following case studies outline two major marketplace initiatives. Both use XML extensively.

1.6.2 Case Study: ChemConnect

Summary Points

- For a marketplace, with multiple different business entities, standardization is crucial
- Equally crucial is openness of the technology – ease of adoption
- ChemConnect utilized XML for standardization and openness
- The ChemConnect marketplace utilized standards of an industry domain (CIDX), not just of its own marketplace domain – it only uses 20 of the 50 CIDX messages
- The power of openness: in 2002, 30 companies exchanged over 250,000 messages for transactions totaling \$8.8B

Background

ChemConnect was founded in 1995 as a bulletin board site, and has since established itself as a leader in helping companies optimize their purchasing and sales processes for chemical feedstocks, chemicals, plastics, and related products through the use of e-commerce. The company's goal and vision was to improve transaction processes for chemical buyers and sellers from multiple industries around the world from one single point of origin, namely an e-marketplace. Designed to speed and optimize online negotiations, ChemConnect's marketplace automates key business processes, including online requests for quotes, proposals and information. ChemConnect allows its members to identify new suppliers and negotiate with buyers and suppliers of direct and indirect materials.

The site allows for member companies to:

- Get access to timely, relevant market information.
- Buy and sell more than 60,000 products.
- Respond to postings on ChemConnect's Marketplace.
- Participate in online auctions.
- Receive automatic email alerts for the products the firm buys and sells.



ChemConnect's success can be attributed in part to the number of member companies, which total 9,000 companies in 150 countries. These member companies include producers, consumers, distributors, traders, and intermediaries, that serve and support various industries including chemicals, plastics, pharmaceuticals, pulp & paper, soaps and detergents, adhesives and sealants, textiles, food additives, oil and gas, and paints and coatings. The number of products in the ChemConnect database totals 60,000. In 2002 total transactions reached 16,000 with a value in excess of \$8.8 billion.

Implementation

The XML standards behind ChemConnect's successful marketplace architecture are termed Chemical eStandards, which are governed by CIDX, a trade association and standards body, focused on building transactional efficiency throughout the global chemical industry supply chain. CIDX's Chemical eStandards are a single set of global XML-based data exchange standards for all chemical industry affiliates. While incredibly valuable, XML only provides the means of exchanging data; it does not define the data to be exchanged. CIDX was formed to maintain and support a previously created, open, non-proprietary set of standards, using a single XML vocabulary that allows for companies across all parts of the chemical industry, like ChemConnect, to succeed.

ChemConnect uses 20 industry standard CIDX XML messages, of the 50 standard messages available, for direct connection transactions between the marketplace and business partners. The standard message suite includes order processing, logistics and Vendor Managed Inventory (VMI) messages.

ChemConnect provides its members with direct connectivity services based on Chemical eStandards, the inventory, forecasting, and collaboration electronic messages developed by the Chemical Industry Data Exchange (CIDX), for the transfer of XML documents between back end enterprise resource planning (ERP) systems. In addition, ChemConnect's link to GXS gives ChemConnect members new opportunities to exchange documents with downstream customers and suppliers, who use different electronic data exchange standards, including EDI.

ChemConnect and Global eXchange Services (GXS) exchange electronic documents through a hub-to-hub connection enabling the transfer messages between trading partners within and outside the chemical industry. In 2002, more than 30 companies exchanged in excess of 250,000 messages via the ChemConnect hub. The connection between ChemConnect and GXS enables ChemConnect Members using the Chemical eStandards data format to send and receive documents with businesses that use electronic data interchange (EDI), proprietary data formats, or other versions of XML. Using the GXS network, ChemConnect Members no longer need to establish costly one-to-one connections with their customers or suppliers outside of the chemical industry. Instead, ChemConnect members may access these business partners using their single connection through the ChemConnect hub to the GXS network - where all data translation and transaction routing is performed automatically through GXS' Ecommerce Service Center.



Benefits

ChemConnect provides a marketplace where trading partners, specializing in various sectors of the supply chain, can streamline their product sales and purchasing. In an environment where cooperation is necessary, standardization for data exchange becomes crucial. Chem eStandards provide ChemConnect with an infrastructure based on a set of free, open transaction XML messages, that, when implemented among the business partners, facilitate data exchange.

Although there are other competing Chemical marketplaces, ChemConnect has achieved success in part because of the flexibility of the Chem eStandards. In 2002, 30 trading partners did business worth close to \$9 billion across the ChemConnect marketplace.

1.6.3 Case Study: Covisint Inc

Summary Points

- Covisint leveraged the ebXML framework for building their exchange – but it is only using the components (messaging services) that it feels are most mature
- The XML Vocabulary used by Covisint was built on broader existing standards – xCBL and OASIS XML standards
- While Covisint has standardized based on the above-mentioned technologies, it did not force everyone in the exchange to switch at once – it has eased the transition curve by continuing to support prior messaging specifications.

Background

Covisint is an electronic exchange for the Auto Industry that enables speed in decision making, waste elimination, and cost reduction while supporting common business processes between manufacturers and their supply chain. Covisint is the central hub where OEMs and Suppliers of all sizes are joined together in a single business environment using the same tools and user interface, with one user ID and password. Covisint has been designed with an emphasis on making information accessible and visible within a secure online environment.

Covisint was created by DaimlerChrysler, Ford Motor Company, and General Motors, who jointly announced plans to combine efforts and form a single global business-to-business supplier exchange. Each company brought together its individual e-business initiatives to avoid the burdens suppliers would endure if asked to interact with redundant proprietary systems. With a slowdown in vehicle sales evident this year and in previous years, due to the soft economy, the big three automakers placed increased pressure on their 150,000 suppliers to reduce costs. This factor drove the exchange's overall goals: to lower cost through integration and collaboration, to facilitate business practices and to increase efficiencies across the entire industry.



One example of the cost benefits of Covisint is GM's plan to reduce the average cost of processing a purchase order from \$100 to \$10. The world's largest automaker spends more than \$80 billion in procurements each year, so even a minor improvement in how these activities are handled can save the company billions. These figures contribute to the projection that the automotive exchange will be to handle more than \$240 billion in annual procurements of raw materials and vehicle parts by the big three manufacturers alone.

Implementation

Covisint was originally built using technology from Commerce One and Oracle, which uses the Common Business Library (CBL) for message payload (i.e., content) and OAGIS XML formats for the message transport layer. Covisint used these off-the-shelf XML standards for the document payload but recognized the need to develop industry wide XML standards that are focused on the needs of the automotive industry. This belief encouraged Covisint to work in conjunction with other associations to manage a transition plan from existing legacy specifications to the adoption of ebXML and OAGIS XML standards.

In January of 2002, Covisint announced the adoption and implementation of the ebXML message transport layer and use of the Open Applications Group's OAGIS standards for the XML document payload as its technology strategy. Covisint's adoption of these standards allows OEMs, automotive suppliers and software providers to make critical business decisions on applications and products that also use these common standards. This will promote software and application interoperability that enhances business agility, improves communication and reduces integration costs.

A 'message transport layer' is a set of electronic protocols that works very much like a paper envelope works to 'envelop' a message or letter. It contains information as to who sent it and directs where to deliver the document. The XML payload, in an electronic sense, is the letter inside the envelope. This approach will give Covisint the ability to exchange Internet-based messages between trading partners wrapped in a standard message framework that is being adopted globally.

While this decision establishes a formal messaging protocol for Covisint, the company will continue to accept and transform messages with other messaging frameworks. However, Covisint's business model will make it more economical for its customers to use the ebXML messaging specification. Covisint's integration technology provider webMethods will facilitate the company's adoption of ebXML's messaging specification.

Covisint will also be utilizing Web services to complement its infrastructure capabilities as those technologies continue to mature. This further supports the company's open standards policy on which the exchange itself is built.

Covisint will initially only adopt the messaging services element of the ebXML specification. The company's adoption of the other elements of ebXML such as registry, business process



Data Strategy Enterprise-Wide XML Framework XML Framework Strategic Assessment and Enterprise Vision

specification, collaborative protocol profiles and agreements is dependent on those specifications maturing and customer demand for them.

Benefits

Covisint enables business partners to speed decision making, eliminate waste, and reduce overall costs while supporting common business processes between manufacturers and their supply chain. Covisint has leveraged the ebXML framework to build their infrastructure, but have only used the components (messaging services) that the developers feel are most mature. In addition, the XML Vocabulary used by Covisint was built on broader existing standards, including xCBL and OASIS XML standards.

While Covisint has created a standard using these technologies, it has facilitated transition to the XML standards for business partners, while continuing to support prior messaging specifications. The end result is a successful, flexible marketplace moving towards a single data exchange standard that facilitates business transaction between members.



1.7 Internal Application to Application - EAI

1.7.1 Overview

EAI is the unrestricted sharing of data and business processes throughout networked applications or data sources in an organization. Formerly, applications, such as inventory control, human resources, and database management, were designed to run independently, with no interaction between the systems. They were custom built, in a specific technology, for a specific need being addressed, and were often proprietary systems. As enterprises grow and recognize the need for their information and applications to have the ability to be transferred across and shared between systems, companies are investing in EAI software in order to streamline processes and keep all the elements of the enterprise interconnected.

Enterprise application integration (EAI) software connects applications through a central message-routing hub, similar to middleware tools like IBM's MQSeries. However, EAI tools are also equipped to parse and translate data, and automatically route information according to business processes.

The biggest benefits achieved from EAI implementation are speed, cost savings, and flexibility in altering business processes. Simplification and reusability of interface code contribute to this cost savings. Once the basic connectors have been created, much of the code can often be reused. In some integration projects, faster linking also means faster time-to-market. When using EAI with these projects, speed of implementation can contribute directly to savings. In addition, existing built-in EAI business process management tools allow users to record changes through a graphical user interface.

However, EAI is far from off-the-shelf or plug-and-play, there are unavoidable and significant consulting, customization and maintenance costs. EAI requires continued maintenance, and using EAI to connect to outside business partners requires extra attention because of data definition mismatches. Much work is involved in creating and resolving data definition compatibility issues. Although it does not eliminate maintenance and support, XML can prove useful when creating common interfaces, and can be extremely useful if a data dictionary or core components have been created. It can also be used in conjunction with XSLT, the language used in XSL style sheets to transform XML documents into other XML documents, for data transformation between systems.

Presently many EAI companies are rebuilding their technology on top of a web services foundation. Web services can be represented as a standards-based (SOAP, WSDL and UDDI) pipe between systems. SOAP, a lightweight XML-based messaging protocol, is essential to encoding the information in Web service request and response messages before sending them over the network. With EAI implemented above the pipe, functionality such as routing, transformation, and publishing can be enabled.



The following case study outlines the role of XML in a traditional EAI implementation, enabling communication between disparate ERP systems.

1.7.2 Case study: EnergyAustralia

Summary Points

- Because SAP and TIBCO standardized on XML, integration of SAP into the enterprise was eased
- In part, this ease of integration also sped the adoption of real-time messaging

Background

EnergyAustralia, with more than 1.4 million customers, is one of the largest energy companies in Australia. It operates an electricity network covering some of the country's most dynamic markets including Sydney, and the entire Central Coast. EnergyAustralia, like many energy utilities around the world, faced an uncertain future with the deregulation of its electricity and gas marketplace. Before the deregulation legislation was enacted, EnergyAustralia executives realized that competition would require them to place a far greater emphasis on delivering premium customer service while streamlining back-office functions. Among other enhancements, both of these proposals called for more integrated systems. In addition, EnergyAustralia realized the organization would need to undergo extensive internal restructuring.

Realizing its limitations to accommodate both deregulation and seamless business operation, EnergyAustralia took on the initiative to make the organization a major player in the newly deregulated Australian energy market. The comprehensive plan comprised a variety of smaller responsibilities, including a CRM project termed the Customer Care Project, which was designed to deliver SAP IS-U/CCS, a CRM solution tailored specifically for utility organizations. The implementation of SAP replaced several existing customer care systems, and presented a substantial integration challenge for the remaining legacy systems.

Implementation

To help implement SAP IS-U/CCS, and to help select and implement an enterprise application integration package that would support its entire interface development, EnergyAustralia contracted Accenture. After a vendor selection process, the client chose TIBCO's ActiveEnterprise suite, which it found to be best suited to facilitate integration of SAP with the rest of EnergyAustralia's back-office systems.

One of TIBCO's major selling points was the ease with which its adapters integrated with a wide range of off-the-shelf applications, including SAP R/3. TIBCO adapters provide shared XML metadata definitions, standard error handling and reporting, and GUI administration tools. In turn SAP R/3 uses CA-XML as its XML vocabulary, which allows for conversion of any middleware data format into an XML document and facilitates document transfer to SAP



Data Strategy Enterprise-Wide XML Framework XML Framework Strategic Assessment and Enterprise Vision

R/3 using HTTP and HTTPS. This approach laid a solid foundation for EnergyAustralia to realize real-time messaging throughout the enterprise and to expand customer service to the Internet.

The team designed and built the development, execution and operations technical architectures to integrate SAP with EnergyAustralia's existing mainframe systems – DB2 v.4-based legacy applications and some file-based systems and built real-time interface capability using TIBCO ActiveEnterprise XML Adapters.

Benefits

Working with Accenture to implement EAI across the enterprise provided EnergyAustralia with a host of benefits. Most importantly, the company is better prepared to face the challenges posed by an increasingly competitive environment and deregulation.

Accenture and EnergyAustralia have coordinated releases of new functionality to coincide with deregulation guidelines. The final release of the system featured improvements such as: delivery of customer service/front-office assistance, device management, billing and customer finance, sales and campaign management, bill reconciliation, and enhanced electricity transfers. As deregulation laws are enacted across Australia, EnergyAustralia is now better prepared to make future enhancements and systems integration initiatives, as well as accommodate seamless, fast and low-cost integration of its Customer Care solution and legacy systems. A key element of the integration effort was the use of XML for real-time messaging between TIBCO and the primary CRM application, SAP. These benefits have helped EnergyAustralia thrive in a competitive environment, an advantage for customers and the marketplace.



1.8 Internal Data Quality

1.8.1 Overview

XML, through the use of various tools, can provide a means of ensuring data integrity across an enterprise. These tools (e.g., BEA Liquid Data) allow IT departments to easily aggregate data from many sources inside and outside of the enterprise, and tailor it for different business users. By using a data-view abstract layer, to make it appear that multiple underlying heterogeneous data resources are a single logical database, these tools, which leverage XML standards, can provide real-time access to current data, and thus avoid the potential for inconsistency that comes from duplication in a data warehouse.

In some cases XML can provide improved data consistency through data verification, especially if compared to a manual information verification process, like the process used at the Osaka Securities Exchange Company. By implementing an automated transaction system that utilized XML, the company effectively eliminated the manual data entry and verification process, and automated their report disclosure system.

1.8.2 Case study: Osaka Securities Exchange Company Limited

Summary Points

- A standard XML format for Data Exchange helped dramatically improve the data quality in reports distributed by Osaka Securities Exchange
- The electronic data format enabled the development of automated systems, which eliminated some labor-intensive data entry and validation processes

Background

The Osaka Securities Exchange discloses information by listed companies to media agencies and investors. Prior to XML implementation the process for disclosure by listed companies, from receipt to publication, involved some form of paper based manual labor. The application of XML drastically reduces the workload and time required to disclose information by eliminating the need for paperwork.

Previously, listed companies submitted information, such as quarterly statements and year-end financial results, to Osaka for disclosure as paper documents, because each company had disparate data architectures and data formats. The information was then manually entered into the system before being processed and disclosed. Data integrity was verified manually. Because of this lengthy process, data entry and verification had become far too labor intensive and time consuming.

Implementation



Osaka Securities found that XML more than met their business process goals. XML offered a means to automate data verification, simplify overall data processing, and facilitate data access via the Internet. The company created an automated input tool used to submit financial information intended for the disclosure. The tool, which was released to 1,300 listed companies, automatically checks the submitted data, converts it into XML format, based on its own XML vocabulary, and submits the XML file to Osaka Securities Exchange. The files are then either quickly processed by the document management system and forwarded to the corresponding media agencies, or transformed into HTML via the document management system and published to the web to allow investors to query for financial information via the Internet. The process is dependant on the document type.

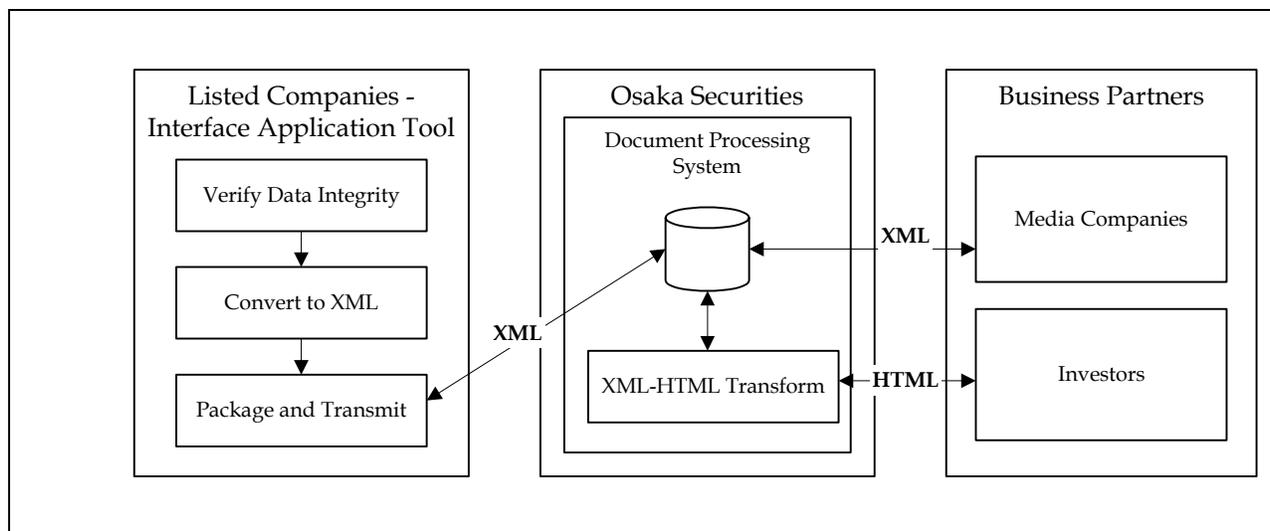


Figure 4 - Osaka Securities Exchange XML Architecture

Benefits

Beyond merely automating the file submission process, XML virtually eliminated the labor cost associated with data entry. In addition it allowed for improved data integrity, and considerably faster processing time. In future projects, an already established XML framework will facilitate data exchange between the Osaka's digital disclosure system and similar systems owned by other companies and securities exchanges. One possible example for future business-to-business transactions is the opportunity for document exchange with Japan's Ministry of Finance.



1.9 Government - G2B Enterprise Initiatives:

1.9.1 Overview

There is a growing awareness among government agencies of the potential use of XML across their respective enterprises. In fact the Bush administration's E-Government Strategy, published in 2001, urges the use of XML in some of its more driven initiatives. One such initiative is the IRS XML effort described in more detail in this section. Other government agency initiatives, some of which are included in the E-government strategy, are documented in Appendix F.

XML initiatives cross departments and implementation business strategies, but all reiterate the government's push towards using XML. In December of 2002, the Navy released an XML policy to coordinate its efforts to adopt the language and establish an enterprise wide XML vocabulary. The document set the standard for how XML will be used within the Navy so that XML-tagged data is fully interoperable enterprise wide. In addition, the policy outlined how the Navy will implement XML to better find, retrieve, process, and exchange data.

The Air Force began using XML in 2002, to Web-enable its massive collection of technical manuals. By providing an index of standard data definitions, a metadata repository will play a critical role in facilitating the flow of technical data from the Air Force's multiple content management systems and from vendors whose products are affected by the new Web-based system, to the end users. The end result will allow users to search both the metadata and the full text contents from a Web interface, which can be deployed on the network for all Air Force operations, and will allow information to be downloaded from laptops to be used on aircrafts or in remote field operations.

The Census bureau collects data from various internal and external data feeds and is presently attempting to make the information available in a variety of formats, from flat files to CD-ROM to Web interfaces, to other government agencies and citizens. The bureau began building a corporate metadata repository, a central database that would identify where all of its survey information is located, what specific records are in each database or file, and what format the information uses, yet it needed to provide internal and external users with an easy way to access the data. The agency has used XML to develop a common Web-interface so that applications can create, edit, browse and exchange metadata information.

As this trend continues federal agencies will increasingly turn to XML, especially as the demand for data sharing rises to meet homeland security and other needs. The following case study describes one government XML initiative in greater depth.

1.9.2 Case study: IRS.gov

Summary Points



- IRS.gov - e-government initiative
- Industry push towards creation of XML vocabulary, registry, common schema
- Use of XML facilitates and speeds up electronic form validation for e-filing

Background

With twenty-four e-government initiatives underway, the U.S. federal government is committed to transforming to a more streamlined, efficient and cost effective business model. The Internal Revenue Service's customer-facing Web site, IRS.gov, is one of these key e-government initiatives. The IRS currently collects over \$2 trillion in gross revenue, comprising 95 percent of the federal government's revenue. While electronic filing has been increasing rapidly, 77 percent of returns are still filed on paper. Reaching the Congressionally mandated goal of 80 percent electronically filed returns by 2007 will place enormous demands on IRS.gov.

The agency is critically dependent on a collection of computer systems developed over a 35-year period. These systems comprise a network of 40 mainframe computers, over 100,000 individual computers, 2,779 vendor supplied software products, and over 50 million lines of IRS developed code. Despite the department's extensive IT infrastructure, the IRS still processed billions of paper forms each year.

The IRS decided that one of the quickest and most cost effective ways to reduce this labor-intensive process was to focus on building tax form submission processes through IRS.gov. XML plays an integral part in planning this submission process, because it has been viewed as the industry standard for data exchange. In addition, XML offers:

- Ease of tax compliance and lower cost for taxpayers
- Ease of entry and lower cost for software companies
- Subsidiary benefits such as shorter audit cycle time

Some electronic forms are presently available for e-file on IRS.gov, while others will be available in future years. One example, the Employment Tax e-file System, already uses XML during online employer form submission for Forms 940, 940PR, 041, 941PR, 941SS.

Given that there are numerous complex paper based forms that are submitted to the IRS, XML schemas must be created for each individual electronic form. Although this may seem like a lengthy process, the development of XML Schemas for these forms, when combined with the use of XSL, allow for the implementation of encoded business rules. These business rules in turn ensure fewer errors, reduce costs for validating returns and ease the transition of future tax changes. In addition, a base schema can be derived that facilitates the creation of form specific schemas.

Implementation



One electronic file that will be available for e-file in 2004 is the U.S. Corporation Income Tax Return Form 1120. Form 1120 is used to report income, gains, losses, deductions, credits, and to calculate the income tax liability of a corporation. Form 1120 has presently received much focus from XML groups because it:

- Represents ~85% data elements for IRS
- Exhibits significant overlap with Individual Tax Form (1040)
- Creation effort will reconcile duplicate data elements (e.g., string length for address)
- Will exploit larger base of developers, given its functionality
- Is a scoped pilot
- Meets the requests of external stakeholders

TIGERS

One of the groups presently working to create XML schemas for Form 1120 is The Tax Information Group for ECommerce Requirements Standardization, or TIGERS, group. TIGERS is part of the American National Standards Institute's ASC (Accredited Standards Committee) X12-Government Subcommittee. The Government Subcommittee is a standing committee of ASC X12. The Government Subcommittee sub-group that works on tax standards is Task Group 2, Tax Information Interchange (TG2). TIGERS is a Work Group of Task Group 2, and it has been chartered to discuss matters relating to business standards and practices surrounding national tax data formatting and transfer, and develop and maintain tax electronic technical format standards for a variety of tax filing and other related government electronic reporting or data exchange applications. The TIGERS project web site presently provides public access to draft schemas for IRS Form 1120 (140 XML schema files) and for Form 1120S (Subchapter S Corporation).

The ultimate goal of the group is to create guidance, useful to state and federal (IRS) tax authorities, to assist them in XML application development. A recent focus of the group has addressed the use of XML as a data transformation tool, and efforts to develop a standard taxonomy and base schema as guidance for tax agencies. Using this standard base schema, derived schemas can then inherit from the generic schema. For example Form 1120's schema will inherit many of the core components found in the base schema. In addition the group is examining a variety of XML uses across other tax filing types (personal income, sales, motor fuel, corporate income, etc.).

The group has progressed to examination and development of a standard Schema Structure (in accord with W3C's recommended XML Schema specification), largely based on IRS's work in this area, and an attempt to develop a Schema model that works in a variety of tax submission scenarios (e.g., tax types).

TIGERS determined that an effort to develop standard entity and tax-specific names for elements across the various tax types would be highly useful to all involved parties, and going forward additional work is encouraged in this area.



1.9.3 Case study: Department of Navy

Summary points

- XML will help the Navy achieve its strategic technology goals and vision.
- Navy sees the need for a component and data model repository.
- Navy strategy and policy will align with existing standards.
- XML Policy document will define initial governance model.

Background

As part of an effort created by the U.S. military to web enable applications for facilitating access to data from resources on shore and afloat, and to create a common data source and data consolidation, the Department of Navy recognized the importance of using XML as a key component of achieving these goals. The Navy's strategic initiative calls for building an XML component repository by 2006 and XML vocabulary repository for XML data models by 2008. As a first step to attaining these projected goals, the Navy released its XML vision in March of 2002 to establish a vision for the enterprise wide XML strategy. By December of 2002 the Navy released its official XML policy to coordinate its efforts to adopt the language, and establish its own standards for implementation.

This document sets the standard for how XML will be used within the service so that XML-tagged data can be fully interoperable enterprise wide. In addition, the policy outlines how the Navy will implement XML to better find, retrieve, process, and exchange data. The Navy policy outlines other XML standards and initiatives with which it will coordinate, these include, among others, the technical specifications of the World Wide Web Consortium (W3C). The document also outlines responsibilities for developing XML governance policy, and the DON's XML Working Group responsibilities for XML implementation strategy and XML namespaces coordination.



OASIS: Tax XML

In keeping with this idea, a new OASIS 'Tax XML' Technical Committee was formed in November of 2002 to focus on developing a common vocabulary that allows participants to identify tax related information exchanged within a particular business context. Canada Customs and Revenue Agency, Inland Revenue of the United Kingdom, United States Internal Revenue Service, IBM, Oracle, Republica, SAP, Software AG, Vertex, and other OASIS Members will collaborate on the Tax Information Exchange Standard. The products of this Tax XML committee will include a vocabulary of terms, a repository of artifacts including XML templates, documents exchanged for tax compliance, best practices, guidelines and recommendations for practical implementation.

Tax XML will rely heavily on incorporating the XML standards that are defined for the common business vocabulary. Since tax related information spans many business interests and is mostly either an extension of common business documents or a repackaging of business information for tax compliance documents, any existing or in progress standards for business information will be examined and incorporated as appropriate.

Benefits

One of the key benefits of using XML, for e-filing, is that it is presently the industry standard for data exchange. XML also:

- Eases tax compliance and lowers costs for taxpayers
- Eases entry and lower costs for software companies
- Creates subsidiary benefits such as shorter audit cycle time

XML holds great promise for many businesses and governments in easing data transformation processes and improving electronic exchanges of information. However, it is only a "meta language" specification, with many customizable aspects. So the various and distinct user-entities that wish to employ XML have to agree that there is value-added in developing and maintaining a tax-XML "standard".

In many cases improvements come with roadblocks. For example in the case of Form 1120, although electronic form submission using XML greatly facilitates validation and speeds up refund turn around times, the IRS' electronic filing infrastructure cannot yet support large returns, and many of the corporate forms can be up to 36,000 pages. With improvements in XML implementation comes a necessary effort to modernize the infrastructure, which requires time and funding.