XML in Electronic Commerce - Through the Rearview Mirror and Crystal Ball
Dr. Robert Glushko: Director, Information Engineering
Outline

• The Vision of “Plug and Play” Commerce
• The Integration Challenge
• XML for Interoperability of Commerce Applications
• The Common Business Library
• Technology for “Plug and Play” Commerce
The Vision of
“Plug and Play” Commerce
The XML Revolution in Electronic Commerce

- Today’s Web sites publish information for people
  - “eyes-only” is dominant design perspective
  - hard to search
  - hard to automate processing
- Tomorrow’s sites will provide information and services for computers (and people)
  - Overcomes HTML’s inherent limitations
  - Enables the new business models of the network economy
The XML Revolution in Electronic Commerce
Plug-And-Play Commerce
Plug-And-Play Commerce
Plug-And-Play Commerce
Business Models for Electronic Commerce

- Stores and malls
- Virtual communities
- Purchasing center
- Auctions and reverse auctions
- Value-chain service provider
- Value-chain integrator
- Collaboration and concurrent engineering
- Information brokerage
Leverage Points

- Streamlining processes through consolidation, aggregation, and automation
- Replacing closed trading partner relationships with open markets
- Introducing new intermediary services such as auctions
- Facilitating interoperation of services via hubs and open standards
Shared Information --\(\rightarrow\) Commerce Networks

- Supply Chains
  - Merchants, distributors, manufacturers, brokers, logistics, shippers
- Real Estate
  - Brokers, banks, escrow, title, inspection, MLS, government agencies, classifieds, loan aggregators
- Travel
  - Hotels, airlines, rental car agencies, travel agents
Networks of Networks...
The Integration Challenge
Traditional Supply Chain
Business Models and Integration Requirements

- Traditional supply chains represent long-term, point-to-point, and tightly coupled relationships
  - EDI is acceptable here because high integration costs can be recovered over time
  - Partners are more willing to invest in compatible IT infrastructure at each end or in middleware that creates a distributed application
New Supply Chain -> Supply Mess

Vendors

Distributors

Resellers

Buyers
Business Models and Integration Requirements

- Internet enables new models for outsourcing, open sourcing, trading communities, buying consortia and “virtual enterprises” that are fundamentally different
  - Relationships are experimental and evolving and have shorter lifetimes overall
  - Both initial integration cost and incremental cost to evolve must be low
  - Point-to-point coupling approaches won’t support “describe once, {sell,buy} anywhere” goals
XML for Interoperability of Commerce Applications
XML as Technology Platform

.. exchange data in an application and vendor neutral format

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Benefits of XML to Business

- Businesses can describe services in a manner that can be easily understood
- One set of documents, forms and messages can be exchanged by businesses with different internal business systems
- Errors in re-keying data are reduced because data can be transformed through gateways
- Frequent changes in business process can be handled without substantial engineering costs
- Leverages investment in legacy systems and can be used with latest Internet technology
XML’s Big Idea: Document Types

- Customer Profiles
- Vendor Profiles
- Catalogs
- Datasheets
- Price Lists
- Purchase Orders
- Invoices
- Inventory Reports
- Bill of Materials
- Contracts
- Credit Reports
- Bank Statements
- Directories
- Transportation Schedules
- Receipts
- many many more...
Laptop Computer Catalog Entry

Laptop Computer

IBM Thinkpad 560X
233 Mhz
32 Mb
4 Gb
4.1 pounds
$3200
Laptop Computer in HTML

<TITLE> Laptop Computer </TITLE>
<BODY>
<UL>
<li>IBM Thinkpad 560X</li>
<li>233 Mhz</li>
<li>32 Mb</li>
<li>4 Gb</li>
<li>4.1 pounds</li>
<li>$3200</li>
</UL></BODY>
Laptop Computer in XML

<COMPUTER TYPE="Laptop">
  <MANUFACTURER>IBM</MANUFACTURER>
  <LINE>Thinkpad</LINE>
  <MODEL>560X</MODEL>
  <SPECIFICATIONS>
    <SPEED UNIT="MHZ">233</SPEED>
    <MEMORY UNIT="MB">32</MEMORY>
    <DISK UNIT="GB">4</DISK>
    <WEIGHT UNIT="POUND">4.1</WEIGHT>
    <PRICE CURRENCY="USD">3200</PRICE>
  </SPECIFICATIONS>
</COMPUTER>
Smarter Processing Enabled by XML

- `<COMPUTER>` and `<SPECIFICATIONS>` provide logical containers for extracting and manipulating product information as a unit
  - Sort by `<MANUFACTURER>`, `<SPEED>`, `<WEIGHT>`, `<PRICE>`, etc.
- Explicit identification of each part enables its automated processing
  - Convert `<PRICE>` from “USD” to Euro, Yes, etc.
### XML Commerce Languages

<table>
<thead>
<tr>
<th>CBI</th>
<th>Corporate Procurement</th>
<th>AMEX, Office Depot, Boise Cascade</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTP</td>
<td>Retail Payment</td>
<td>Mastercard, Mondex</td>
</tr>
<tr>
<td>OFX / GOLD</td>
<td>Personal Finance</td>
<td>(Intuit, Microsoft), (IBM, 125 Banks)</td>
</tr>
<tr>
<td>RosettaNet</td>
<td>Computer Supply Chain</td>
<td>Ingram + 24 largest channel players</td>
</tr>
<tr>
<td>ICE</td>
<td>Content syndication</td>
<td>News Corp., Sun, Microsoft, Adobe, Vignette, C/Net</td>
</tr>
</tbody>
</table>

This list is growing explosively, and all are using XML (or shortly will be)...
XML and Metcalfe’s Law

• The value of a language depends on how many people (or computers) understand it
• How do you encourage and enable others to understand your language?
• The EDI approach:
  • BIG COMPANY: Speak MY language or I won’t do business with you!
  • SMALL COMPANY: Yes, master.
• The XML approach:
  • Excuse me, here are the rules of my language if you’d like to speak with me...
The Pending Interoperability Crisis

- Delayed time to market
- Redundant development costs
- Limited Interoperability
The Common Business Library
Airline Schedule in XML

<TransportSchedule Type="Airline">
  <Segment Id="United Airlines #200">
    <Location Type="Origin">San Francisco</Location>
    <Time Type="Depart" TZ="PST">11:30</Time>
    <Location Type="Destination">Honolulu</Location>
    <Time Type="Arrive" TZ="HST">2:30</Time>
    <Price Currency="USD">368.50</Price>
  </Segment>
</TransportSchedule>
Using the same schema for all scheduled transportation services:

\[
<\text{TransportSchedule} \ Type=\text{“Airline”}> \\
<\text{TransportSchedule} \ Type=\text{“Train”}> \\
<\text{TransportSchedule} \ Type=\text{“Ferry”}>
\]

An application could create itineraries that involve more than one service by matching on locations and times
Shared semantics for location and time in all schemas that need them enables richer “commerce networks” of services:

<TransportSchedule Type="Airline"> ... 
<Location>Honolulu</Location>

<Accommodation Type="Hotel">...
<Location>Honolulu</Location>

<Event Type="Concert">...
<Location>Honolulu</Location>
Solution: Open Framework For Commerce

Common Business Library
CBL Building Blocks

CBL

Business Documents
- Vendor
- Services
- Products

Business Forms
- Catalog
- Purchase Order
- Invoice

Measurements
- Time
- Currency
- Weight

Locale
- Address
- Country
- Language

Classification
- SIC
- NAICS
- FSC

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Composing from Building Blocks

CBL

Business Documents
- Vendor
- Services
- Products

Business Forms
- Catalog
- Invoice
- Purchase Order

Measurements
- Time
- Currency
- Weight

Locale
- Address
- Country
- Language

Classification
- SIC
- NAICS
- FSC

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Customization with Interoperability

CBL Documents

FedEx Airbill

Business Descriptions
- Vendor (core)
- Services (core)
- Products

Business Forms
- Catalog
- Purchase Order
- Invoice

Measurements
- Time
- Currency
- Weight

Locale
- Address (core)
- Country (core)
- Language (core)

Classification
- SIC
- NAICS
- FSC
CBL Document Architecture for B2B

Market Registration
- Company
- Name
- Address
- Agent
- Name
- Title
- Role
- Buyer

Purchase Order
- Buyer
- Name
- Address
- Product
- SKU Number
- Manufacturer
- Model
- Order Quantity
- Price
- Payment Method
- Account Number

Catalog Description
- SKU Number
- 10023
- Product Type
- Laptop
- Manufacturer
- IBM
- Model
- ThinkPad 560
- Speed
- 166MHz
- List Price
- $3500.00

ERP Query
- SKU Number
- 46747456
- In Stock
- 6
- Customer Price
- $1500.00

Wallet
- Card 1
  - American Express
  - 123-234-4444
- Card 2
  - Visa
  - 001-234-5678
Common Business Library Status

- CBL v1.1 contains several dozen DTDs and modules
  - can be freely downloaded from www.veosystems.com
- CBL has been deployed in several pilots
  - Project Seitai, GSA catalog interoperability
- CBL submitted to CommerceNet’s eCo Working Group to seed a public XML repository
  - HP, Intel, IBM, Microsoft, Netscape, Sun, (~20 others)
  - Senior architects from leading standards initiatives including OBI, OTP, RosettaNet, XFDL, ICE, and XML-EDI
Plug and Play Commerce - Veo Systems’ Technology
Veo Systems’ Plug and Play Commerce

- All Web commerce sites and services are treated as reusable components whose interfaces are expressed as documents.
- These “market participants” interoperate because they share a common semantic framework based on the open Common Business Library.
- They can be linked to create virtual companies, markets, and trading communities.
“Loose Coupling” via Shared Document Models

- Business systems and services are integrated via the documents they exchange rather than via their application interfaces.
- Shared document definitions provide an intuitive framework for specifying the business logic and computations that take place on each end of the exchange.
Businesses are collection of services

Customer Registration
Vendor Establishment
Proposal
Product Information
Pricing
Purchasing
Invoicing
Inventory

Parts Ordering
Contracting
Credit Authorization
Shipping
Tracking
Order Status Reporting
Receipt Confirmation
Many, many, more ...
Documents are input/outputs of services

Customer Profiles
Vendor Profiles
Catalogs
Datasheets
Price Lists
Purchase Orders
Invoices
Inventory Reports

Bill of Materials
Contracts
Credit Reports
Shipping Reports
Tracking Reports
Order Status Reports
Receipts
Many, many, more...

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“Loose Coupling” via Shared Document Models

- Five shared document definitions are implied in these two business rules:
  - if you send me a request for a catalog, I will send you a catalog
  - if you send me a purchase order and I can fulfill it, I will send you a shipping notice and an invoice
<service>
  <service.name> ... 
  <service.location> ... 
  <service.op>
    <service.op.name> ... 
    <service.op.inputdoc>... 
    <service.op.outputdoc>...
  </service.op>
  ... 
</service>
<service>
  <service.name>Order Service</service.name>
  <service.location>www.veosystems.com/order</service.location>

  <service.op>
    <service.op.name>Submit Order</service.op.name>
    <service.op.inputdoc>po.dtd</service.op.inputdoc>
    <service.op.outputdoc>poack.dtd</service.op.outputdoc>
  </service.op>

  <service.name>Track Order</service.name>...
</service>
Businesses Interact Through the Services They Offer and Consume

Catalog Integration Service
Integrates catalogs from other Catalog Services

Requests integrated catalog

XML

Business A

Business B

Catalog Service

Business C

Catalog Service

Business D

XML
Makes It Possible to Have “Plug and Play” Businesses and Commerce

XML

Catalog Integration Service

Integrates catalogs from other Catalog Services

Requests integrated catalog

Business A

Business B

Catalog Service

Catalog Service

Business C

Business D

Business E

XML

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Adding Services Incrementally
Supply Mess: Ad Hoc Integration

Vendors

Distributors

Resellers

Buyers
Supply Web: Exchange of XML Documents

Vendor

Distributor

Reseller

Customer
XML Enables Plug and Play Commerce

- XML is the key breakthrough that makes the Web “smart enough” to be used by programs instead of just “by eyes”
- Internet commerce will scale qualitatively when businesses publish rich and interoperable schemas for product catalogs and service descriptions
- Loose coupling via shared document definitions in service interfaces is the key to scalable integration
XML and Interoperable Documents

“Untangling the Web”
25 April 1998

.."But the biggest role that XML is expected to play is in integrating the way that existing paper documents -- invoices, loan applications, contracts, insurance claims, you name it are exchanged between organizations around the world. Imagine what the world would be like if one company's computer system could automatically read any other organization's documents - and make complete sense of them? This is the goal that the technique known as EDI has struggled, unsuccessfully, to achieve for years. Though efforts have barely begun, there is a chance that XML could actually make that happen. If it did, business on the Web could run riot."