XML as the Foundation for e-Marketplaces

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Bob’s Mini-Biography

- Stanford BA, Wang Inst. MS, UCSD Ph.D.
- 20+ years of R&D and consulting experience in text processing, user interface design, online publishing, electronic commerce
  - Bell Labs
  - CMU Software Engineering Institute
- Founder or co-founder of three companies
  - 3rd one was Veo Systems:
    - pioneered XML in e-commerce, acquired by Commerce One in January 1999
- At Commerce One, (formerly) responsible for XML architecture / standards / interoperability: “Document Engineering”
Outline

- Business Model and Technology Co-evolution for e-commerce
- The XML Revolution
- Electronic Marketplaces and Marketplace Networks
- Document Exchange Architecture
- The XML Common Business Library
- xCBL in the Global Trading Web
- Commerce standards as “Marketsite Onramps”
Business Model and Technology Co-Evolution for E-Commerce
Traditional Electronic Business

- Traditional models for electronic business are based on long-term, point-to-point, and tightly coupled relationships.
- Electronic Data Interchange (EDI) used since 1980s to automate routine transactions between established trading partners, especially for direct goods, supply chains.
- But EDI syntax not programmer or Web-friendly.
- Not well-suited for small businesses or more spontaneous, open market transactions like indirect procurement.
Traditional Enterprise-Centric View for e-Business

Enterprise

Supply Chain

Indirect Procurement

Customers
Sample EDI Message

20000305:102' DTM+158:20000305:102' DTM+159:20000722:102' NAD+SU+98765432
NY'NAD+MI+88835':92'GIS+37'NAD+ST+72681':92'LIN+++93235494:IN'PIA+1+0
04'REF+ON:XXX00004'QTY+79:6660:EA'DTM+51:19991225:102'DTM+52:20000304
20000313:102'SCC+4+6W:16'QTY+1:900:EA'DTM+158:20000320:102'QTY+1:900:
0:EA'UNT+73+770001'UNZ+1+77'UNB+UNOA:2+BFT:ZZ+CAT:ZZ+000305:2338+78++
Business Trends

- Relentless search for competitive advantage
- Ruthless efficiency necessary for survival
- Accelerating cycle times
- Focus shifting from administrative efficiency in the enterprise to winning in the marketplace
Business Inefficiencies

• Lack of real time information for basic business decisions
• Inability to connect supply to demand increases costs and limits revenue
• Disparate technology across the value chain makes planning & collaboration slow and expensive
Problem/Solution Mismatch

- Current problems primarily result from poor visibility and collaboration with external commercial relationships.

- Current solutions provide tools that focus on internal administrative and control processes of the enterprise.
The Internet Was Supposed to Change Everything

The Internet will enable new business models for marketplaces, trading communities, outsourcing, open sourcing, buying consortia, auctions, supply chain integration and “virtual enterprises” that are fundamentally different...
Networks of Commerce Communities

- Assembly Outsourcing
- Distribution
- Customers
- Markets
- Enterprise
- Supply Chain
- Indirect Procurement
- Procurement Outsourcing

Commercia Networks of Commerce
Evolving Solutions Roadmap

- **Complex Business Process / Direct Goods**
  - Collaboration, Logistics, Forecasting,
  - Supply Chain Management

- **Simple Buying & Selling**
  - Indirect goods

- **Point to Point**
  - Phone, Fax, EDI

- **e-Marketplace to e-Marketplace**
  - E2E Connectivity
Evolution of Business Technology

Enterprise Model
- Calculation
- Host based Computing
- Internal
- Control
- Single Data Model
- Single Entity Process
- Administration

E-Marketplace Model
- Communication
- Internet Computing
- Inter-entity
- Collaboration
- Multiple Data Models
- Inter-entity process
- Commerce
Internet Business Models & Integration Requirements

- Business models and relationships are experimental and evolving and have shorter lifetimes overall
- “Describe once, {sell,buy} anywhere” is the goal
- Both initial integration cost and incremental cost to evolve must be low
- Point-to-point coupling approaches won’t scale
Connecting with HTML ("by eye")

HTML encoding can’t carry the information that is needed for automated e-commerce --> manual data entry or "scraping and hoping"
HTML’s Limitations for Integration

- The Web was created as a publishing medium, not as an e-commerce platform.
- HTML, the Web’s language for encoding information, is format-oriented and meant to be understood “by eye”:
  - simple structures: headings, lists, links
  - Browsers are “hard wired” to render HTML as web pages
- No content-based encoding means that HTML can’t be effectively searched or processed by business applications.
<body>
<p><b>The Compaq Armada300 Family</b></p>
<ul>
<li>Ultra portable form factor - 3.2 - 3.4 lbs. light and .9 in. thin</li>
<li>Large 12.1 in. CTFT display and full function keyboard at 95 percent full notebook size</li>
<li>Intel Mobile Pentium III processor</li>
<li>$2,399 is the Internet price for the Armada M300 part number 165288-002</li>
<li>Compaq recommends Windows 2000 Professional for business</li>
</ul></body>
The XML Revolution
XML: Extensible Markup Language

- Instead of a fixed set of format-oriented tags, XML allows you to create whatever set of tags are needed for your type of information.
- This makes any XML instance “self-describing” and easily understood by computers and people.
Gratuitous Clip Art Slide

HTML

Browsers

XML

Computers

Computers

Browsers
XML’s Big Idea: Document Types

XML allows you to create whatever set of tags are needed for your type of information

- Catalogs
- Price Lists
- Purchase Orders
- Invoices
- Inventory Reports
- Bill of Materials
- Payments
- Schedules
- Forecasts
- ….whatever you need

The formal definition of permitted elements, attributes, and the rules by which they combine is called a Document Type Definition or DTD or schema
Catalog Entry in XML

<computer type="Notebook">
  <oem series="Armada300">Compaq</oem>
  <specs>
    <partno>165288-002</partno>
    <display type="CTFT" unit="in">12.1</display>
    <processor>Intel Mobile Pentium III</processor>
    <weight unit="lb">3.2</weight>
    <price currency="USD">2399</price>
    <os>Windows 2000 Professional</os>
  </specs>
</computer>
Smart Processing with XML

- XML enables content and hierarchical encoding and separates that from formatting, which is controlled by browser “style sheets”

- `<computer>` and `<specs>` provide logical containers for extracting and manipulating product information as a unit
  - could sort products by `<oem>`, `<processor>`, `<weight>`, `<price>`, etc.

- Explicit identification of each part enables its automated processing without “scraping and hoping”
  - Convert `<price>` from “USD” units to Euro, Yen, etc.
Connecting using XML

**Benefit:** XML can be processed automatically with huge cost savings

**Problem:** Company 1 and Company 2 have to agree on document format
Electronic Marketplaces and Marketplace Networks
E-Marketplace Architecture

An e-marketplace is a destination on the Internet built on a commerce platform that brings businesses together to conduct e-commerce.

Suppliers of Indirect Goods

Suppliers of Direct Goods

Suppliers of Business Services

Buyers of Goods & Business Services
Marketplace Networks
Commerce One E-Marketplace Solution

- Commerce One creates a highly transparent commerce community with suppliers, partners, and customers
- Commerce One provides a complete e-business solution
  - Strategy, Platform, Software, Services
- Commerce One accesses existing enterprise systems with the disparate technologies of suppliers, partners, and customers
Commerce One’s Global Solutions for B2B

Horizontal

1. Only Complete B2B end-to-end solution for Buyers & Sellers, Market-makers

2. 34 Portals providing infrastructure and trading services as part of the Commerce One Global Trading Web

3. Adopted by industry leading Market Makers across Multiple Industries

4. 1000s of Buyers & Sellers e-Commerce enabled by Commerce One

5. Live Today and Processing tens of thousands of e-Commerce transactions!
Making Money in B2B -- Vendors

- Selling software and services to create the e-marketplace technology foundation
- Fees based on the complexity and volume of transactions
  - what counts as a transaction?
  - who pays the fees -- buyers or suppliers?
  - fees for exchange-to-exchange transactions and syndicated services
- Ongoing sales of licenses, services, and transaction fees associated with technical and functional improvements
Making Money in B2B -- Vendors and Customers

- **Equity**
  - owning a share of the new company created to run an e-marketplace
  - only valuable if the company can go public
  - not going to happen anytime soon
Making Money in B2B -- Customers

- Market efficiency
  - driving costs out of supply chain for all participants
  - exploiting & refining existing business relationships & experience
    - putting an external “market face” on enterprise applications

- Standards are crucial to these concerns
Maximize The Network Effect by Interconnecting the Marketplaces

- Connect once, trade anywhere
  -- drives the “network effect”
  and value increases exponentially for everyone in the trading community:
  - Buyers
  - Suppliers
  - Net Market Makers
  - Mega Exchanges
  - Business Service Providers
The Global Trading Web

- The Global Trading Web is the world’s largest business-to-business Internet trading community, comprised of many open e-marketplaces, accelerating the movement of global trade onto the web.

“The Global Trading Web is the Internet enhanced for business.”
Regional E-Marketplaces that connect you around the Global Trading Web

Australia & New Zealand

United States

United Kingdom

Canada

Central and South America

Southeast Asia

Switzerland

Germany

Italy

South Africa

Japan Consortium

Sinar Mas Group

BayanTrade.com

SE Asia Consortium

Philippines Consortium

French Consortium

Taiwan Consortium

French Banks

Citi

S.Korea Consortium

Sinar Mas

S.Korea Consortium

S.Korea Consortium

S.Korea Consortium

Greater China Consortium

French Banks

S.Korea Consortium

S.Korea Consortium

SE Asia

Greater China

Israel Consortium

India Consortium

Asia2B

COMMERCE ONE

India Consortium

S.Korea Consortium

PeopleSoft

Spain

Portugal

Trade.com

opcional.com

CABLE & WIRELESS OPTUS

All You Business Needs Online

SAMi

SAMi

SAMi

SAMi

SAMi

SAMi
E-Marketplaces -- Industry Consortia

- Telecommunication
- Automotive
- N. America Utilities (5 Companies)
- Global Utilities (15 Companies)
- Metals & Mining (16 Companies)
- Japanese Gas, Chemicals & Utilities
- Film and Television
- Energy
- Forest Products
- Outdoor Products and Services
- Electronics
- e-Procurement Consortium (14 Companies)
- N. America Utilities (5 Companies)
- Telecommunication
- Automotive
- N. America Utilities (5 Companies)
- Global Utilities (15 Companies)
- Metals & Mining (16 Companies)
- Japanese Gas, Chemicals & Utilities
- Film and Television
- Energy
- Forest Products
- Outdoor Products and Services
- Electronics
- e-Procurement Consortium (14 Companies)
Document Exchange Architecture for Electronic Marketplaces and Marketplace Networks
What Defines a Marketplace?

- The “market maker/operator”
- The participating businesses
- The services these businesses provide to each other
- The messages and documents that are exchanged to request and perform the services
If you send me a catalog request, I will send you a catalog.

If you send me a purchase order and I can fulfil it, I will send you a purchase order response.
XML Document Exchange Architecture

- Document exchange is a more natural way to think about doing business
  - Less brittle than APIs (how enterprise sw vendors think)
  - More consistent with legacy EDI
- XML is application and vendor neutral, making it easy to provide “open” marketplace with 3rd party buying and selling apps and other marketplace services like payment, taxation, logistics…
- Document exchange between marketplaces is fundamentally the same as within a marketplace -> Global Trading Web
The XML Common Business Library (xCBL)
There are many different “standard” document formats

Problem: Individual companies mapping to every other company’s document formats doesn’t scale
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?
XML and Metcalfe’s Law

- Traditional EDI approach:
  - BIG COMPANY: Speak MY language or I won’t do business with you!
  - SMALL COMPANY: Yes, master.
XML and Metcalfe’s Law

- The XML approach:
  - Excuse me, please, here are the rules of my language if you’d like to speak with me…
N x N Document
Mapping Doesn’t Scale!

Map Document Formats??
The XML Common Business Library

- The FIRST “horizontal” XML specification (started 3/97)
  - a set of reusable XML components that are common to many business domains
  - a framework for creating documents with a common architecture
  - we were so far out in front here that this work was partly funded by a research grant from the US Department of Commerce’s Advanced Technology Program in October 1997

- Documents built and extended according to the CBL frameworks can be understood from their common message elements
Building Documents from Components

CBL Documents

Business Descriptions
- Vendor
- Services
- Products

Business Forms
- Catalog
- Invoice
- Purchase Order

Measurements
- Time
- Currency
- Weight

Locale
- Address
- Country
- Language

Classification
- SIC
- NAICS
- FSC
XML Component Architecture: The Architectural Key to B2B

- Simple services can be combined into aggregated services to support complex business processes -- and much information is reused from service to service
  - Procurement = catalog + purchase order + shipping notice + invoice + payment etc. ... 
- Intra- and inter-company reuse of information between the different steps in a business process:
  - Drives costs out of business relationships
  - More efficient, robust, and scaleable integration
  - Reduces Inter-enterprise cycle time
  - Extends ERP between enterprises
Information Reuse in B2B Document Architecture

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 Compaq
- Model Armada 300
- Speed 700MHz
- List Price $2200.00

Payment
- Card 1
  - American Express
  - 123-234-4444
- Card 2
  - Visa
  - 001-234-5678

ERP Query
- SKU Number 46747456
- In Stock 6
- Customer Price $1500.00
Evolution of the XML Common Business Library

- xCBL drives and has been driven by Commerce One’s extensive participation on XML and XML/EDI standards activities
- Its ongoing evolution and management are transitioning outside of Commerce One as we make it a de facto (and maybe de jure) standard
xCBL 3.0 Business Processes and Documents (www.xcbl.org)

- Catalogs / Catalog Management (2 documents)
- Order Management (8 documents)
- Shipping/Planning (4 documents)
- Invoicing & Payment (5 documents)
- Availability (4 documents)
- Auction & RFQ (6 documents)
- Trading Partner Information (5 documents)
- Supply Chain Statistics (3 documents)
- ... more on the way (logistics, intn’l trade)
XML {vs., and, or} EDI
Perspective of Company Creating a New Internet Marketplace

Implementation & Maintenance Cost

EDI

XML

Benefit of Using XML Syntax

Time
Perspective of EDI-enabled Buyer or Supplier

Implementation & Maintenance Cost

Cost of creating XML document types and mapping to/from EDI

Time

EDI

XML
So EDI must be part of the solution, too...

- EDI is *NOT* dead. Most of our big customers (auto, aerospace, petroleum, utilities, etc.) are heavily invested in EDI
- We must preserve the business processes and expertise embedded in their EDI implementations
- We do this in a way that supports a technical migration path to XML and a value proposition that justifies making the transition
xCBL Combines EDI and XML

- EDI standards provide a strong non-proprietary semantic foundation for xCBL
- Companies using EDI today see a clear migration path in xCBL for mapping from EDI applications to XML
- SMEs for whom EDI is not cost-effective can use xCBL in simple Web applications to interoperate with EDI partners
Marketplace Operator’s Perspective with xCBL

Implementation & Maintenance Cost

EDI
XML
CBL

Time

Benefit of Using XML Syntax
Benefit of Using XML Schemas and Component Library (CBL)

Benefit of Using XML Syntax
EDI with xCBL

Implementation & Maintenance Cost

Benefit of Mapping EDI to/from CBL

Time

EDI

XML

CBL
xCBL and Interoperability
xCBL 3.0 – The Interoperability Standard

xCBL’s robust component architecture enables it to map between all the major eCommerce document standards.
Trading partners agree to exchange XML documents based on xCBL.

Company “X” transforms xCBL document into another XML schema.

Company “Y” routes and processes the standard xCBL document.

Company “Z” transforms original into a non-XML private data format (EDI, ERP).
How xCBL Enables the Global Trading Web

- Every Marketplace in the GTW begins with standard business services implemented using XML document interchanges defined using xCBL

- This ensures that:
  - some standard versions of common business services are available everywhere
  - the standard messages mean the same thing everywhere
Customization with Interoperability

- Any market operator or business can develop a new or enhanced service, register it and the XML documents that it uses, and make it available to other businesses within its marketplace and throughout the GTW.

- These new or customized services are implemented using the standard components whenever possible.

- This reuse enables vertical and regional Marketplaces to interoperate on the basis of their shared xCBL document cores.
Object-oriented Document Design enables Backward Compatibility

The extensions needed in each industry can be recognized and ignored by the other
Commerce Standards as “Marketsite Onramps”
Commerce Standards are “Marketsite Onramps”

- Not all trading partners will use the same commerce standards
- Commerce One’s efforts in XML standards are working to achieve convergence or harmonization
- But in the meantime, Marketsite needs to be able to connect to anyone regardless of the standard they use
“Connector Onramp”

- Parties connect to MarketSite using Commerce One XML connector technology on both ends to send and receive documents
“Gateway Onramp”

- Trading partner sends/receives using alternate standards with no added work
- MarketSite responsible for
  - Document Mapping
  - Understanding the alternate standard
- MarketSite accepts or sends the alternative protocol in its native form
- MarketSite Operators can charge fees for conversion service