

Document Engineering with UBL:

The Missing Pieces for Web Services

Tim McGrath

OASIS OPEN STANDARDS 2005

Sydney October 28th 2005

DOCUMENT ENGINEERING WITH UBL: THE MISSING PIECES FOR WEB SERVICES
TIM McGRATH AND VIKTOR GLUSHKO
OASIS OPEN STANDARDS 2005
SYDNEY OCTOBER 28th 2005

Personal Introduction



- EDI and e-commerce marketplace in Australia.
- Background in international trade and transport.
- Led the Quality Review Team for ebXML.
- Co-author of “Professional ebXML Foundations” .
- Chair of the Library Content subcommittee of the OASIS Universal Business Language (UBL).
- Co-author of “DOCUMENT ENGINEERING: Analyzing and Designing Documents for Business Informatics and Web Services”.
- Promoting UBL and the Document Engineering approach in Australia, Hong Kong, US, Singapore, Japan, Thailand, Korea, China, UK and Denmark.

Overview



1. Why Businesses use Documents

2. Document Exchange

– its all about “What” not “How”

3. The Interoperability Challenge

4. Why Document Engineering

5. Making It Real With UBL

The background features a light blue network diagram with several nodes connected by lines. Each node contains a 3D folder icon with the text 'BUSINESS INFORMATION' on it. The central text 'Why Businesses use Documents' is overlaid on this diagram.

Why Businesses use Documents

**DOCUMENT
ENGINEERING**

**MODELING FOR
BUSINESS INFORMATICS
AND WEB SERVICES**

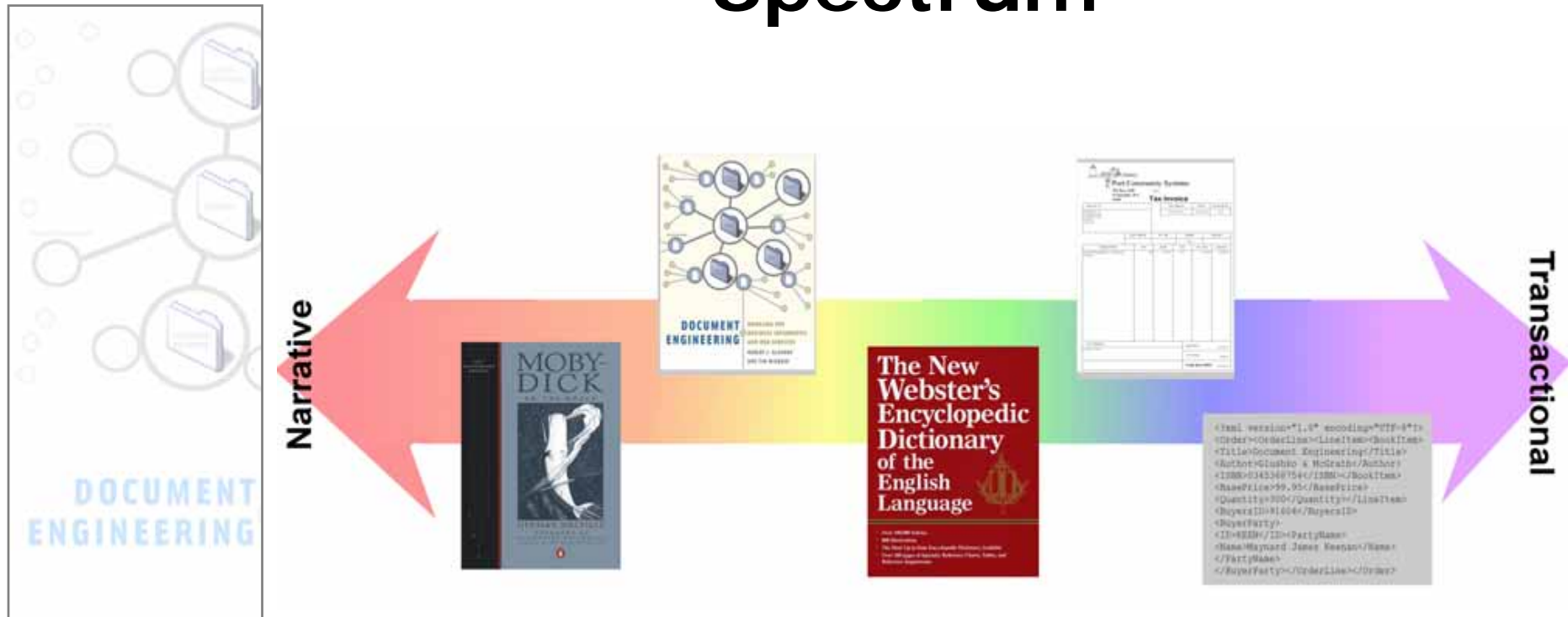
ROBERT J. GLUSHKO
AND TIM McGRATH

Documents are Everywhere



- Documents are a purposeful and self-contained collection of information.
 - Interfaces for people.
 - Interfaces to business processes.
- Documents cover a spectrum of types to suit their target audience.
- Using documents as interfaces allows for loosely coupled business processes.
 - The document (and only the document) connects the processes.

The Document Type Spectrum





Using documents for exchanging business information is natural and intuitive.

Administrative documents

Early Dynastic III, about 2500 BC
Probably from Shuruppak (Fara)

Left: the governor receives 14 shekels of silver from 5 persons, and 46 shekels remain unpaid by 13 other persons. The total amount of silver is 1 mina.

Doing business by document exchange



- Every major advance in technology has brought a corresponding evolution in business processes and the document exchanges they require.
- We don't use pottery, papyrus, and parchment anymore, and electronic versions have replaced many paper documents.

BUT

- The basic idea of document exchange has changed very little.

Pottery Tax Receipt 2500 BCE



XML Tax Receipt 2001 CE



```
<?xml version="1.0" ?>
<!DOCTYPE NAT4191-9.2001>
<NAT4191-9.2001>
  <PERIOD_DATE_FROM>01042001</PERIOD_DATE_FROM>
  <PERIOD_DATE_TO>30062001</PERIOD_DATE_TO>
  <FORM_DUE_ON>28072001</FORM_DUE_ON>
  <PAYMENT_DUE_ON>28072001</PAYMENT_DUE_ON>
  <EMAIL_ADDRESS>maddy.maxie@practiceeci.com</EMAIL_ADDRESS>
  <EFT_CODE>          97999 999 999 9360</EFT_CODE>
  <BILLER_CODE>75556</BILLER_CODE>
  <TAX>500</TAX>
  <TAX_REFUND>200</TAX_REFUND>
  <NET_AMOUNT>300</NET_AMOUNT>
</NAT4191-9.2001>
```

Document Exchange - its all about “What” not “How”

“What have we to say to India?”

DOCUMENT
ENGINEERING

MODELING FOR
DOCUMENT ENGINEERING, OPTICS
AND WEB SERVICES

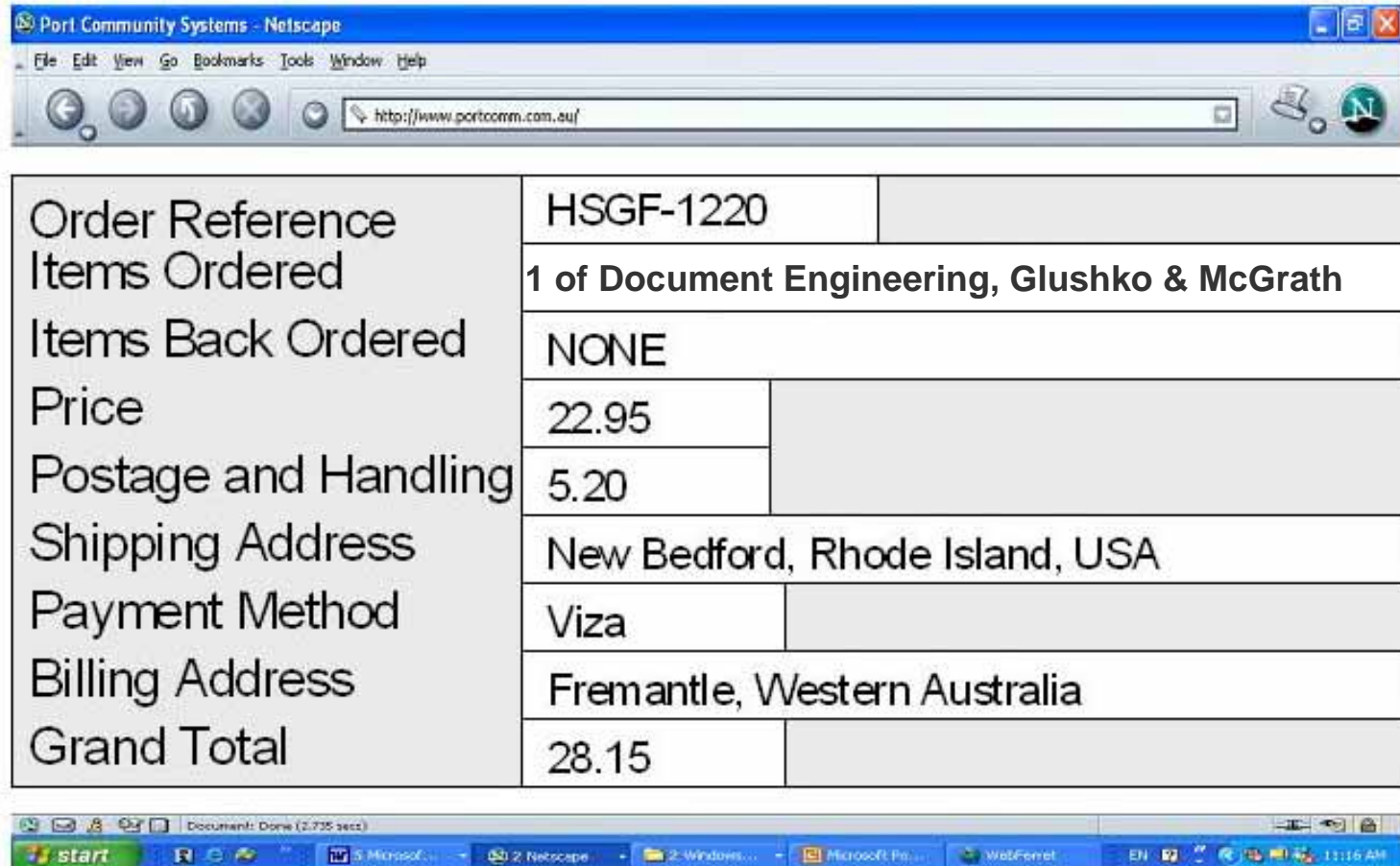
ROBERT J. GLUSHKO
AND TIM McGRATH

Document Exchange



- Document exchange is the mother of all business patterns.
- Business model patterns:
 - marketplace, auction, supply chain, build to order, drop shipment, vendor managed inventory, etc.
- Business process patterns:
 - procurement, payment, shipment, reconciliation, etc.
- Document patterns:
 - catalog, purchase order, invoice, etc.
- Some new business models *are only* document exchanges.

Example: Buying a Book Online - GMBooks.com



Port Community Systems - Netscape
http://www.portcomm.com.eu/

Order Reference	HSGF-1220	
Items Ordered	1 of Document Engineering, Glushko & McGrath	
Items Back Ordered	NONE	
Price	22.95	
Postage and Handling	5.20	
Shipping Address	New Bedford, Rhode Island, USA	
Payment Method	Viza	
Billing Address	Fremantle, Western Australia	
Grand Total	28.15	

Document: Done (2.735 secs)
start | Microsoft... | 2 Netscape | 2 Windows... | Microsoft Pe... | WebFerret | EN | 11:16 AM

The Real Question is “What” not “How”



- But what should these documents contain?
- The real challenge is understanding what the content of documents mean.
 - We call this “interoperability”
- The technologies for Web Services don’t address interoperability.
 - They ignore it.

The Interoperability Challenge

“Words cannot convey the depth of language, and language cannot convey the depth of meaning.”

**DOCUMENT
ENGINEERING**

**MODELING FOR
BUSINESS INFORMATICS
AND WEB SERVICES**
ROBERT J. GLUSHKO
AND TIM McGRATH

Confucius (551-479 BCE)

Interoperability



- A basic requirement for two businesses to conduct business is that their business systems interoperate.
 - The meaning of the information exchanged is understood as intended.
- This has always been true, regardless of the technology used.
- Interoperability requires:
 - that parties can exchange information and use the information they exchange.
 - that the information being exchanged is conceptually equivalent.
- Easy to express but hard to achieve.
 - Variations in strategies, technology platforms, legacy applications, business processes, and terminology.
 - Different “contexts of use”

The Virtual Enterprise

Distributor

Shipping Note

Customer Reference
 Goods Description
 Shipping Address

Delivery Service

Purchase Order

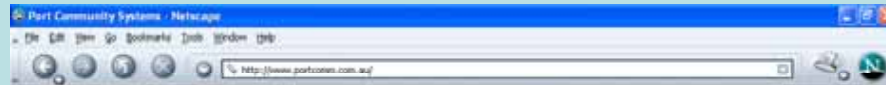
Order Reference
 Item Ordered
 Quantity Required
 Shipping Address

Credit Authority

Transaction Advice

Reference
 Details
 Payment Method
 Billing Address
 Grand Total

GMBooks.com



Order Reference	HSGF-1220	
Items Ordered	1 of Document Engineering, Glushko & McGrath	
Price	99.95	
Postage and Handling	5.20	
Shipping Address	New Bedford, Rhode Island, USA	
Payment Method	Viza	
Billing Address	Fremantle, Western Australia	
Grand Total	105.15	



Customer's View of Buying a Book

The Virtual Enterprise

Distributor

Shipping Note

Customer Reference	HSGF1220
Goods Description	1 of Document Engineering, Glushko & McGrath
Shipping Address	New Bedford, Rhode Island, USA

Delivery Service

Purchase Order

Order Reference	HSGF-1220
Item Ordered	Document Engineering, Glushko & McGrath
Quantity Required	1
Shipping Address	New Bedford, Rhode Island, USA

Credit Authority

Transaction Advice

Reference	99847566663
Details	HSGF-1220 GMBooks.com
Payment Method	Viza
Billing Address	Fremantle, Western Australia
Grand Total	105.15

GMBooks.com

Order Reference	HSGF-1220
Items Ordered	1 of Document Engineering, Glushko & McGrath
Price	99.95
Postage and Handling	5.20
Shipping Address	New Bedford, Rhode Island, USA
Payment Method	Viza
Billing Address	Fremantle, Western Australia
Grand Total	105.15

Customer's View of Buying a Book

Approaches to Interoperability



- Interoperability doesn't require that business systems be identical.
- There are two alternatives:
 1. Build expensive customized tightly coupled solutions,or
 2. Engineer equivalent conceptual models.

What Do We Mean by a Conceptual Model?

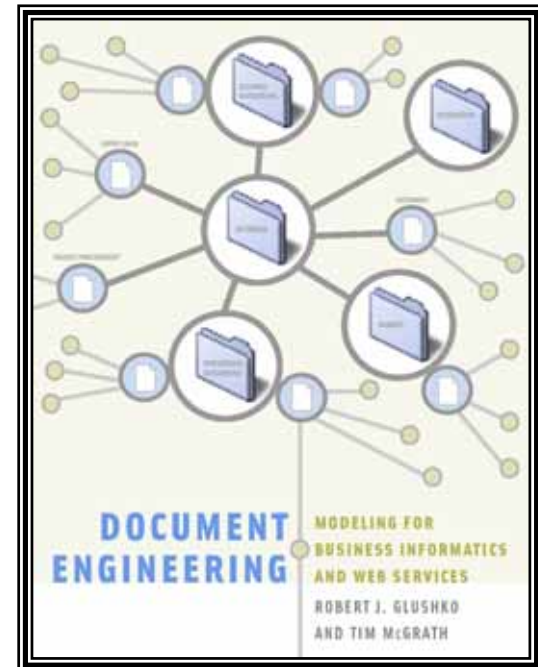
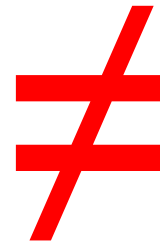


- Simplified description of a subject:
 - abstracts from its complexity.
 - emphasizes some features or characteristics.
 - intentionally de-emphasizes others.
- Remove the features for implementation technology and focus on meaning.
 - Not “how” but “what” (again!)
- Note: an XML schema is a “physical” model
 - Describes the XML expression of documents that share a common information model.
 - Limited by the technology.

XML Documents Are Models Too!



```
<Book>  
  <Title>Document  
  Engineering</Title>  
  <Author>Glushko</Author>  
  <Author>McGrath</Author>  
  <ISBN>0804900337</ISBN>  
  <Publisher>MIT Press</Publisher>  
</Book>
```



Problems with Modeling Documents



- The names of components are only a small part of their semantic definition:
 - XML is not self-describing.
 - modelers will often choose different names for the same component.
- Different document samples can lead to incompatible models.
- All model expressions have technological limitations.
 - XML schemas cannot do everything.
- So how do we solve this challenge?

Why Document Engineering

"If it is true that words have meanings, why don't we throw away words and keep just the meanings?"

DOCUMENT
ENGINEERING

MODELING
BUSINESS INFORMATICS
AND WEB SERVICES
ROBERT J. GLUSHKO
AND TIM McGRATH

Document Engineering



- A new approach to modeling the document exchanges between enterprises as a means of customizing them for particular industries or domains (contexts of use).
- Comprises of a set of analysis and design techniques that yield meaningful models of document exchanges.
- Encourages re-use of common patterns for models.
- Synthesizes ideas from:
 - business process analysis.
 - task analysis.
 - document analysis.
 - data analysis.

Encouraging the use of Patterns



- Patterns are models that are sufficiently general, adaptable, and worthy of imitation that we can use them over and over again.
- Document exchanges for businesses follow common patterns.
- Using patterns ensures applications and services are robust but adaptable when technology or business conditions change (as they inevitably will).

Sidenote on Standards



- Standards are common patterns that have sanction and/or traction.
- Sanction
 - de jure (ISO/UN/IEC)
- Traction
 - de facto (widely used)
- History tells us traction is more important than sanction (HTML, TCP/IP, MS-Word, etc..)
- Sanction is a means to achieve traction – not a goal in itself!
- I prefer the general term “pattern”
 - The rest is marketing and politics.

Patterns Promote Interoperability



- Interoperability requires all members of a trading community to understand the documents.
- This is facilitated when their **syntax** and **semantics** conform to common patterns.
- XML has become the preferred **syntax** for representing information in documents.
- Now we need to define common patterns for the **semantics** of business documents using XML syntax.
 - a “universal” business language

Making it real with UBL

**“Technology neutral
semantic alignment is
unarguably a good thing, but
only standardization on a
single syntax will yield direct
advantages.”**

**DOCUMENT
ENGINEERING**

**MODELING FOR
BUSINESS INFORMATICS
AND WEB SERVICES**

Jon Bosak Chair, OASIS UBL TC
ROBERT J. GLUSHKO
AND TIM McGRATH



The Universal Business Language

- International, royalty-free library of electronic business documents patterns.
- Piloted many of the ideas for Document Engineering.
- Designed in an open and accountable vendor-neutral OASIS Technical Committee.
- Fills the “payload” slot in B2B web services frameworks



UBL is a business vocabulary for XML



HTTP + HTML = Web Publishing

↓ ↓ ↓

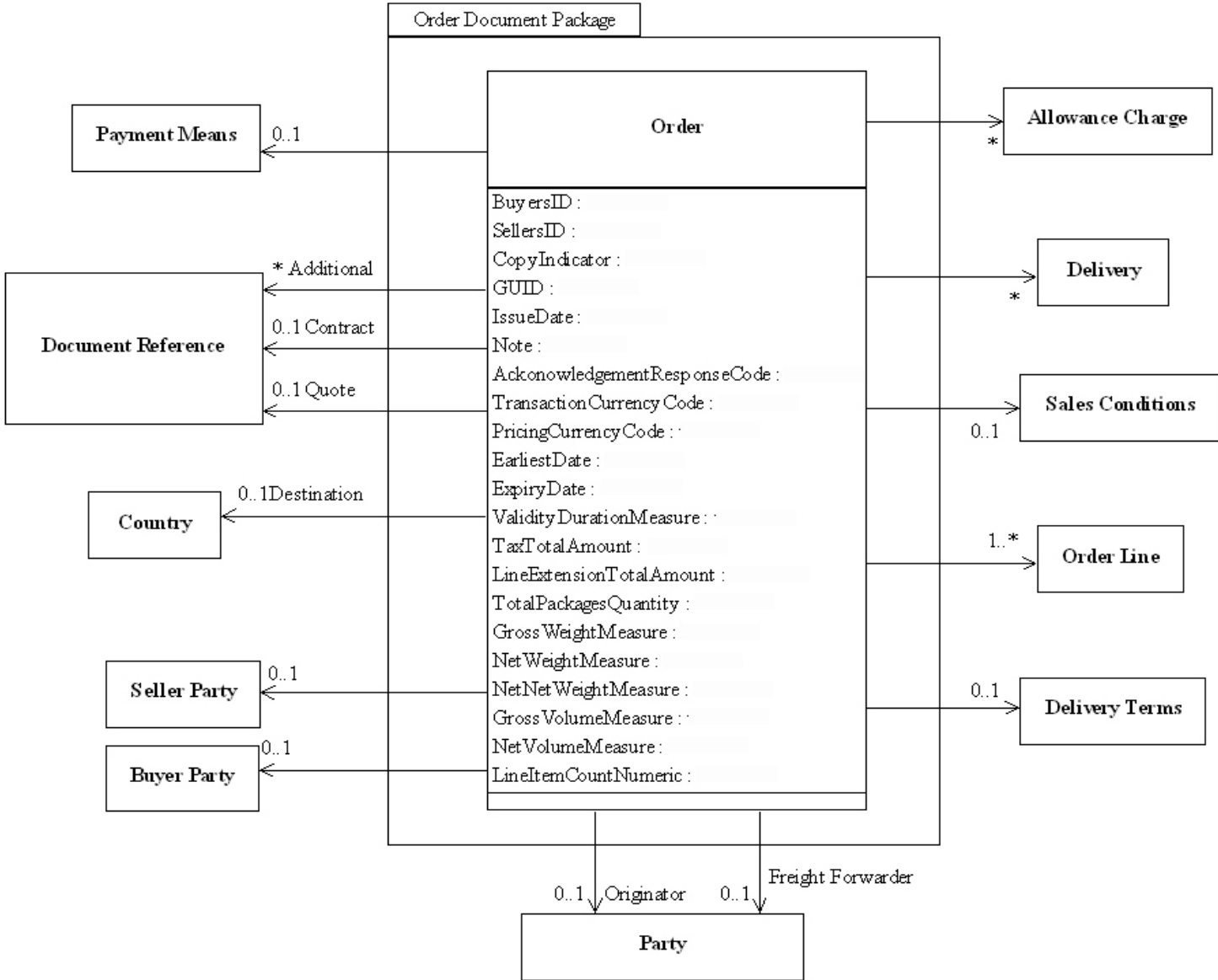
ebXML/WS + UBL = Web Commerce

UBL: the “Fifth Generation” B2B language



- UBL represents over six years of continuous development in the creation of a standard XML business syntax.
- G1 (1Q 1998): CBL 1.0 (Veo/NIST)
- G2 (2Q 1999): CBL 2.0 (Commerce One)
 - plus over 20 years of EDI standards development
- G3 (4Q 2000): xCBL 3.0 (Commerce One and SAP)
- G4 (1Q 2003): UBL 0.7 (OASIS)
- G5 (4Q 2004): UBL 1.0 (OASIS)

Example of a UBL Conceptual Model



Example of a UBL schema



```
<xsd:element name="Order" type="OrderType"/>
<xsd:complexType name="OrderType">
  <xsd:sequence>
    <xsd:element name="BuyersID" type="udt:IdentifierType" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="SellersID" type="udt:IdentifierType" minOccurs="0"
maxOccurs="1"/>
    <xsd:element ref="cbc:IssueDate" minOccurs="1" maxOccurs="1"/>
    <xsd:element ref="cbc:Note" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="EarliestDate" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cbc:ExpiryDate" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="ValidityDurationMeasure" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cbc:TaxTotalAmount" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cbc:LineExtensionTotalAmount" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="TotalPackagesQuantity" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cac:BuyerParty" minOccurs="1" maxOccurs="1"/>
    <xsd:element ref="cac:SellerParty" minOccurs="1" maxOccurs="1"/>
    <xsd:element ref="OriginatorParty" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="FreightForwarderParty" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cac:Delivery" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="cac:DeliveryTerms" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cac:SalesConditions" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="DestinationCountry" minOccurs="0" maxOccurs="1"/>
    <xsd:element ref="cac:OrderLine" minOccurs="1" maxOccurs="unbounded"/>
    <xsd:element ref="cac:PaymentMeans" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```

Example of a UBL Document



```
<BuyersID>20031234-1</BuyersID>
<cbc:IssueDate>2003-01-23</cbc:IssueDate>
<cbc:LineExtensionTotalAmount amountCurrencyCodeListVersionID="0.3"
amountCurrencyID="USD">438.50</cbc:LineExtensionTotalAmount>
<cac:BuyerParty>
<cac:Party>
<cac:PartyName>
<cbc:Name>Bills Microdevices</cbc:Name>
</cac:PartyName>
<cac:Address>
<cbc:StreetName>Spring St</cbc:StreetName>
<cbc:BuildingNumber>413</cbc:BuildingNumber>
<cbc:CityName>Elgin</cbc:CityName>
<cbc:PostalZone>60123</cbc:PostalZone>
<cac:CountrySubentityCode>IL</cac:CountrySubentityCode>
</cac:Address>
<cac:Contact>
<cbc:Name>George Tirebiter</cbc:Name>
</cac:Contact>
</cac:Party>
</cac:BuyerParty>
```

Example of a UBL Implementation



PURCHASE ORDER				Page 1 of 1		
Seller: Joes Office Supply 32 W. Lakeshore Dr Chicago, IL 60022		Purchase order number: 20091234-1				
		Date: 2009-01-23		Seller's reference (quote no.):		
		Buyer's reference:		Other reference (contract no.):		
Consignee: Bills Microdevices 413 N Spring St Elgin, IL 60123		Buyer: Bills Microdevices 413 Spring St Elgin, IL 60123				
		Bank bank:				
		Country of origin:		Country of destination:		
Mode of transport:	Date of dispatch:	Terms of delivery:		Location:		
Means of transport:	Place of dispatch:	Special terms: Signature Required		Currency of payment:		
Vessel/flight No.:	Port of loading:	Terms of payment:				
Port of discharge:	Place of delivery:					
Shipping marks, container number:		No. and kind of packages, description of goods:		Total gross weight (kg):		Total volume (m³):
				Total net weight (kg):		
Item reference	Description	Quantity of origin	Quantity of order	Quantity	Unit price	Amount
1	Pencils, box #2 red			5	2.50	12.50
2	Photocopy Paper- case			10	30.00	300.00
3	Pens, box, blue finepoint			10	5.00	50.00
4	Tape, 1in case			3	12.50	37.50
5	Staples, wire, box			10	1.00	10.00
6	Pens, box red felt tip			5	5.00	22.50
7	Mousepad, blue			12	.50	6.00
Totals:					Total amount:	
					438.50	

14 2008-09-09



UBL 1.0



- Released May 1st 2004
- Basic Procurement Business Process Model
 - Order to Invoice
- XML Schemas (W3C XSD)
 - Order to Invoice Documents
 - Re-usable Common Component Library
- XML (XSD) Naming and Design Rules
- Guidelines for schema customization.
- Pattern library of conceptual models.
- Forms Presentations and sample documents
- Download at : <http://www.oasis-open.org/committees/ubl>



Recent UBL Developments

- UBL International Data Dictionary:
 - 600 elements translated into Chinese (Simplified and Traditional), Japanese, Korean, and Spanish.
- UBL Naming and Design Rules (NDR)
 - adopted by chemical industry (CIDX), petroleum (PIDX), agriculture (RAPID), real estate (OSCRE/PISCES), U.S. Department of the Navy (DON), U.S. Taxation (IRS).
- UBL Invoice used by the Danish Govt.
 - February to April 2005, more than one million invoices exchanged.
 - Estimated savings 94 million Euro annually.
- UBL Invoice used by the Swedish Govt.
 - Announced September 2005.
- Small Business Subset
 - Simple implementation guide for SMEs.



Work Plan for UBL 2.0

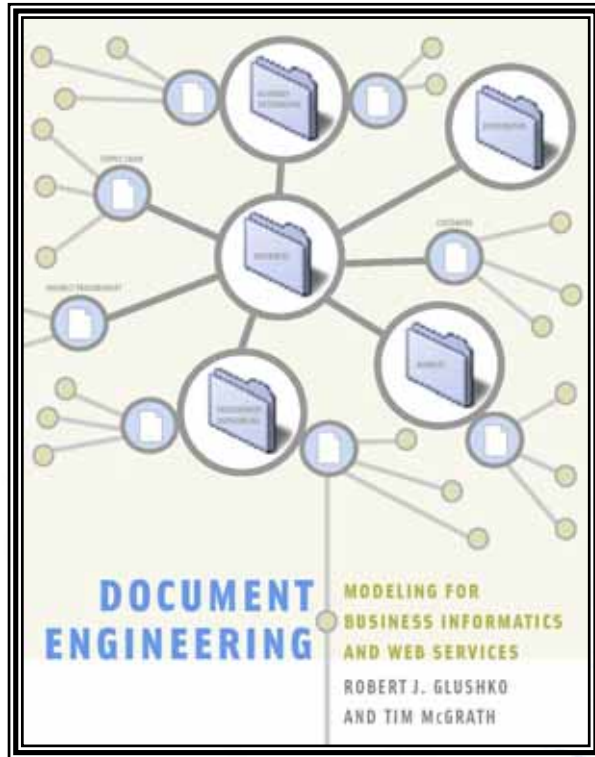
- Extended library.
 - Extended Procurement Process (Europe).
 - Transportation Process Documents (Asia).
 - Electronic Catalogue process (Europe).
- Improved library.
 - Improve architecture.
 - Better document engineering.
- Aligning with UN/CEFACT projects.
 - Core Component Type library.
 - UN/eDocs.
- Release early 2006.



Summary



- The basic idea of document exchange has changed very little.
- Using documents as interfaces allows for loosely coupled business processes.
- Some new business models are only document exchanges.
- The real challenge is understanding what the content of documents mean.
- Interoperability requires that parties can exchange information and use the information they exchange.
- The best way to support interoperability is to engineer equivalent conceptual models.
- Document Engineering comprises of a set of analysis and design techniques that yield meaningful models of document exchanges.
- Document exchanges for businesses follow common patterns.
- Interoperability requires all members of a trading community to understand common patterns of document syntax and semantics.
- The Universal Business Language is an international, royalty-free library of electronic business documents patterns



Thank You

... available from MIT Press
(and here!)

DOCUMENT
ENGINEERING

MODELING FOR
BUSINESS INFORMATICS
AND WEB SERVICES

ROBERT J. GLUSHKO
AND TIM McGRATH

tmcgrath@portcomm.com.au

