Application Servers
G22.3033-003

Session 7 – Sub-Topic Presentation
Business Model Engineering

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Agenda

• Business Process Interoperability
• EDOC and ebXML
• Component Collaboration Architecture
• ECA Entity Profile
• ECA Business Events
• EDOC Business Processes
• Patterns
Part I

Business Process Interoperability

Semantic Web & Ontology

• Semantic Web
  – Machine-processible semantics of data
    • Semantic annotation, XML, RDF
  – Explicit representation of the semantics of data accompanied with domain theories (i.e. ontologies)
  – Lead to a highly knowledgeable world-wide system

• Ontology
  – “specifications of a shared conceptualization of a particular domain”
  – Describe the semantics of information exchange
  – Ontology description tools: ontolingua, OIL, DAML
Generic Interoperability Methodology

- Example: ECIMF methodology

 Generic Interoperability Methodology

- Example: Relationship between the ECIML and other modeling standards.
Semantic Translation Layer

- Mapping concepts from different ontologies

Semantic Translation Layer

- Semantic Translation meta-model
Business Process Mediation Layer

- Example scenario that requires Process Mediator.

Business Context Matching

- Business Context model as seen by the shipping agency.
Business Context Matching

1 - GIVE

- Business Context model as seen by the customer

Process Mediation

<table>
<thead>
<tr>
<th>Party</th>
<th>Collaboration Task</th>
<th>Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td></td>
<td>NIF 2.0</td>
</tr>
<tr>
<td>ShippingAgent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction name</th>
<th>Initiator / Responder</th>
<th>Request document</th>
<th>Response document</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPSAT: Request for quote</td>
<td>Initiator</td>
<td>QuoteRequest</td>
<td>QuoteConfirm</td>
</tr>
<tr>
<td>PPSAT: Request Order</td>
<td>Initiator</td>
<td>PORequest</td>
<td>POConfirm</td>
</tr>
<tr>
<td>PPSAT: Notify of Invoice</td>
<td>Responder</td>
<td>Invoice</td>
<td></td>
</tr>
<tr>
<td>PIPPS: Notify of remittance advice</td>
<td>Initiator</td>
<td>RemittanceAdvice</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Party</th>
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<th>Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>ShippingAgent</td>
<td></td>
<td>EDP/FACT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction name</th>
<th>Initiator / Responder</th>
<th>Request document</th>
<th>Response document</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPSAT: Request for quote</td>
<td>Responder</td>
<td>RESQUOTE</td>
<td>QUOTES</td>
</tr>
<tr>
<td>PPSAT: Request Order</td>
<td>Responder</td>
<td>ORDERS</td>
<td>ORDER</td>
</tr>
<tr>
<td>Notify of Invoice</td>
<td>Initiator</td>
<td>INVOICE</td>
<td></td>
</tr>
<tr>
<td>Notify of remittance advice</td>
<td>Responder</td>
<td>REMADV</td>
<td></td>
</tr>
</tbody>
</table>

Message delivery control: Any APEXAK/CONTRAL
Process Mediation

Semantic Translation

- Semantics of the two corresponding concepts

<table>
<thead>
<tr>
<th>Customer: TV-set</th>
<th>Semantic Translation</th>
<th>Shipping Agency: Box</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Properties</strong></td>
<td><strong>Mapping Rules</strong></td>
<td><strong>Properties</strong></td>
</tr>
<tr>
<td>Height</td>
<td>TV_set → Box: dimension values will always be higher, but discrete. Need to be obtained from a product catalogue (external resource)</td>
<td>Height</td>
</tr>
<tr>
<td>Width</td>
<td>TV_set → Box: dimension values will always be higher, but discrete. Need to be obtained from a product catalogue (external resource)</td>
<td>Width</td>
</tr>
<tr>
<td>Depth</td>
<td>TV_set → Box: dimension values will always be higher, but discrete. Need to be obtained from a product catalogue (external resource)</td>
<td>Depth</td>
</tr>
<tr>
<td>Not available (N/A)</td>
<td>TV_set → Box: needs to be obtained from a product catalogue (external resource)</td>
<td>Not available (N/A)</td>
</tr>
<tr>
<td>Fragile</td>
<td>Fragile: Marks the payload as fragile (requiring special care during transportation)</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Color:</td>
<td></td>
</tr>
<tr>
<td>Style</td>
<td>Style:</td>
<td></td>
</tr>
<tr>
<td>ProductID</td>
<td>ProductID:</td>
<td></td>
</tr>
<tr>
<td>StackLevel</td>
<td>StackLevel:</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Weight:</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>Dimensions:</td>
<td></td>
</tr>
</tbody>
</table>
Semantic Translation

- Analyze the message delivery control mechanisms

<table>
<thead>
<tr>
<th>Customer (RNIF)</th>
<th>Semantic Translation</th>
<th>Shipping Agency (EDI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SecureFlow</td>
<td>Document</td>
<td>APERAK</td>
</tr>
<tr>
<td></td>
<td>Signal</td>
<td>ORDERS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>INVOIC</td>
</tr>
<tr>
<td>Bapck</td>
<td>Exception</td>
<td>ORDERS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>INVOIC</td>
</tr>
<tr>
<td>RptAdExc</td>
<td>GeneralExc.</td>
<td>REMedy</td>
</tr>
</tbody>
</table>

SecureFlow consists of a business document (containing business data) and a responding business signal (acknowledgement).

ReceiptAckException

This signal means the document business data has been accepted for further processing (which implies also well-formedness).

ReceiptAck

This signal means that the document business data has been accepted for further processing (which implies also well-formedness).

This message is sent when parsing errors occur. Business data was not considered at all.

The semantics of both messages is identical, which means a 1:1 mapping can be applied, both ways.

In this particular case, the EDI system uses APERAK and CONTRL messages only to signal exceptions. Acknowledgements are implicit, in the form of response business documents.

The RNIF business documents map 1:1 to EDI business messages, e.g.:
- QuickReport ← REQUOTE
- QuickConfirm ← QUOTES
- PONRequest ← ORDERS
- POCOnfirm ← ORDRSP

However, individual data elements can be missing, and will have to be collected from the previous messages, or supplied explicitly in the rules, or obtained from external resources.

Syntax mapping

- Message syntax mapping
Shared ontology approach to semantic translation

Multiple ontologies + labels

Shared ontology

local ontology

local ontology

local ontology

Part II

EDOC and ebXML
Vision

• EDOC
  – Simplify the development of component based EDOC systems by means of a modeling framework, based on UML 1.4 and conforming to the OMG Model Driven Architecture.
  – Provide a platform independent, recursive collaboration based modeling approach that can be used at different levels of granularity and different degrees of coupling, for both business and systems modeling.
  – Embrace MDA – Provide design and infrastructure models and mapping

• ebXML
  – Creating a single global electronic market

The Internet Computing Model

• Collaboration of independent entities
• Document exchange over internet technologies
  – Large grain interactions, not “method calls”
• No required infrastructure *
• Long lived business processes
• Business transactions

* Not technical transactions


**Requirements for the “ICM”**

- **Contract of Collaboration**
  - Meta-Model (EDOC-ECA) and representation (I.E. XMI, ebXML-BPSS)
  - Shared Repository for Contracts (MOF, UDDI, ebXML)
  - Tightly coupled systems may simulate the repository with file exchange (I.E. IDL)

- **Connectivity which meets requirements of the contract**

- **Implementation of each contract role providing connectivity** (application server)

Contract of collaboration can be mapped to the format of various technologies. (ebXML, Soap, .NET)

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**Two levels of interoperability**

- **Instance data and interoperability**
  - ebXML Over Soap Over Soap
  - Biztalk Over Soap

- **Metadata (model) interoperability**
  - ebXML EDOC-ECA Biztalk

Each can be transformed
Drilling down – inside a role

- Inside one role you frequently find more
- Collaborating “parts” of the enterprise
- Until you get to a role within a domain
  - These can share resources!
  - E.G. Common access to a DBMS or Service
  - Exist within a managed domain
  - Can also be a legacy application

ebXML does not go here, Only EDOC-ECA

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Standards for collaboration

<table>
<thead>
<tr>
<th></th>
<th>EDOC-ECA</th>
<th>ebXML-BPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Collaborations</td>
<td>Yes – Community Process</td>
<td>Yes – Multi Party Collaboration</td>
</tr>
<tr>
<td>Contract of Interaction</td>
<td>Yes – Protocol with Choreography &amp; Object Interface</td>
<td>Yes – Binary Collaboration with Choreography and Business Transactions</td>
</tr>
<tr>
<td>Content Model</td>
<td>Yes – Document Model</td>
<td>Uses external forms, such as XML Schema</td>
</tr>
<tr>
<td>Recursive Composition</td>
<td>Yes – Recursive Composition into Enterprise</td>
<td>No – Only “B2B”</td>
</tr>
<tr>
<td>Detail sufficient to drive communications</td>
<td>No – Requires technology mapping</td>
<td>Yes – As ebXML transport. BPSS includes timing and security parameters.</td>
</tr>
<tr>
<td>Computing Models Supported</td>
<td>Internet document exchange, entities, business processes, objects and events</td>
<td>Internet document exchange</td>
</tr>
</tbody>
</table>

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Parts of EDOC

- Enterprise Collaboration Architecture (PIM)
  - Component Collaboration Architecture
  - Business Process Specification
  - Entities
  - Business Events
  - Patterns
- Technology Mapping (PSM)
  - Flow Composition Model (Messaging)
  - EJB & Corba Components
  - ebXML (In progress)
  - Others…
- MAPPING – Models are the standards and are source code

Enterprise Architecture
Parts of ebXML

- Business Process Specification (Like CCA)
  - XML Representation of business process
- Core Components
  - Business Data Types
- Collaboration Protocol Profile
  - What business partners implement what business processes using what technologies
  - One-One agreement for doing business
- Transport Routing & Packaging
  - Messaging Built on Soap
- Registry & Repository
  - Finding business partners, document and process specifications
Summary of points thus far

- We must enable the emerging Internet Computing Model
  - Loosely coupled roles exchanging documents based on a contract of collaboration
- Web need interoperability at two levels
  - Messaging for the data
  - Metadata for the contract of collaboration, stored in repositories
- This model of collaborating roles is recursive, extending into the enterprise, into managed domains and into applications
  - Inside the enterprise we want to include resources entities, business events and business processes
- Between EDOC & ebXML we are covering B2B and intra enterprise

Part III

Component Collaboration Architecture
(the model of doing)
The Marketplace Example

Mechanics Are Us
Buyer

Order
Conformation

GetThere Freight
Shipper

Shipped

Physical
Delivery

Process
Complete

Acme Industries
Seller

Ship Req

Shipped

Delivered

The Seller’s Detail

Order
Conformation

Shipped

Ship Req

Shipped

Delivered

Order Processing

Shipping

Event

Receivables
Parts of a CCA Specification

• Structure of process components and protocols
  – Process components, ports, protocols and documents
    • Class Diagram or CCA Notation

• Composition of process components
  – How components are used to specify components
    • Collaboration diagram or CCA Notation

• Choreography
  – Ordering of flows and protocols in and between process components
    • Activity Diagram

The Community Process

• Identify a “community process”, the roles and interactions

• Using CCA Notation
Component structure

Component structure
Defines the “outside”
Contract of a component

Protocol Example

• Specification of a protocol

Protocol OrderBT

Order
OrderConfirmation
OrderDenied

responderRole
Seller

initiatorRole
Buyer
Choreography of Protocol

Object Interfaces

- Use standard interface notation
- Are a subtype of “Protocol” in the MetaModel
- Allow modeling of and integration with classical and/or existing objects
Composition defines the “inside” of a component.

Part IV

ECA Entity Profile
(the model of things)
Adding Entities

- Entities are added to manage entity data
- Entity Roles are managers that provides a view of the same identity in another context
- The Entities have ports for managing and accessing the entities
- Non-entities which are owned by (aggregate into) an entity are managed by the entity
Part V

*ECA Business Events*
*(the model of when …)*
Point to point Event Notification

Pub/Sub Event Notification
Event Example

Part VI

EDOC Business Processes
(the model of how ...)

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**Business Process Model**

- Specializes CCA
- Activity-centric view of a Process
- Expresses
  - Complex temporal and data dependencies between business activities
  - Iteration of activities
  - Alternative required Inputs and Outputs of activities
  - Roles related to performers, artifacts and responsible parties for activities

**Data Flows**

- *DataFlows* are special CCA Connections
  - Uni-directional between ProcessFlowPorts
  - DataFlows indicate
    - data dependency & transmit values at run-time, or
    - temporal dependency (aka control flow)
Part VII

Patterns

Patterns: Buyer/Seller

Inheritance

Composition