OsEra

Open Source eGovernment Reference Architecture

Cory Casanave, President
Data Access Technologies, Inc.
www.enterprisecomponent.com

OsEra

• What we will cover
  – OsEra Overview
  – Model to Integrate – From business model to execution
  – Synthesis of MDA, Semantic Web and FEA
OsEra Stack

- Tool Integration: Component-X, Eclipse, UML
- Architecture Modeling: Objectives, Information, Process, Rules
- Model Repository: FEA, EDOC, UML, Semantics Core
- Eclipse Environment: FEA with real time metrics, Eclipse is an open source "IDE"
- Provisioning: Transformations, Import/Export, Model->Integrate
- Semantic Web: RDF & OWL

GSA “Sea Change”

- Sea of change
  - Get-it-right (Initiative for better acquisition)
  - Merger of FTS/FSS (Major Internal Organizations)
  - Restructuring to provide a unified face to the customer
  - OMB and Congressional mandates and changes of mission
  - Integrating and modernizing financial management
  - Reduction of redundant processes and systems
- Implications
  - Massive organizational change
  - Massive system changes
  - Retraining staff
  - High cost of change
  - Risky and hard to achieve
  - Change combined with current costs and inefficiencies of redundant stovepipe systems is not practical

“Business As Usual” is insufficient
“Sea Change” Enablers & Cost Reduction

• Value Chain Analysis
  – Analyzing and restructuring business processes based on realized customer value
• Model Driven Executable Architecture
  – Executable enterprise architecture to realize business goals with systems and workflow automation
• Business Service Oriented Architecture (SOA)
  – An enterprise modernization strategy supporting business services, integration, reuse and common components across a system of systems integrated with SOA/ESB
• Enterprise Service Bus (ESB)
  – A technology platform to support the deployment and integration of SOA components.
• Semantic web with “semantic core” integration ontology
  – Make architectures a web resource able to be interconnected and analyzed
  – Integrate information into a coherent enterprise view
• Combined effect of architected, automated processes

Standards Base

• OMG-MDA Specifications
  – Enterprise Distributed Object Computing (EDOC)
  – Unified Modeling Language (UML)
  – Meta Object Facility (MOF)
  – XML Model Interchange (XMI)
  – Query View Transform (QVT)
  – Ontology Definition Metamodel (ODM)
• W3C Standards
  – XML, XML Schema, Web Services
  – Business Process Execution Language (BPEL)
  – Ws-Security, Ws-Policy
  – Resource Definition Framework (RDF)
  – Web Ontology Language (OWL)
• Java Community
  – J2EE set of standards
**MDA in the U.S. Government**

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**Simulated Model Driven Architecture**

- **Enterprise Architecture Model (PIM)**
- **Business Architecture**
- **Semantic Core Meta Model**
- **Simulator**
- **Refine/Iterate**

**Live Process Simulation**

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**Automated Model Driven Architecture**

- **Enterprise Architecture Model (CIM)**
- **Tools Produce & Integrate**
- **Framework & Infrastructure (E.G. J2EE-WS)**
- **PSM**
- **Mapping**

**Minimize and structure manual implementation**

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**Manual Coding**

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**Technical Architecture**

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Model to Integrate

From business needs to executing solutions
Value Chains

Mission-Critical Value Chain
- Plan and Design
- Develop and Deliver
- Provide After Care

Development of Government-wide Policy
- Marketing
- Acquisition

Support Services Value Chains
- Financial Management Services
- I.T. Services
- Human Capital Services

Shared Services Value Chains

Disciplines – Areas of Responsibility

Financial Management
- Acquisition
- Solutions
- Property Management

Policy
- Human Resources

Business Intelligence
- Marketing

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Collaborative Process Model

Enterprise Role. A major area of functional responsibility within the discipline of financial management.

Work Role. A role responsible for a specific functional area within an enterprise role, such as might be assigned to a single worker or supported by an IT system.

Activity. A specification of a business function in carried out the context of a work role.

Subactivity. A specification a subfunction within necessary to carry out an activity.

Protocol. A defined conversation between two roles that may be extended over time. One role initiates and the other responds to the protocol, but information may flow both ways across the protocol.

Information Flow. An individual flow of information across a protocol or into or out of an activity.

Receivables Management Example

Related to Customer Orders

Related to Receivables
Information Model Example

A term in the vocabulary represents a class of things to be described.

Entities may be described as having a unique identity.

A relation between terms is described by an association between classes.

Attributes specify descriptive information having simple types.

A class may be specialized into sub-classifications.

This indicates a compositional (as opposed to referential) association.

This is a constraint that defines the sub-classification.

Business (CIM) view - Collaborating Roles with Processes

Role

Role

Role

Role

Conversation Protocol

(Collaborating Roles with Processes)
“Upper” PIM (system) View - Enterprise Component

People, organizations and/or enterprise components play roles in Business Processes.

“Rotate” to look at other aspects of the component.

The “Enterprise Digital Assistant”

People, organizations and systems play roles.

Components frequently help people play these roles.

People, organizations and systems components work together to realize roles.

Components are the people’s automated assistant.

Enterprise components help people and organizations play roles by automating and monitoring the business process.

From the system perspective, people and organizations become part of the implementation of the role.
PIM: Service-Oriented Component Architecture

Each Work Component in the PIM implements a Work Role from the CIM.

Service Managers implement as system services the business services defined in the CIM.

Information Model

Note; Not expecting anyone To really read this
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Enterprise Service Bus to Enable Target State

- Services driven from the business model
- Reusable Enterprise Services are independent & easily adapted and interconnected
  - Services communicate with each other like humans do with email
- Information systems become a lattice of cooperating components providing services
- SOA/Enterprise Service Bus using commercial standards
  - Industry best practice to avoid developing large monolithic applications

One-GSA Business Model

Provisioning Model
Example of XML provisioned from model

```xml
<CustomerOrderEstablishment>
  <Inter-Work-RoleTransaction>
    <inter-work-roleTransactionID> ...
    ...</inter-work-roleTransactionID>
  </Inter-Work-RoleTransaction>
  <newOrder>
    <orderingCustomer>
      <customerID> ... </customerID>
    </orderingCustomer>
    <controllingSalesInstrument>
      <salesInstrumentId> ... </salesInstrumentId>
    </controllingSalesInstrument>
    <customerOrderAmount> ... </customerOrderAmount>
    ...<lineItems>
  </newOrder>
</CustomerOrderEstablishment>
```

Note: Don't have to really read this either!

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Enterprise Service Bus

Logical SOA Tiers and Components

<table>
<thead>
<tr>
<th>Client</th>
<th>Presentation</th>
<th>Business</th>
<th>Intermediary</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Apps</td>
<td>Portal or Web Container</td>
<td>EJB, POJO, or Servlet Container</td>
<td>JBI Container</td>
<td>Heritage System</td>
</tr>
<tr>
<td>Java Apps</td>
<td></td>
<td></td>
<td></td>
<td>ROHS</td>
</tr>
<tr>
<td>Mobile Device</td>
<td></td>
<td></td>
<td></td>
<td>Other Apps</td>
</tr>
<tr>
<td>EJB Gateway</td>
<td></td>
<td></td>
<td></td>
<td>BPM Repository</td>
</tr>
<tr>
<td>Domain Objects</td>
<td></td>
<td></td>
<td></td>
<td>Rules Repository</td>
</tr>
<tr>
<td>Domain Objects</td>
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<tr>
<td>Domain Objects</td>
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</tr>
</tbody>
</table>

* Complements of JBoss
Many BPEL Processes support the CIM
**Common Environment for Intellectual Capital**

- **Meta Object Facility (MOF)**
- **Value Chain Modeling**
- **UML Modeling**
- **Workflow Tools**
- **Business Modeling**
- **Collaboration Modeling**

**Models define the system**

**Intellectual Capital**

Integration of infrastructure

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**Net Effect of Enterprise MDA**

- Clear path from needs to running technology
- Integrate business driven solutions with capital planning & the FEA
- Interoperable component architecture based on SOA
- Integrate legacy, COTS, GOTS and new development into a coherent solution
- Strategic evolution
- Reduced time, costs & risk
Integration of the Semantic Web with MDA

And now a word from another community!

Users “meta” integration problem

Too many ways to talk about the same thing, redundant and conflicting semantics.
MDA Modeling Needs Ontologies

- The semantic web infrastructure provides a great way to:
  - Publish models as web resources
  - Query over models
  - Analyze models and the intersection of multiple models
  - "Semantically ground" models
- RDF/Ontology based models are more resilient to change without "refactoring"
- Ontologies are better able to connect models that were not designed together – integrating and adapting architectures, processes, interfaces and information
- The open, distributed and federated "meta object facility" has yet to emerge as readily available and mainstream
- Semantic web infrastructure is picking up industry steam, tools and infrastructure are coming available

Ontologies Need MDA Modeling

- A vast amount of information exists in these environments.
- Use of these paradigms represents mainstream best practice – there are lots of practitioners
- The structured modeling tools are more mature and suited to specific problems.
- Model Driven Architecture has started to bind structured models with the software development process, providing even more leverage
  - Doesn't require changing the runtime infrastructure as some Semantic Web Approaches are suggesting – separation of technology concerns
- Ontologies can't ignore this wealth of knowledge, tools, expertise and industry momentum.
The “Big Win”

- Architectures developed using structured modeling tend to be islands
  – Can we bring these together into a coherent view of the problem domain – E.G. a true multi-view enterprise model?
  – Can we embrace multiple structured modeling languages as well as integrate Ontologies?
  – Can we use the semantic web stack to support integration of enterprises and their technology islands?
  – Can we, ultimately, solve the interoperability and reuse problems?
Open Source Components

- OsEra is building on and helping to create open source assets for use by the government
- Integrating
  - Eclipse Integrated Development Environment
    - Tool framework - Eclipse
    - Repository – “EMF” Modeling framework
  - jBoss Application Server
    - Web services
    - BPEL Process Engine
  - More…

OsEra Opportunity

- Open Source Initiative, this is work in progress!
- Model to integrate platform
- Business driven I.T.
- Embraces current trends, EDOC, UML, MDA and Semantic Web
- Applicable to any government agency
- Helps achieve an architected enterprise
- Substantial reduction in software Lifecycle cost
- Reduce costs with increased effectiveness
- Pilot already under way
- Opportunity for others to participate
- How can we make this a government-wide “happening”? 