Legal Considerations for Web Services, Federated Systems and E-Commerce
Current State of Affairs

- Business partners are increasingly seeking relief from failed expectations in their business relationships.
- Business partners are increasingly incorporating Quality of Service expectations in their agreements to do business.
- Corporate security policies and procedures are increasingly being owned by legal departments.
- Clients are requesting functionality that address legal issues.
The Proposition

- Architect and engineer (design, model) legally-oriented processes into federated systems. The models and software implementations can be used to help avoid litigation (and improve overall quality and security)

- Help reduce the time and costs of litigation by providing evidence
Presentation Strategy

• Part I
  – Problem Presentation: High-level legal view of needs, requirements, and architecture for a federated bioinformatic system
  – Context for Analysis and Design
• Part II
  – Application of MDA and UML in architecting and engineering a solution
High-level Legal View of Needs, Requirements, and Architecture for a Federated Bioinformatics System
The Federated Bioinformatic System Problem

Community of Practice

Knowledge Domain

Bioinformatic Integration Support Center

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High-level Properties and Characteristics of Federated Bioinformatic System

- Distributed
- Heterogeneous
- Approximately 100 enterprises
- Enterprises participate in multiple communities of practice
- Enterprises belong to specific domains of knowledge
- Enterprises belong to public and proprietary domains
- Enterprises include government agencies, research labs, clinical labs, research consortiums, pharmaceuticals, hospitals
- Each enterprise has its own set of legal, quality, information, and security standards, policies and procedures
- A mission (and “safety”) critical system to enhance the discovery and application of new medical therapies
High-level Requirements for Federated Bioinformatic System (Parital List)

- Requires shared data, information, knowledge and applications among all parties
- Requires collaboration among all parties
- Requires stringent security/privacy measures
- Open-source development must be embraced
- All standards, policies and procedures of each enterprise must be respected
- Data integrity must be maintained
- Data models must be flexible, extensible, adaptable, maintainable
- Both structured and unstructured data sources must be manipulated and shared
- Requires a bioinformatic technology support center
- Requires Peer-to-Peer and ASP models
Questions Asked by the Legal View

• What is the nature of the relationship between enterprises doing business? Degree of coupling and coherency?
• What is the degree of trust?
• What are the boundaries between enterprises?
• Who owns what?
• What are the expectations placed on each enterprise doing business with each other?
• What kind of liability risks are there?
• At what points, in the process of doing business, is there a liability risk to each enterprise?
Questions Asked by the Legal View

- Are there shared risks?
- Who’s accountable?
- What processes can be put in place to ensure quality of service expectations are met?
- To what degree can a legal contract be modeled and embedded in a federated system?
The Federated System Problem

Enterprise A

Enterprise B

Enterprise-Enterprise Interaction based on Enterprise-Enterprise Agreements

Data Exchange

Systems, Processes, Standards, SOPs, Policies,

Legal Management Process Intelligence Knowledge, Information, Data Application Technology Communications Security Quality

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The Federated System Problem

Enterprise A

- Systems, Processes, Standards, SOPs, Policies
- DB
- APP
- WS, Portal

Enterprise B

- Systems, Processes, Standards, SOPs, Policies
- DB
- APP
- WS, Portal

Shared systems, processes, standards, SOPs, Policies

Enterprise-Enterprise Data Exchange

Enterprise-Enterprise Interaction based on Enterprise-Enterprise Agreements

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The Federated System Problem
Points of Possible Liability

Points of liability risk

Shared liability risks

Enterprise-Enterprise Data Exchange

Enterprise-Enterprise Interaction based on Enterprise-Enterprise Agreements

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The Federated System Problem
Points of Possible Liability

Points of liability risk
Database Integrity - ACID transactions
Security (Non-repudiation, Identification, Authorization etc.),
Privacy
Data Quality
Network Performance
Intellectual Property, etc.

Shared liability risks
Enterprise-Enterprise Data Exchange
Enterprise-Enterprise Interaction based on Enterprise-Enterprise Agreements

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The Federated System Problem
Semantic Variance (Semantic Shift, Semantic Drift)

Enterprise A
Enterprise B

Language Domain
Industry Domain
Knowledge Domain
Community of Practice
Role
Data

Enterprise-Enterprise
Data Exchange

Enterprise-Enterprise
Interaction

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The Federated System Problem

Jurisdiction
Context for Analysis and Design
Integrated and Collaborative Enterprises
Systems: Architecture an Engineering
(ICESAE™, I- 'Say)

Integrated and Collaborative Inter-Enterprise Systems
(Architectures and Engineering for Federated Systems, E-Business)

Integrated and Collaborative (Intra)Enterprise Systems
(Architectures and Engineering for Integration and Collaboration of Foundation Systems)

Foundation Sub-Systems
(Architectures and Engineering for Integration and Collaboration of subsystems to create Foundation Systems)

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Integrated and Collaborative Intra-Enterprise Systems: Architectures and Engineering

Business Vision

Business Goals, Objectives

Business Strategies

Strategy Views
- Business Strategies
- Business Intelligence Strategies
- Knowledge, Information, Data (KID) Strategies
- Application Strategies
- Technical Strategies
- Communications Strategies
- Security Strategies
- Quality Strategies
- Legal Strategies
- Management Strategies

Emergent Strategies

Business Domain Strategies

Business Domain Systems
- CRM, ERP, KM, Financials, Custom, etc.

Emergent Systems Models

E-Commerce, Web Services, Enterprise Services, EAI, Marketplaces, Supply Network, Portals, Informatics, etc.

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Integrated and Collaborative Intra-Enterprise Systems: Architectures and Engineering

Strategy Views
- Business Strategies
- Business Intelligence Strategies
- Knowledge, Information, Data (KID) Strategies
- Application Strategies
- Technical Strategies
- Communications
- Strategies
- Security Strategies
- Quality Strategies
- Legal Strategies
- Management Strategies

Emergent Strategies

Business Domain Strategies
- CRM, ERP, KM, Financials, Custom, etc.

Emergent Systems Models (PIMs, PSMs)

PIMS and PSMs can be considered to be enterprise components similar to hardware and software components.
Standards-based Integrated and Collaborative Enterprise Systems: Architecture and Engineering

PIMS and PSMs can be considered to be enterprise components similar to hardware and software components
Systems and Systems Integration are Built on Ontologies / Semantics, and Measures and Metrics

Integrated and Collaborative Enterprise Standards (e.g. PIMS and PSMs)

Integrated and Collaborative Enterprise Measures and Metrics

Integrated and Collaborative Enterprise Ontology / Semantics
Integrated and Collaborative Enterprise Systems

- **Ontology / Semantics**
- **Measures and Metrics**
- **Standards (e.g. PIMs and PSMs)**

**Business**
- Business Intelligence
- KID

**Application**
- Technical
- Communication
- Security
- Quality
- Legal

**Management**

L2

Integrated and Collaborative Enterprise Systems

L3

Integrated and Collaborative Inter-Enterprise Systems - *Federation* of Enterprises

Integrated and Collaborative Enterprise Systems

Integrated and Collaborative Enterprise Standards (e.g. PIMs and PSMs)

Integrated and Collaborative Enterprise Measures and Metrics

Integrated and Collaborative Enterprise Ontology / Semantics

Enterprise B

E-Commerce, Web Services, Enterprise Services, EAI, Marketplaces, Supply Network, Portals, Informatics, etc.

Enterprise A

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Integrated and Collaborative Inter-Enterprise Systems - *Federation* of Enterprises

Management, Business, Intelligence, KID, Application, Technical, Communications, Security, Quality, Legal, Standards, Policies, SOPs, Measures and Metrics, Ontologies and Semantics

Inter-enterprise Boundary / Integration and Collaboration Point

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Integrated and Collaborative Inter-Enterprise Systems - *Federation* of Enterprises

Inter-enterprise Boundary / Integration and Collaboration Point

What is the nature of this inter-enterprise relationship? What is the contained in legal contract between enterprises?

Integrated and Collaborative Enterprise Systems

What is contained in this software contract?

E-communication channel

What is the relationship between the legal contract and software contract?

Enterprise A

E-communication channel

Web Service

Enterprise B

Service Level Agreement

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What is the Nature of the Inter-Enterprise Relationship

- Legal Relationship
- Coupling - What do they, or must they, share?
  - Foundation systems (e.g. KID, applications, security, management, etc.)
- Cohesion - How well should they, do they, share?
  - Foundation Systems (e.g. KID, applications, security, management)
- Coupling and Cohesion affect expectations of one enterprise by the other

- The more “supportive” information (data other than that directly operated on) contained in the software contract, the tighter the coupling
What is the nature of individual inter-enterprise relationships?
What is the nature of the aggregation of the inter-enterprise relationships?

What is contained in each software contract?

What is contained in the legal contracts?
Integrated and Collaborative Inter-Enterprise Systems - *Federation* of Enterprises

Management, Business, Intelligence, KID, Application Technical, Communications, Security, Quality, Legal, Standards, Policies, SOPs, Measures and Metrics, Ontologies and Semantics
The Federated Bioinformatic System Problem

Community of Practice

Knowledge Domain

Bioinformatic Integration Support Center
Abstract out commonalities

Registries and Directory Services for the Bioinformatic Federation
Security, Quality, Legal (contracts), Standards, Policies, SOPs, Measures and Metrics, Ontologies and Semantics
Legally-oriented system for the Bioinformatic Federation
Dependent on a federated security and quality system

- Database Integrity - ACID transactions
- Security (Non-repudiation, Identification, Authorization etc.),
- Privacy
- Data Quality
- Network Performance
- Intellectual Property, etc.
Federated Bioinformatic Systems Platform

- The Internet Computing Model (object-oriented, service oriented)
- N-Tiered Distributed Systems (object-oriented, service oriented)
- Ontologies, Dictionaries, Thesauri
- Federated Registries (contracts, services, etc.)
- Federated Agents
- Federated Directory Services
- Federated ICESAE systems
  - Legal
  - Management
  - Kid
  - etc.
- The GRID (where appropriate)
Integrated and Collaborative Inter-Enterprise Systems - *Federation* of Enterprises
Applicable Standards for Bioinformatics Federation

EDOC, Document Repository Integration, Registration and Discovery, Gene Expression, Genomic Maps, Organizational Structure, PIDS, CWM, XMI, SOAP, XML, WSDF, WSFL, UDDI, ebXML, etc.
Architecting and Engineering Federated Systems for E-Business - a Legal View
ICESAE and MDA
Requirements for a Legal System of the Federated System (Partial List)

- Based on Legal requirements of individual enterprises, relationships between enterprises, and the federation as a whole
- Must have contract management (quality of service agreements, trade agreements)
- Must be able to observe federation behavior and compare to contracts: gather, collate, flag, report based upon predetermined metrics - gather evidence.
  - Determine nature of dispute (e.g. security-database access)
  - Determine the parties involved
  - Determine who owns what
- Must be able to mediate “e-disputes” - help disputing parties negotiate a resolution. Must be able to report on mediation of “e-disputes”
- Must be able to arbitrate “e-disputes” - make judgements. Must be able to report on arbitration of “e-disputes”.

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UML and Model Driven Architecture for Federated Systems - L3 Level

- PIM
- PSM
- Execution
- WSFL
- XML Schema, DTD, UML PSM
- Java Object Model, UML PSM
- E / R Model, UML PSM
- XML Document
- Database Tables
- Entity Bean

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UML and Model Driven Architecture for Federated Systems - L3 Level

Enterprise-Enterprise Interaction based on Enterprise-Enterprise Agreements

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Properties and Characteristics of a Legal System of the Federated System (Partial List)

- The Legal System for a federation exists at the L3 abstraction layer. It is a foundation system for the federation.
- It is “owned” by the federation
- Its boundaries are the boundaries of the federation - the enterprises that make up the federation
- It utilizes ontologies, dictionaries and thesauri as references in “e-disputes”
- It utilizes measures and metrics for “e-disputes” - observation, mitigation, and arbitration
UML and Model Driven Architecture for Federated Systems - L3 Level
High-level View of Legal System

PIM
- Security System
- XML Schema, DTD, UML PSM
- Java Object Model, UML PSM
- E / R Model, UML PSM
- Security System

PSM
- Legal System
- Web Services Process Flow

Execution
- XML Document
- Bean
- Database Tables

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