WellGEO RegRep and ebXML RegRep

Technical Update

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Catalog vs. Registry vs. Repository

- **Catalog**
  - Metadata
  - Catalog

- **Registry**
  - Registration procedures
  - Lifecycle and governance

- **Repository**
  - Any type of content
  - Content validation
  - Content cataloging
Role of and Interaction Between Registry and Repository

What is ebXML RegRep

- Repository holds *any type* of content, Registry holds metadata about the content
- Registry supports flexible queries to find metadata, content and related metadata
- Metadata is extensible and may be classified and associated with other metadata
- Registry provides flexible protocols enabling lifecycle and governance features such as authN, authZ, CRUD, validation, cataloging, versioning, subscription and notification etc.
- Registry provides registration procedures for controlling change proposal submission, review, approval
- Multiple regreps may be federated together and searched using federated queries
Overview of ebXML RegRep Functionality

- Lifecycle mgt., Registration Procedures, Registers, Cataloging, Validation, Versioning
- Taxonomies, Classifications, References, Associations, Provenance, Services, Folders, Queries, Events
- Federated registries, federated queries, cross registry refs, Replication and synchronization
- Flexible Protocols and Interfaces (ebRS)
- Selectable query, delivery to email, soap endpoint, PUSH/PULL, HTML formatting
- Pluggable AuthN, Role based AuthZ
- Audit Trail, Single Sign ON
- Publish, manage, discover using SOAP, REST
- Subscription and Notification
- Governance Features
- Secure Architecture
- Multi Server Features
- Info Model (ebRIM)

ebXML RegRep
RegRep Interfaces and Protocols

- Simple, extensible, type independent CRUD protocols
- Flexible enough to support powerful governance and end-to-end lifecycle management features
- Standard and ad hoc queries, stored queries, any query language, user-defined functions, with semantic and spatiotemporal support
- SOAP and REST bindings
Semantically Enhanced Discovery to Find Similar Datasets

- Ontology Editor
- Ontology Mapper
- Query Editor
- SPARQL Query Engine
- Service Discovery UI/Client
- Domain Expert
- Architect

Diagram:
- ebXML Registry/Repository
  - Temperature
    - AmbientTemperature
    - AirTemperature
    - Air
    - is a
    - hasSubstance
    - same as
  - temperatureAir
  - Surface Air Temperature

Providers:
- WCS Dataset: air_temperature
- WCS Dataset: surface_air_temperature
- JMBL Dataset: temperatureAir

Consumers:
- Service Consumer
- Service Provider
  - WCS
  - JMBL
  - Service Provider
ebXML RegRep Information Model (Inheritance View)

- OO metadata standard format
- Core model defines RegistryObject (id, name, description, version, slots)
- Several specialized sub-model described in backup slides
  - Associations
  - Classification
  - Provenance
  - Query
  - Event
  - Federation
  - Access Control
Security Features - Authorization

• Role Based Access Control / Authorization
  – Access Control Policy (ACP) plugin
  – Current support for Default ACP Plugin. Next will support XACML ACP Plugin
  – Default ACP allows anyone to read object, owner to update/delete their own objects and admin role to do all actions on any object

• Custom java ACP plugins may be used to integrate with external 3\textsuperscript{rd} party AuthZ tools
Security Features – Audit Trail

• All WRITE events logged by AuditableEvents
  – READ not logged due to resource constraints
• AuditableEvent tracks who did what action to which objects when and what other objects were impacted by same event
Subscription and Notification Features

• Subscription created, updated deleted using normal LifecycleManager protocols
  – Selector query determines objects of interest
  – DeliveryInfo specifies endpoint for notification delivery (may be email, soap or java plugin)

• Notification PUSHED to endpoint async
  – MAY be PULLED using normal query protocol
  – Supports immediate or periodic notification
  – May be HTML formatted or raw
Multi-Registry Features

• Federation gives illusion to clients that a group of registries are a single registry
  – Federated query indicated by federated="true"
  – Federated query returns single unified result
  – Partial results OK if some nodes unavailable

• Replication and remote references

• Registries in federation MUST support RegRep Query Protocol
Federated Query Example in a Federation Managing Weather Related Information

- Query is ‘fanned out’ to all three registries
- Duplicate results, if present, are pruned

Redundant registries within each domain
Federated Governance, with Local Caching and ebXML RegRep *Remoteable Registers*

- Preserves federated governance model
- Adds caching – remote register contents replicated in local domain
- Allows for changes to optionally be reviewed by human before being ‘pulled’ from remote registry
  - Similar to PC software update model (at least my Mac asks me before installing changes)

**Diagram:**

- NOAA NWS Registry
  - Other Register
  - 4-D Cube Register

- FAA Registry
  - AIM Register
  - NWS 4-D Cube Register
  - 4-D Cube Register

- NOAA Registry
  - NOAA 4-D Cube Register

- NOAA GSD Registry
  - Oceans Register
  - 4-D Cube Register

**Queries satisfied using information from register caches**

**FAA Registry Client**

(Human or machine)
Governance Features (In Dev) – Configurable Governance Process
WellGEO RegRep is built on open industry standards

**SOAP Client**

**REST Client**

**Coverage**
- OGC and ISO Catalog Extensions
  - WRS 1.0 Basic Package
  - GML

**Feature**
- Common vocabularies & ontologies
- ISO 19115, 19119

**Sensor**

**KML**

**OASIS ebXML RegRep 4.0 Server**
- Generic metadata & content management
- Authentication, access control, audit trail
- Validation, cataloging, versioning
- Subscription/notification
- Federated data/queries
- Management of WSDL, XSD, OWL
Related Links

• ebXML RegRep core specifications:
  – http://tinyurl.com/regrep-spec-4-0-wd6-3-zip

• ebXML RegRep Spatio-temporal Profile
  – http://www.wellfleetsotfware.com/node/20

• ebXML RegRep OWL Profile
  – http://www.wellfleetsotfware.com/node/19

• WellGEO RegRep COTS implementation
  – http://www.wellfleetsotfware.com/products
Backup Slides

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Most types extend RegistryObjectType
  - Provides id, name, description, status
ExtensibleObjectType provide slots
More specialized types defined by more specialized models next
• Any two objects may be associated with each other
• Each association has a “type”
• Standard association types defined by AssociationType ClassificationScheme
Registration procedures rely on Organizations and Persons and services with specific governance roles.
ebXML RegRep – Service Information Model

- Based on WSDL 2, OWL-S
- Used to represent service interfaces and endpoints
ebXML RegRep – Query Information Model

- Used to define stored queries and their parameters
- Query expression language neutral (as is the query protocol)
• Used in audit trail, subscription, notification
• RegistryType represents a registry server
• Federation represents a group of registry servers
• Associations are used to add registries to a federation