Geospatial ontologies, registries and semantic services - experiences from the SWING project

Workshop – Standards in action

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Presenters

- Arne J. Berre, SINTEF, Norway
  - Chief scientist, Cooperative and Trusted systems since 1984
  - SWING project coordinator
  - PhD: “An object-oriented framework for systems integration and interoperability”, 1993
  - Active in OMG UML2 and MDA standardisation, current editor for UPMS (UML Profile and metamodel for Services)
  - Previous editor of ISO 19103, ISO 19119 (1996-2001)

- Sven Schade, University of Muenster
  - Research associate, PhD student
  - SWING project member
  - Leading work package on ontologies
  - Work and teaching on ontology engineering and schema mapping
Outline

- Introduction
- Scenario
- Demo
- Implications for Standardisation (ISO/TC211, OGC, W3C, OMG)
How do we see the Geospatial Web?
How are Semantics brought in?

Data Providing Service
Exposed Data Model
Geospatial Data

Here!
Annotation

represents

Ontology
Real World

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Problem Definition

- Geospatial decision-support calls for combination of data from several sources

- Semantic Web Service technology is promising! But...
  - Domain ontologies do not exist or are not shared
  - Requires that services are annotated by specialists
  - Has a high and steep learning curve
Introduction

SWING Components

WP1 Geospatial dec.-making use cases
WP6 Development environment
WP5 Services and catalogues
WP3 Ontologies
WP4 Service Annotation Engine
WP2 Service Execution Engine

Introduction
Quarries and Aggregates

Aggregates = crushed hard rock (limestone, volcanic rock, sandstone, recycled concrete, ….), or on- & off-shore sediments (sand & gravel)

Use Cases:

1. Create a consumption-production map of aggregates
2. and 3. …
Web Service Modeling Ontology (WSMO)

GOALS
Objectives that a client wants to achieve by using Web Services

ONTOLOGIES
Formal specification of terminology used by all other components

MEDIATORS
Connectors between components with mediation facilities for handling heterogeneities

WEBSERVICES
Semantic description of Web Services:
- Capability (functional)
- Interfaces (usage)
Discover (WSML)

Request Features

MiMS
Which role should standards play for the Geospatial Semantic Web?
Continue grounding models on meta-level!

General Feature Model (GFM)

GML Feature Types

Meta Level

Application Level

Ontology Definition Meta-Model (ODM)

Ontology Language Specification

Features

Data Level

Implication for Standardisation/claim
What do we propose for ISO/TC211?

- Work on ontology development, access, and maintenance framework by:
  - Establish linkage between the GFM and ODM
  - Define the relation between CSL and ontology languages
  - Provide methods for ontology translation and a best practise report
  - Extend metadata profiles (services and data)
  - Provide rules for ontology modelling methodologies (TR)

ISO/TC211 – PT19150
What do we propose for others?

• Extend Catalogue interface (registration and query)

- Use common Meta-Model(s)
  • Unique identifiers
  • Separation of domains

- Develop standard interfaces for accessing ontologies
- Use ISO/TC211 standards as basis for geospatial ontologies

• UML Profile and Metamodel for Services (UPMS)
  • Validating by specifying the SWING architecture
  • Includes support for ontologies/semantic services
Thank you!

- SWING IST FP6-26514
- FP6 - STREP
- March 2006 – March 2009
- 7 partners
- http://www.swing-project.org

www.sindef.no/
www.ijs.si/
www.ionicsoft.com/
www.brgm.fr
www.uibk.ac.at
www.univ-muenster.de/
www.nuigalway.ie
• Using common Meta-Model(s)
  • Unique identifiers
  • Separation of domains

• Standard interfaces for accessing ontologies
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Register annotated services

Annotate

/Scenarios (1/3)

Register (WSML)
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Request Composition

Create / Deploy Composition

Request Features

Synchronisation

/Scenarios (3/3)