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

Workshop – Standards in action

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Presenters

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- 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

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Outline

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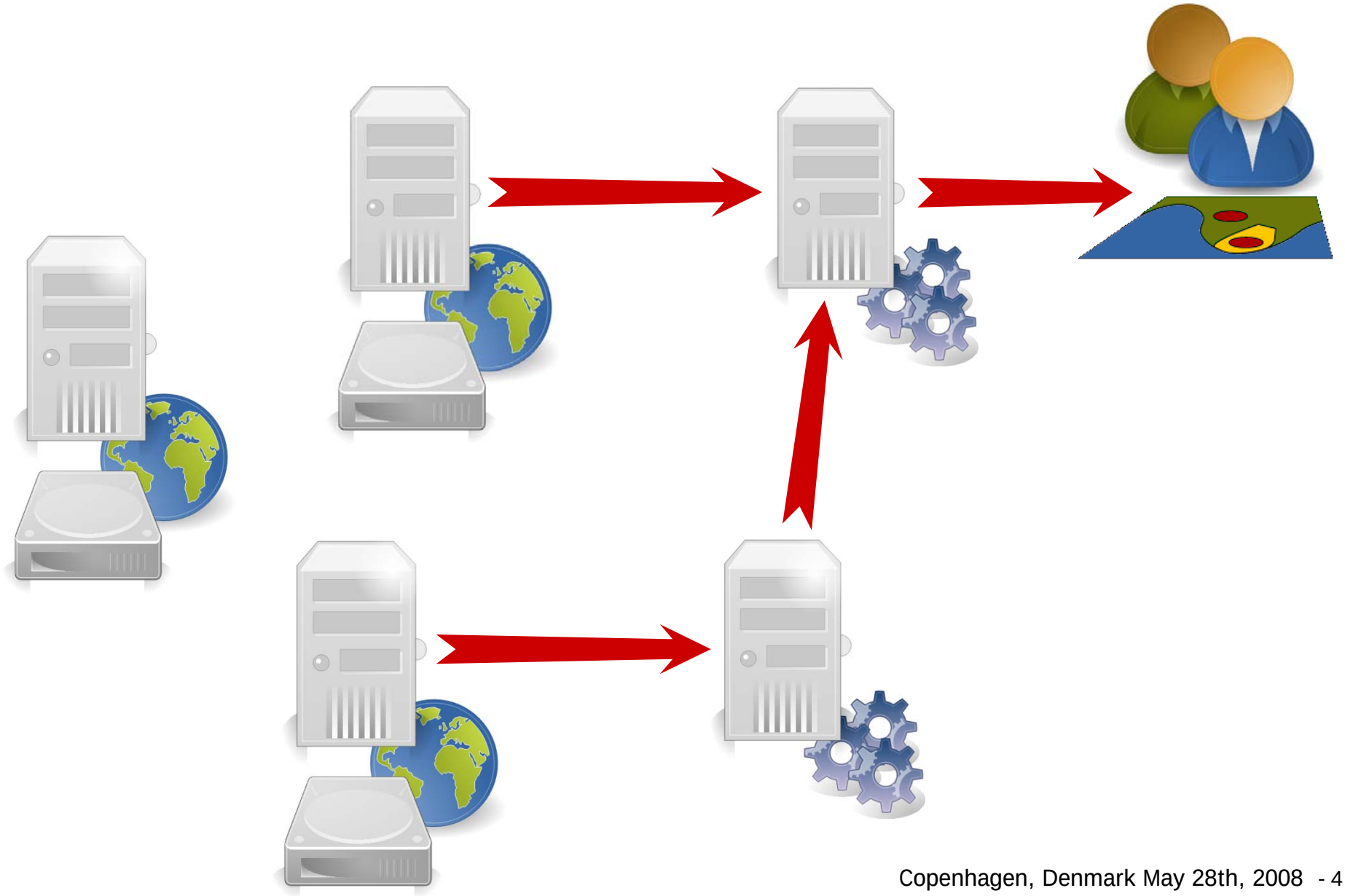
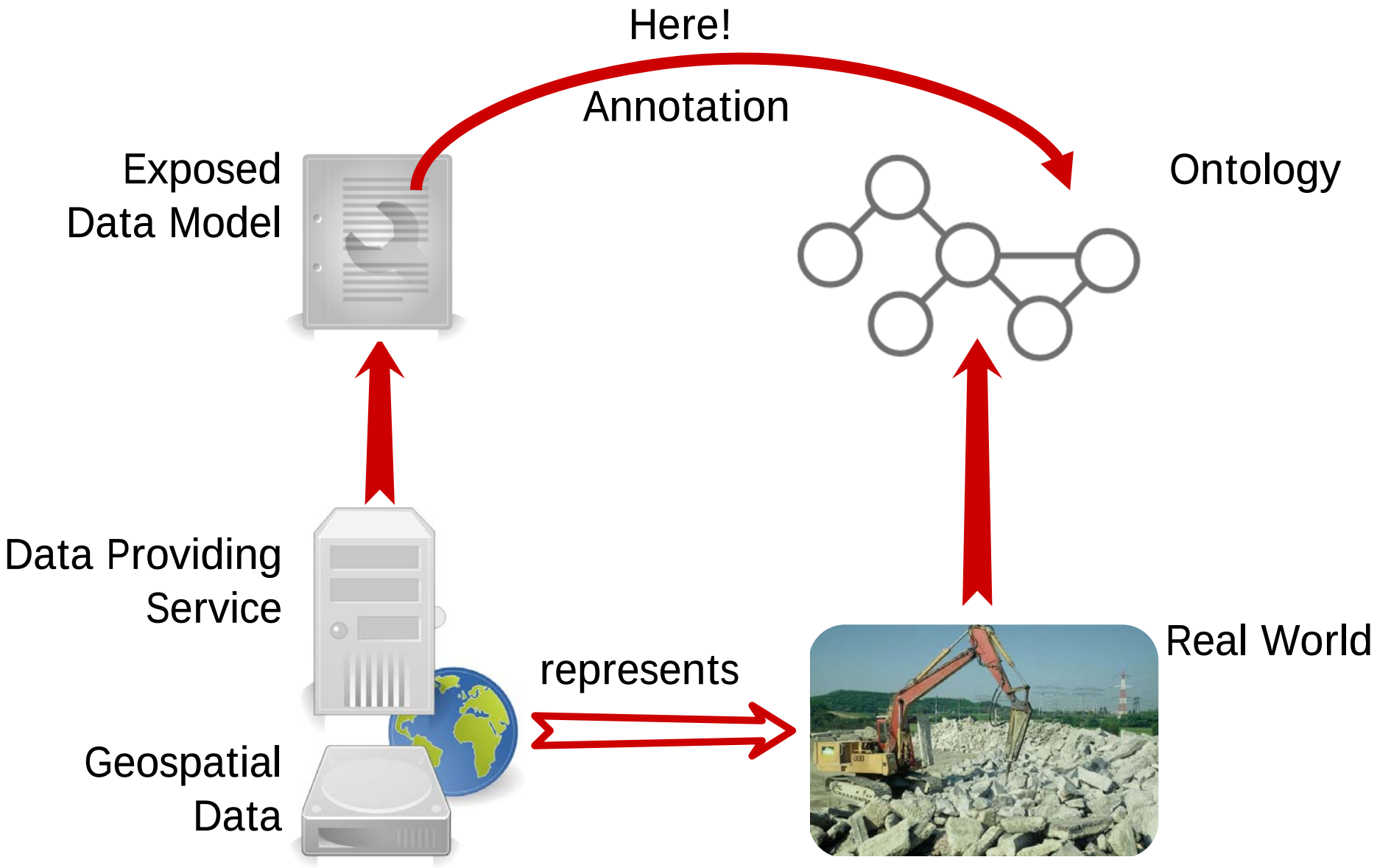
- Introduction
- Scenario
- Demo
- Implications for Standardisation (ISO/TC211, OGC, W3C, OMG)

How do we see the Geospatial Web?



How are Semantics brought in?

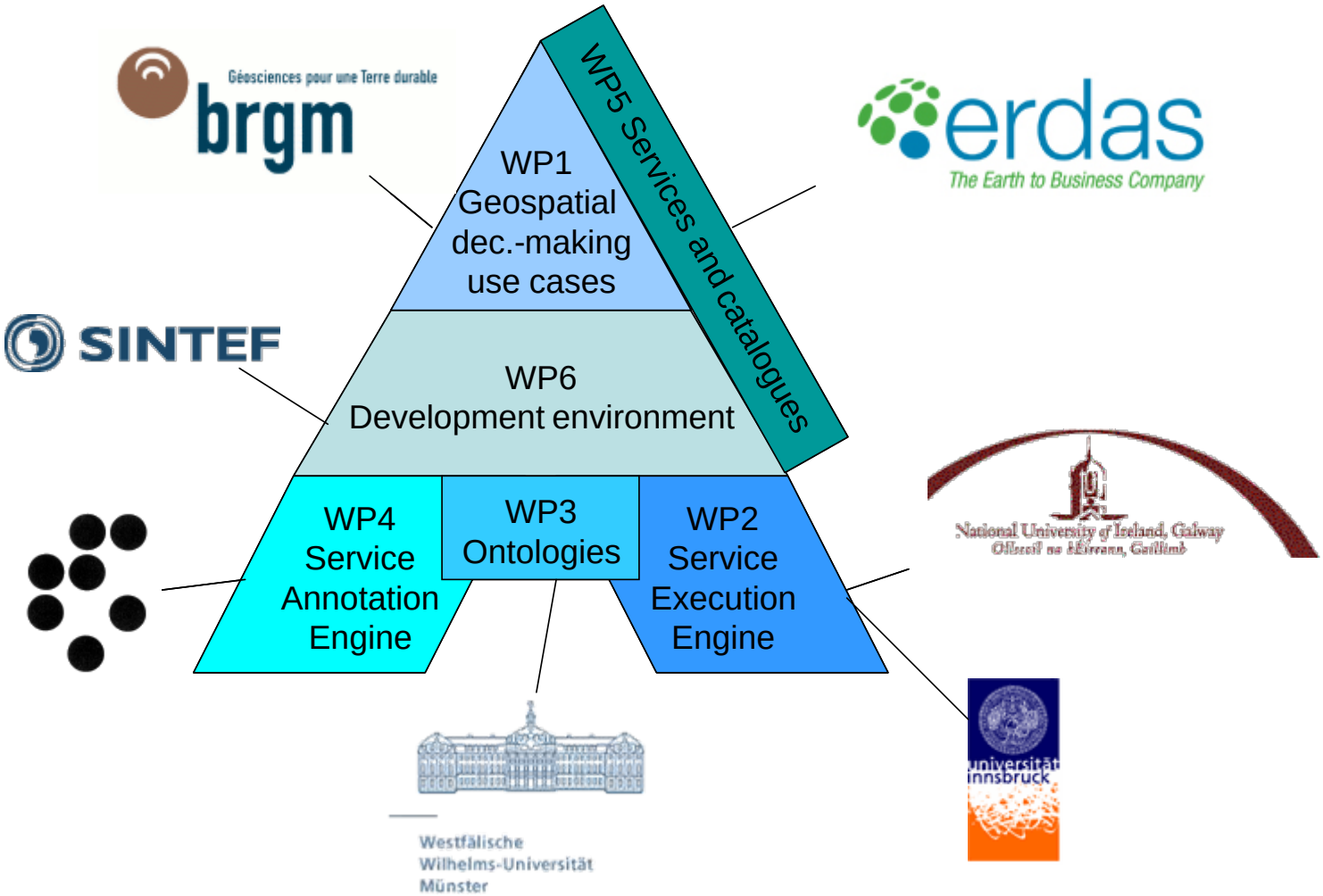


Problem Definition

- 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

SWING Components



SWING application theme

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- 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. ...

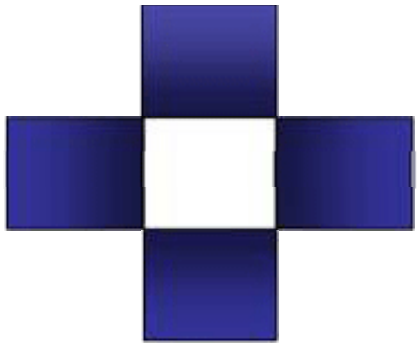
Web Service Modeling Ontology (WSMO)

GOALS

Objectives that a client wants to achieve by using Web Services

ONTOLOGIES

Formal specification of terminology used by all other components



WEBSERVICES

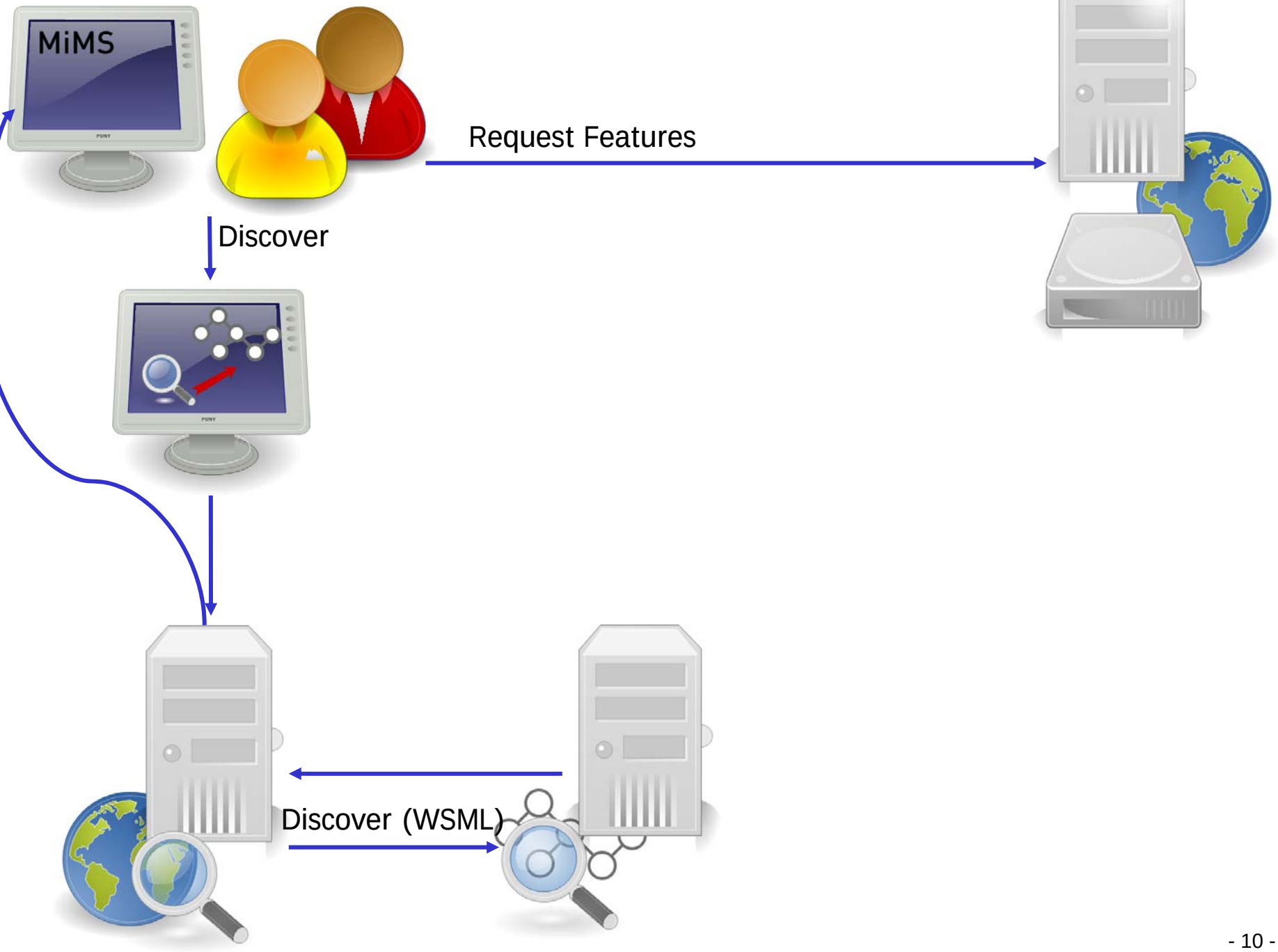
Semantic description of Web Services:

- Capability (functional)
- Interfaces (usage)

MEDIATORS

Connectors between components with mediation facilities for handling heterogeneities

/Scenario



Which role should standards play for the Geospatial Semantic Web?

Continue grounding models on meta-level!

General Feature Model (GFM)

Meta Level

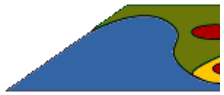
Ontology Definition Meta-Model (ODM)

GML Feature Types

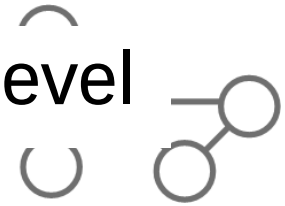
Application Level

Ontology Language Specification

Features



Data Level



Ontologies

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!

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

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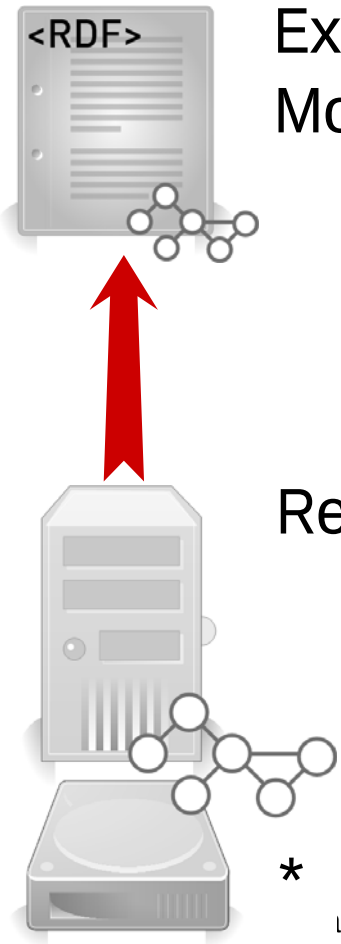
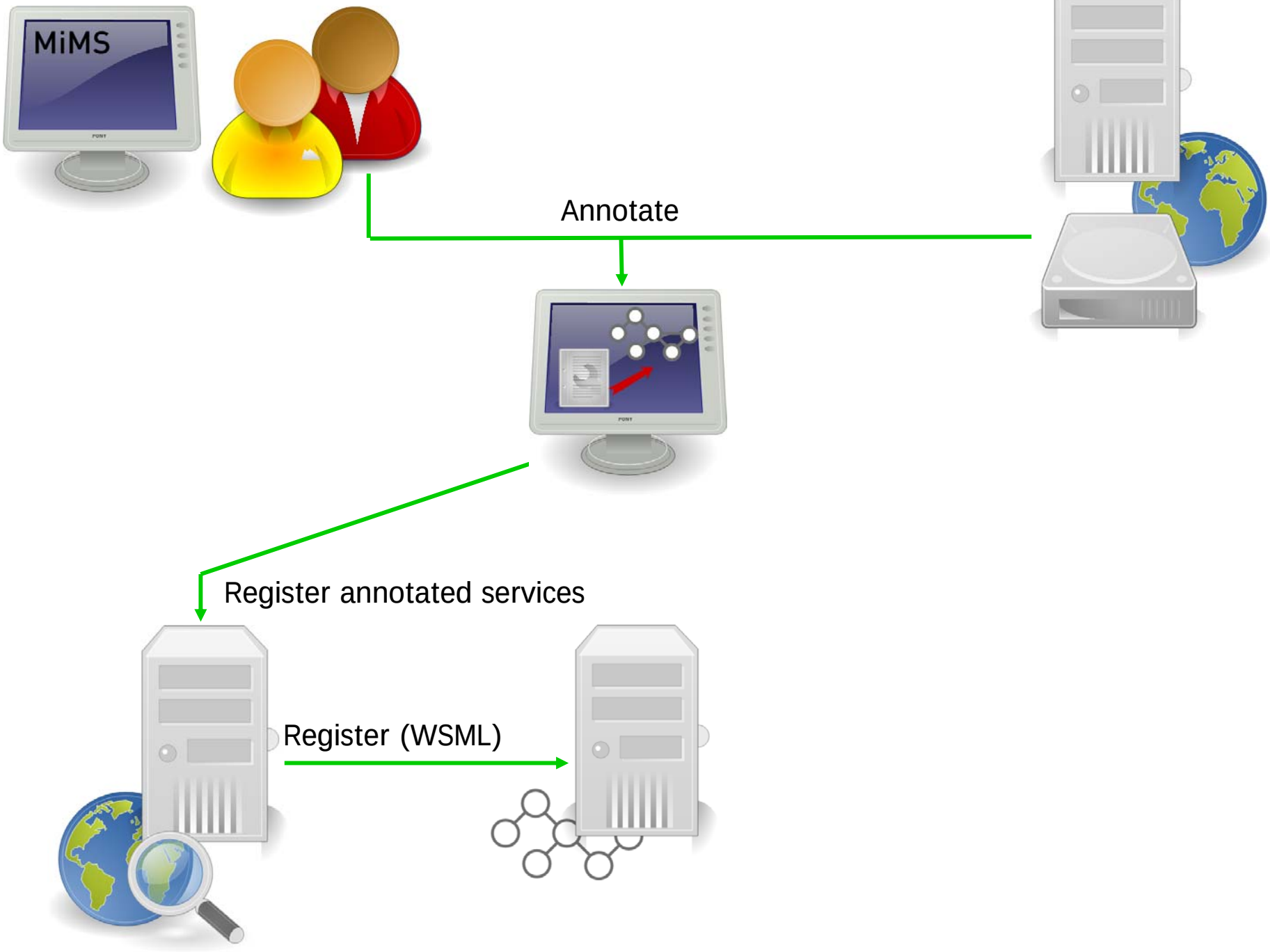
Standardize Methods for Ontology Communication and Access!

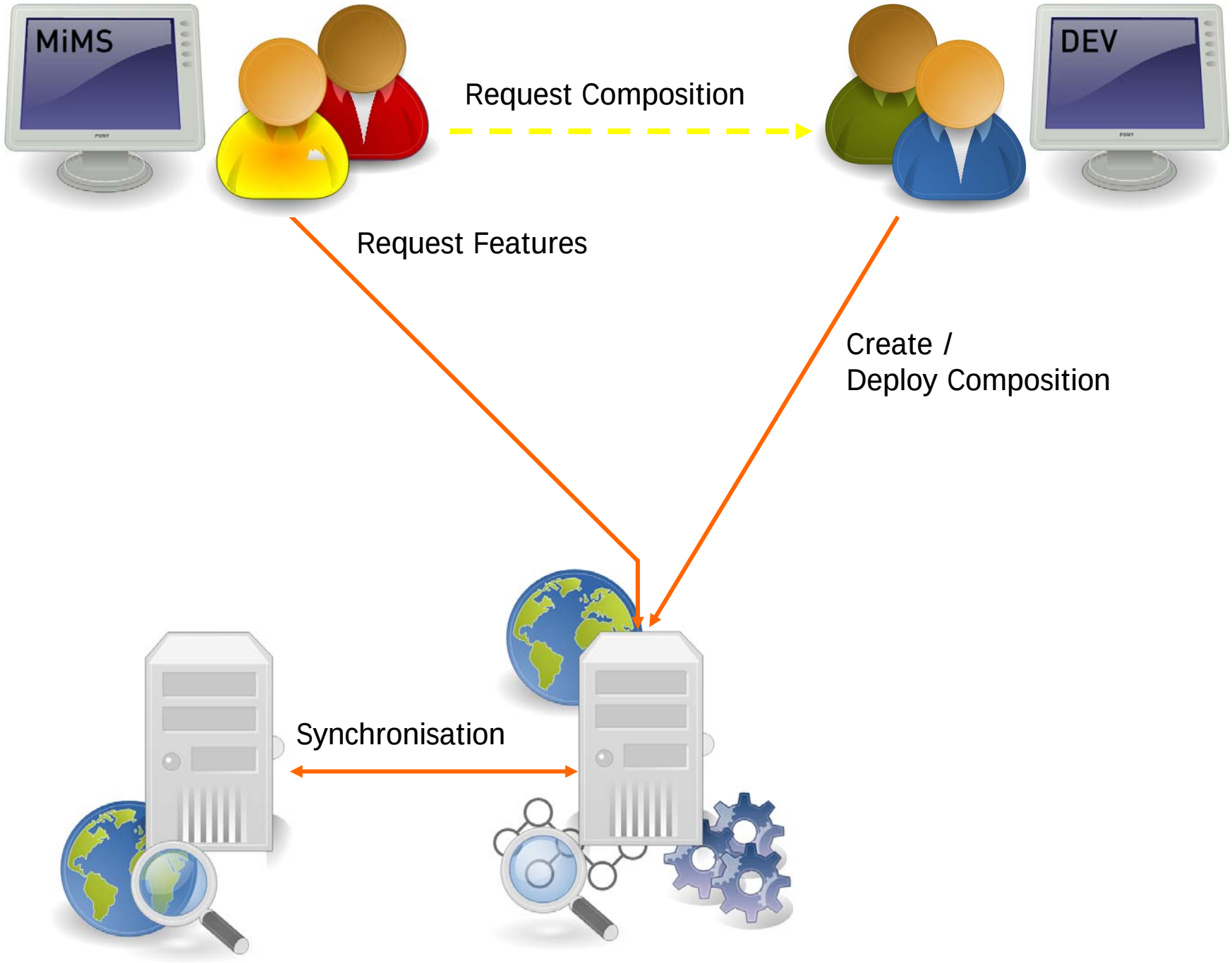
- Using common Meta-Model(s)
  - Unique identifiers
  - Separation of domains
- Standard interfaces for accessing ontologies



/Scenarios (1/3)



/Scenarios (3/3)



/Scenarios all