State of the Art Geodata on the Web Distributed GIS

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Geodata on the Web Seminar
Amersfoort, February 2016

Dr. Ingo Simonis
Open Geospatial Consortium

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Making location count.

From OGC's Perspective

- Advance interoperability to exchange geospatial data & knowledge
- Requirements differ, models differ, approaches differ

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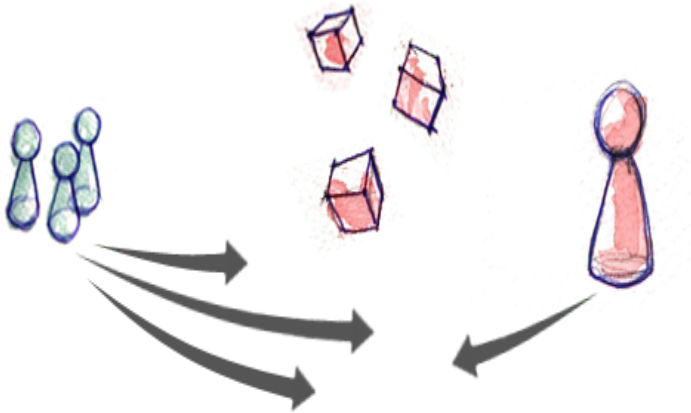
Domain / Persistence / Exchange Models



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Purpose of a Model

- Models should do work:
  - Standardise terminology
  - Help exchanging/storing data
  - Document the relationships between things and properties
  - Visualise the relationships between things
  - Support consistent way of encoding complex formalisms
- Different models do different things
  - Conceptual
  - Physical implementation (data transfer)
  - Physical implementation (persistence, system design, ...)

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Domains specialize: Example: HY_Feature

- **Part 1**: *HY_Features* **conceptual model** (OGC14-111): A machine-readable UML artefact published by OGC.
- **Part 2**: **GML implementation** schema suitable for **data transfer** of *HY_Features* object instances, based on ISO 19136 Annex E encoding rules for Application Schema.
- **Part 3**: **OWL and RDF representation** suitable for defining links between features that implement the *HY_Features* model, based on ISO 19150 encoding rules.
- **Part 4**? : JSON-LD encoding

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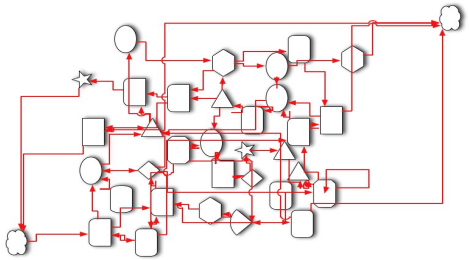
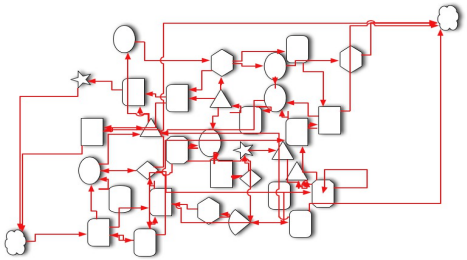
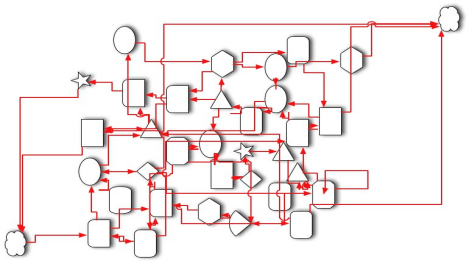
(Lack of) Geospatial Core Ontologies



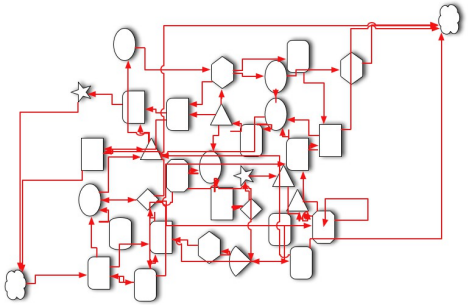
W3C Geo



Geonames ontology



OS Spatial Relationships



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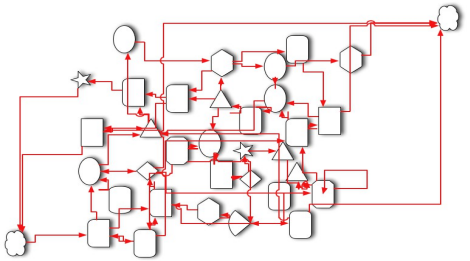

Feature Types Taxonomies

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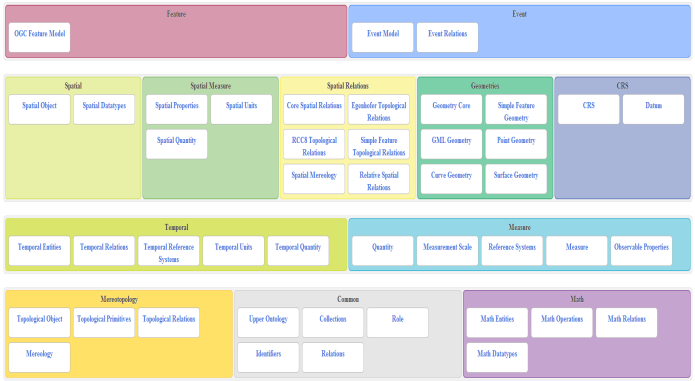
Core Geospatial Ontologies

- Started in Testbed-10
- OGC 14-049: OGC® Testbed 10 Cross Community Interoperability (CCI) Ontology Engineering Report
- Candidate foundational ontologies to bootstrap the Geospatial Semantic Web
- Design criteria:
  - Minimalist semantic commitment
  - Modular
  - Extensible
  - Reusable
  - Cross-domain
  - Leverage existing standards



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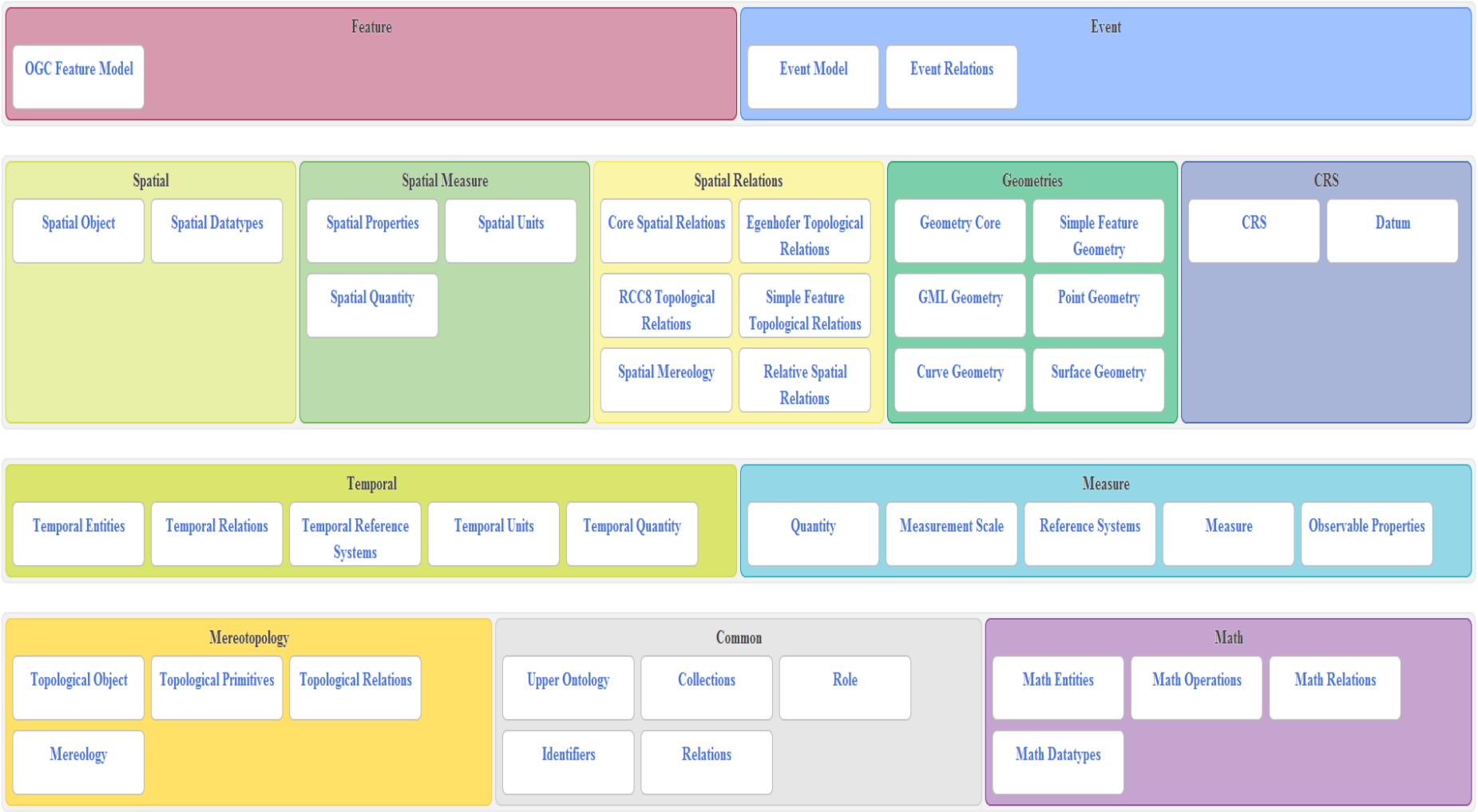
Core Geospatial Ontologies



Core Ontologies Experiments

- **Web standards** (URI, HTTP) and **Semantic Web standards** (RDF, RDFS, OWL, SKOS, SPARQL, RIF, Linked Data API, etc.) **provide the necessary foundation** to enable high level of interoperability on the web

- A **comprehensive unified and extensible semantic framework** is needed to represent data and metadata to enable true cross-domain interoperability

- The OGC Core Ontologies can play a robust starting point

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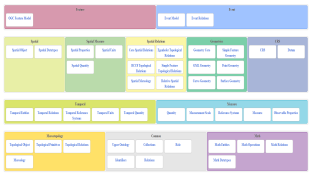
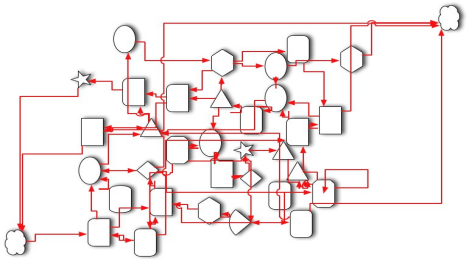
OWS-10 (2014)

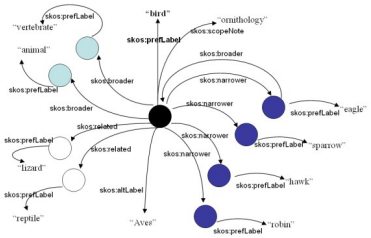
OWS-10



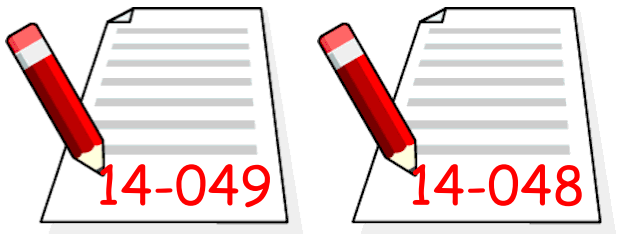
Core ontologies



Core incident ontology



Controlled vocabulary emergency and disaster management domain



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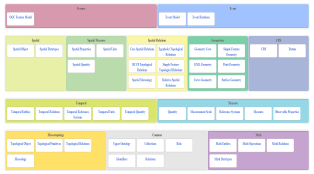
Testbed-11 (2015)

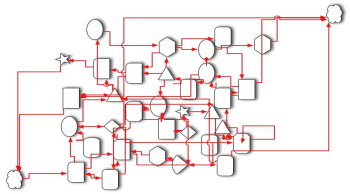
Knowledge centric

Testbed-11 (2015)

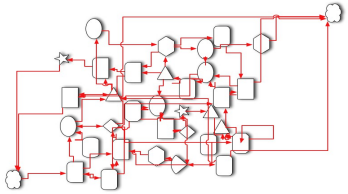
Testbed-11



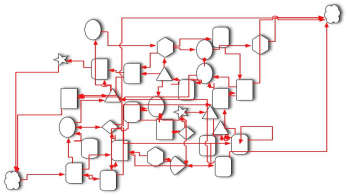
Core ontologies



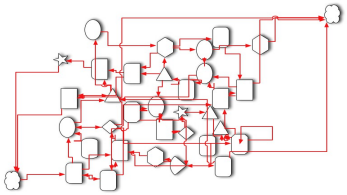
SocialML ontology



Portrayal ontologies



SPARQL extension ontology



Semantic Mediation ontology

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Testbed-11 (2015)

Testbed-11

Semantic Mediation Service

Semantic Portrayal Service

Semantic Gazetteer Service

GeoSPARQL endpoints

15-054

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Testbed-11 (2015)

Testbed-11

15-053

ed 11 Implementing
/GeoJSON in an OGC
ard ER

15-057

tbed-11 Incorporating
cial Media in Emergency
sponse ER

15-058

estbed-11 Symbology
Mediation ER

15-066

d-11 Use of Semantic
l Data with RDF for
al Map NHD and
eer Data ER

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Testbed-12 (2016)

	Work item
A005-1	REST Architecture ER
A005-2	Javascript, JSON, JSON-LD ER
A005-3	TopoJSON, GML ER
A006	Evaluate Semantic Enablement ER
A035	WFS REST Server
A040	WMS REST Server
A044	WCS REST Server
A050	CSW 2.0.2 Server
A051	CSW ebRIM Server
A052	SPARQL / GeoSPARQL Server
A053	Schema Registry Server
A060	REST User Guide
A062	(Geo)JSON User Guide
A066	Semantic Portrayal, Registry, Mediation Services ER
A072	Catalogue, SPARQL ER
A075	General Feature Model
A103	DCAT REST Service
A104	CSW v3.0 with OpenSearch, SOAP
A105	Semantic Portrayal Service
A106	Semantic Mediation Service

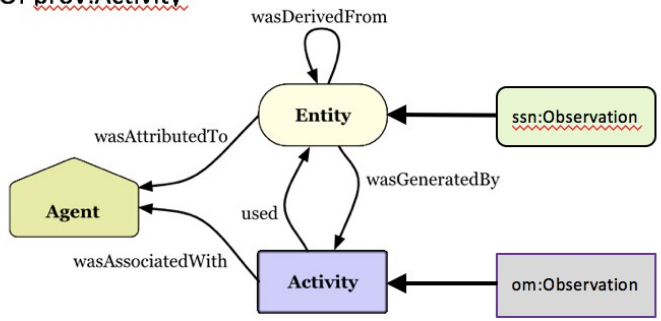
Work-Item	Section
Semantic Enablement	8.5
REST,JSON,and GeoJSON	8.4
Semantic Portrayal	7.4.3
Semantic Mediation	7.4.4
Catalog	8.11 , 7.4.2

Other Approaches & Experiments

SSN Observation vs O&M Observation

ssn:Observation subClassOf prov:Entity
BFO Continuant

om:Observation subClassOf prov:Activity
BFO Occurrent



Ontologies Alignment, Upper Ontologies, Mediation

Other Approaches & Experiments

An explicit OWL representation of ISO/OGC Observations and Measurements

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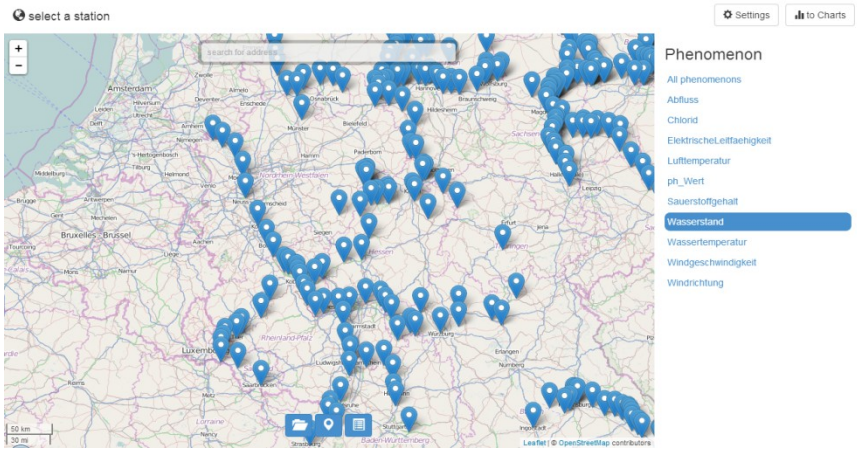
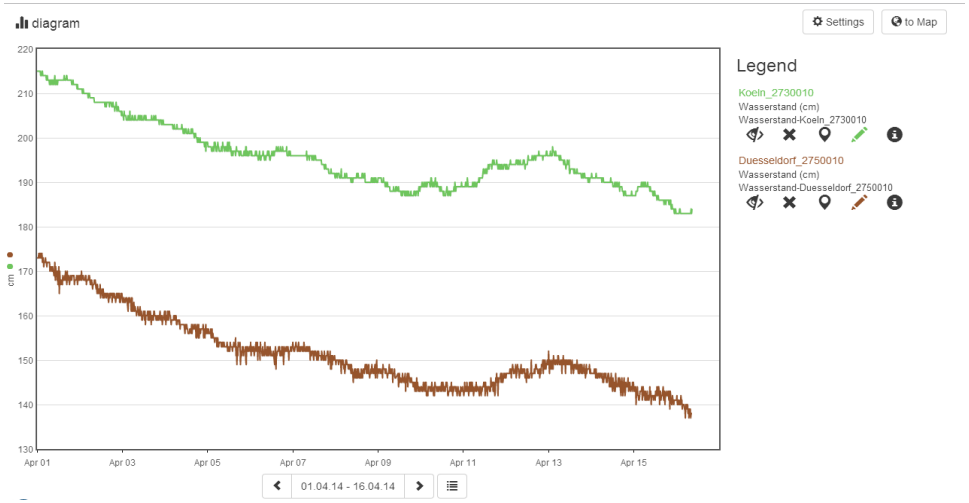
Abstract. We have developed OWL ontologies for the ISO/OGC model for Observations, and for other standard geographic information schemas (geometry, time, metadata) upon which it depends. Translation from the original UML to OWL follows the ISO 19150-2 rules. The ontologies have been prepared standalone, to respect the 'upper ontology' implied by the ISO UML profile and ISO General Feature Model, and thus avoid introducing external bias. Mapping to other ontologies, such as the SSN ontology, can be done subsequently in RDFS and OWL axioms, and maintained as linksets separate from the structure model. A key issue is whether the OWL representation should exactly reproduce the frame-based UML model from the standard, or be an open-world

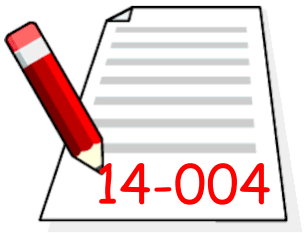
Existing data models in OWL

Other Approaches & Experiments





Profiles of existing standards



14-004r1
Sensor Observation Service 2.0 Hydrology Profile

Other Approaches & Experiments

W3C Working Draft

W3C OGC

Spatial Data on the Web Best Practices

W3C First Public Working Draft 19 January 2016

This version:
http://www.w3.org/TR/2016/WD-sdw-bp-20160119/
Latest published version:
http://www.w3.org/TR/sdw-bp/
Latest editor's draft:
http://w3c.github.io/sdw/bp/
Editors:
Jeremy Tandy, Met Office
Payam Barnaghi, University of Surrey
Linda van den Brink, Geonovum
OGC Document Number::
OGC 15-107

Abstract

This document advises on best practices related to the publication and usage of spatial data on the
may be applied to location. The best practices are intended for practitioners, including Web develo

Joint W3C/OGC Activities

SDWWG

- OGC Published as a **Discussion Paper** the second version of the "**Spatial Data on the Web Use Cases and Requirements**" on 17 December 2015
- OGC is working with the SDWWG to maximize flexibility in OGC processes to align timelines with W3C
- Use of "Discussion Paper" for use case drafts creates good exposure in OGC community and facilitates transition to a Best Practice

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SDWWG II

- "**Spatial Data on the Web Best Practices**" first public working draft published in 19 January 2016 and announced via standard OGC Press Release process for comment
- all drafts can be released and publicized at the whim of the SDWWG; OGC staff will support
- once final Best Practice is up for approval vote, must follow the OGC process

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Evaluation / Experimentation / Best Practices

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