Statens vegvesen
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ISO/TC211
Best practices for UML modelling

05/09/2015

EuroSDR Data modelling workshop, Copenhagen 28.-30.1.2015

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Who am I?

Knut Jetlund

- Geographic information in the Norwegian Public Roads Administration
  - Norwegian Road Database (NVDB)
- ISO TC/211
  - Convenor of ISO/TC 211 AHG on Best Practices for UML
- Norwegian SOSI standard
- INSPIRE

Special interest in

- Maps
- Structure and automation in general
- UML models and Enterprise Architect
- Data transformations in FME

ISO/TC211 Ad hoc group

Best practices for UML modelling

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Resolution 675 **Ad hoc group to draft Best practices for UML modelling in ISO/TC 211**

ISO/TC 211 appreciates and accepts the nomination from NB of Norway of Mr. Knut Jetlund to convene an ad hoc group on development of best practices of UML modelling.

ISO/TC 211 instructs the secretariat to immediately send out a call for membership of the group.

The ad hoc group shall report to the next plenary.

- Resolution at the plenary meeting in Berlin in June 2014
- First working group meeting was held during the meeting week in Shenzhen, China in November 2014
- 20 experts from around the world

ISO/TC211 Ad hoc group

Best practices for UML modelling

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Vision:

UML models shall be understood by both humans and machines

Best practices for UML modelling

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Audience:

- Domain experts
- Model experts

- ISO/TC211
- OGC
- INSPIRE
- National SDIs

ISO-TC211 / **UML-Best-Practices**

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Home

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Knut Jetlund edited this page 3 days ago · 27 revisions

Welcome to the ISO/TC211 Wiki on best practices for modelling geographic information in UML

The purpose of this wiki is to collect and present best practices for modelling geographic information in UML, and to make the models understandable for both machines and humans.

- Basic UML
- Best practices for modelling
- Best practices for diagram design
- Best practices to help implemetation
- Relevant rules from standards
- Level of abstraction
- Reference material

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Pages 15

Basic UML

Best practices for diagram design

Best practices for modelling

Best practices to help implementation

- The outcome of the work will be a **wiki** for modelling geographic information in UML, and will be freely available.
- https://github.com/ISO-TC211/UML-Best-Practices/wiki
- At an early stage of development

ISO-TC211 / **UML-Best-Practices**

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Home

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Pages 15

- Basic UML
- Best practices for diagram design
- Best practices for modelling
- Best practices to help implementation
- Constraints

- Main focus on
  - Modelling
  - Diagram design
  - Prepare for implementation
  - Follow rules from standards

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A constraint is a "*condition or restriction expressed in natural language text or in a machine readable language for the purpose of declaring some of the semantics of an element*" (ref. ISO19103). Constraints are important as they add precision to the models, for instance by setting conditions under which an attribute is mandatory. Expressing constraints at the conceptual level is important for validation, management and maintenance of data.

ISO19109 has some examples of contraints:

- A constraint may specify an acceptable combination of attribute values in one or more feature instances (that may belong to different types);
- A constraint may restrict the cardinality of an association between feature instances;
- A constraint may require that if the real-world phenomenon is of a certain size, the feature instance be represented by a certain subtype of GM_Object;
- The behaviour of a feature, as defined in a feature operation, may be restricted by a constraint.

Recomendation 14 in ISO19103 states that "*Constraints should be expressed using the Object Constraint Language (OCL) as defined in OCL 2.0. In addition, constraints should be expressed in natural language in the accompanying documentation of the model*". The OCL expression is important for implementation (but not mandatory), while the natural language expresion is important for human understanding of the model.

- Writing constraints in OCL is not very intuitive, so it is recomended to **write the natural language first**, and then add the OCL expression based on this.
- The INSPIRE Repository tutorial has some hints on how to write OCL on page 10-11.
- The OCL specification can be found on this address: OCL 2.2.

ISO19136 (GML) - annex E states that "*All OCL constraints are ignored. The assessment of the validity of the instance model with respect to these constraints is the task of the*

https://github.com/ISO-TC211/UML-Best-Practices/wiki/Constraints

Rules and recommendations in standards

- 19103 – Conceptual schema language
- 19109 – Rules for application schema
- 19136 – GML (Annex E)
- 19139 – XML Schema Implementation

Other references

- OGC Domain Modelling Cookbook
- INSPIRE Repository tutorial

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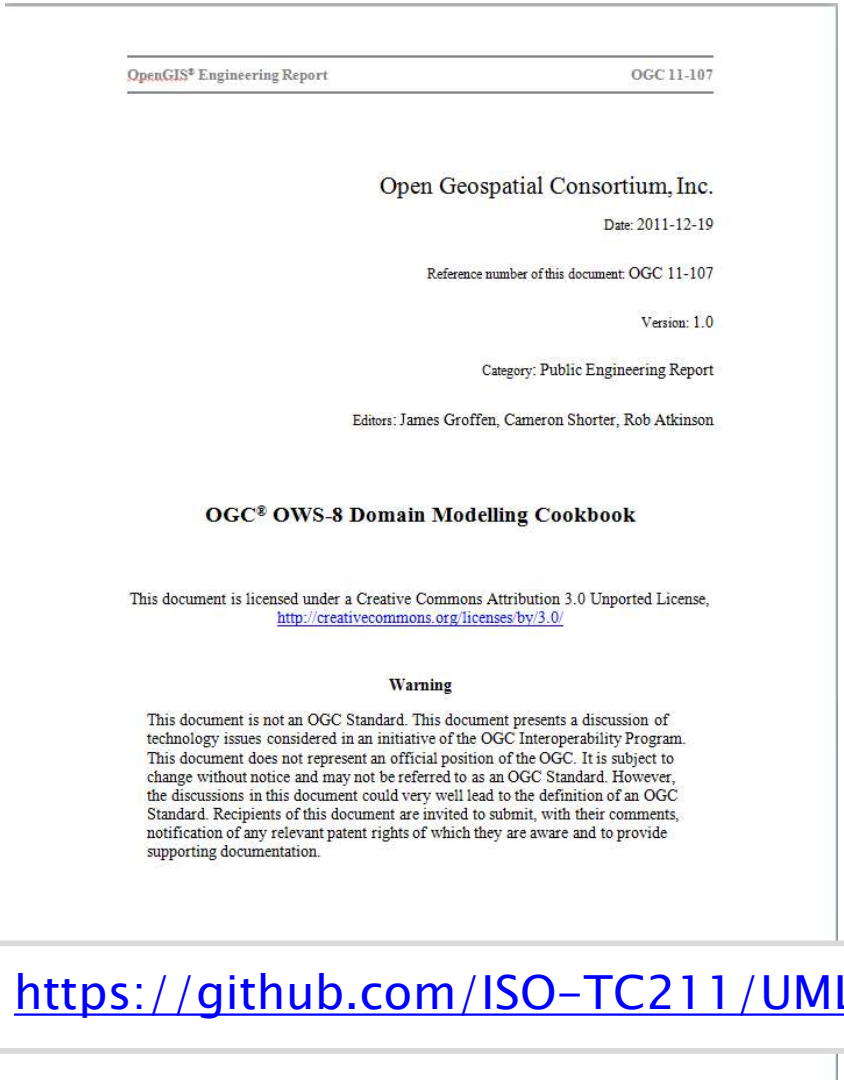

OpenGIS® Engineering Report — OGC 11-107

Open Geospatial Consortium, Inc.

Date: 2011-12-19

Reference number of this document: OGC 11-107

Version: 1.0

Category: Public Engineering Report

Editors: James Groffen, Cameron Shorter, Rob Atkinson

OGC® OWS-8 Domain Modelling Cookbook

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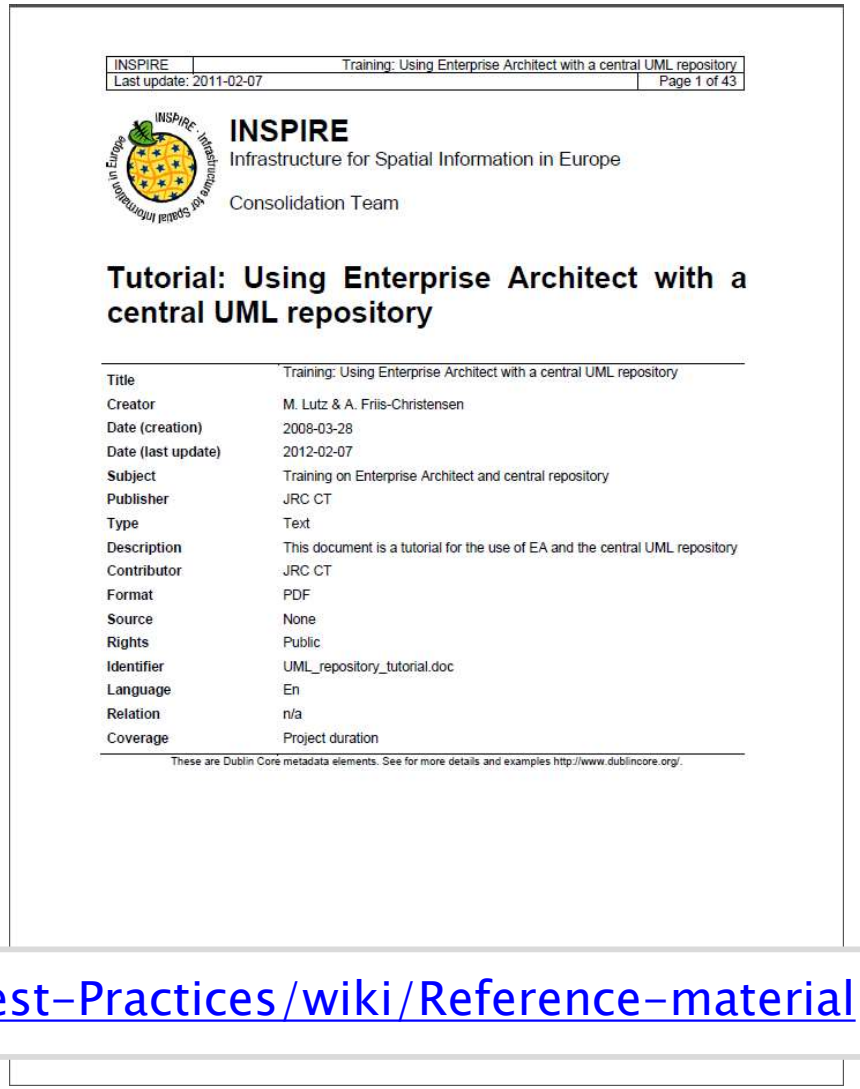
Warning

This document is not an OGC Standard. This document presents a discussion of technology issues considered in an initiative of the OGC Interoperability Program. This document does not represent an official position of the OGC. It is subject to change without notice and may not be referred to as an OGC Standard. However, the discussions in this document could very well lead to the definition of an OGC Standard. Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.



INSPIRE	Training: Using Enterprise Architect with a central UML repository
Last update: 2011-02-07	Page 1 of 43

INSPIRE
Infrastructure for Spatial Information in Europe

Consolidation Team

Tutorial: Using Enterprise Architect with a central UML repository

Title	Training: Using Enterprise Architect with a central UML repository
Creator	M. Lutz & A. Friis-Christensen
Date (creation)	2008-03-28
Date (last update)	2012-02-07
Subject	Training on Enterprise Architect and central repository
Publisher	JRC CT
Type	Text
Description	This document is a tutorial for the use of EA and the central UML repository
Contributor	JRC CT
Format	PDF
Source	None
Rights	Public
Identifier	UML_repository_tutorial.doc
Language	En
Relation	n/a
Coverage	Project duration

These are Dublin Core metadata elements. See for more details and examples http://www.dublincore.org/.

https://github.com/ISO-TC211/UML-Best-Practices/wiki/Reference-material

Modelling

- Prepare for implementation
- Prepare for documentation

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https://github.com/ISO-TC211/UML-Best-Practices/wiki/Best-practices-for-modelling

- Level of abstraction
- Namespaces - the connection between UML packages and XML
- Class and attribute names and (not) prefixes
- Abstract classes

Definitions in models

- ref INSPIRE Repository tutorial page 8
- ref ISO19103 req 2, req 12, req 19, req 20, rec 2.
- ref ISO19109 /req/uml/documentation

Constraints

- OCL: ref INSPIRE Repository tutorial page 10-11
- Display: ref ref INSPIRE Repository tutorial page 14

Stereotypes

- what they mean and how we use them
- Multiplicity
- Roles
- Composition vs Aggregation vs Association

Associations

- Navigability
- ref INSPIRE Repository tutorial page 12-13

*Attribute or Association

- Connecting attributes to data types

Diagram design

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https://github.com/ISO-TC211/UML-Best-Practices/wiki/Best-practices-for-diagram-design

A diagram is just a view of a part of a model, and might not show all aspects. But it is an important illustration for human understanding of the model. This page contains best practices for creating clean and consistent diagrams that are easier to understand.

- **TBD:** ISO/TC211 should have standard colours and fonts in UML diagrams. Ref INSPIRE Repository tutorial page 16-17
- Less is more - few elements and few perspectives for one diagram
- Orthogonality - arrange elements and connectors orthogonaly
- Illustrate classes from other standards
- Avoid crossing lines
- Parent elements above child elements
- Harmonize sizes
- Illustrating constraints

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Less is more

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Back to diagram design

Orthogonality

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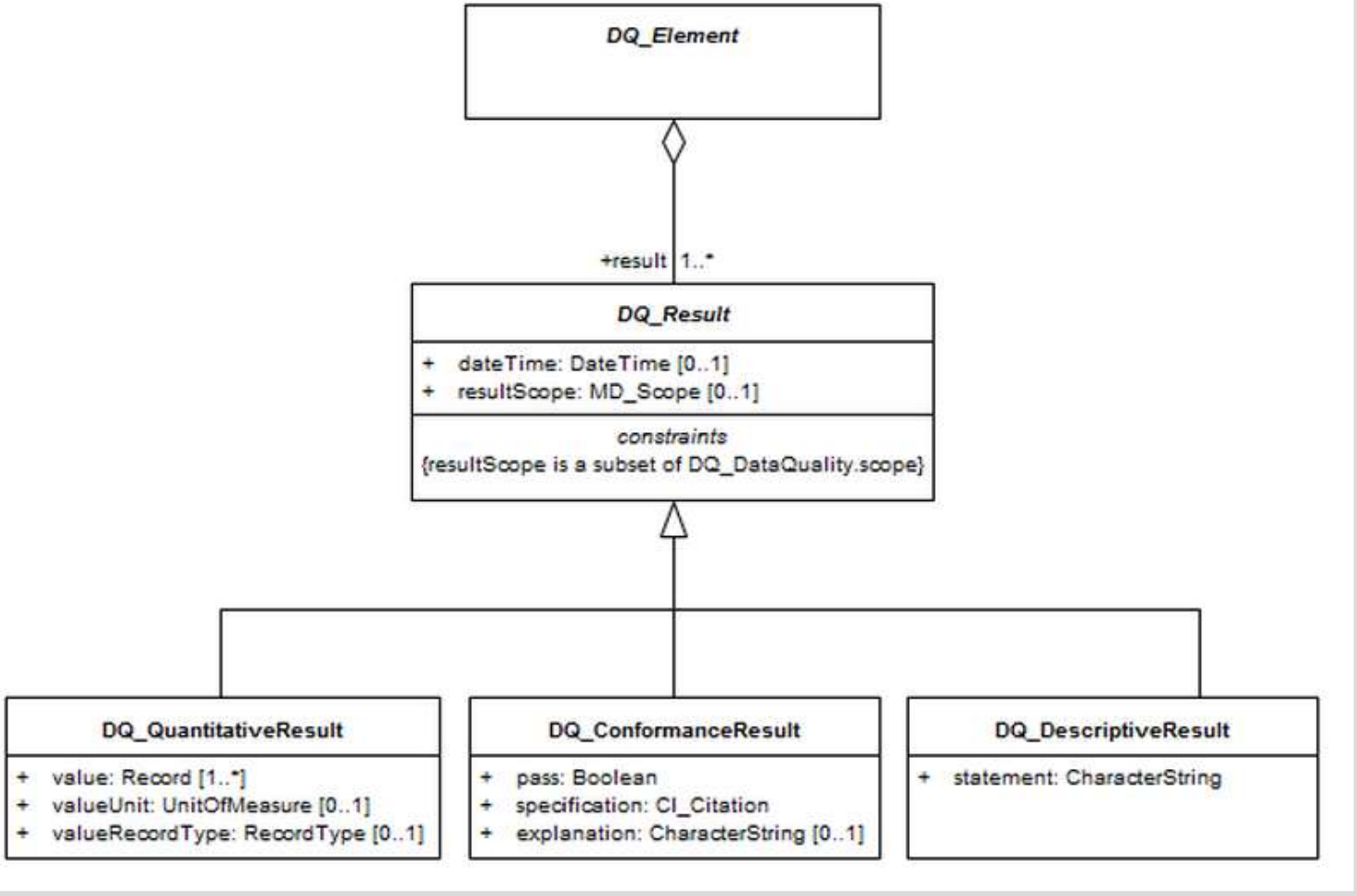
Back to diagram design

Harmonize sizes

classes from other standards



This page is inspire
diagrams.

The elements that a
In other words:

- Subclasses sho
- In aggregation
element on the
- For realizations, the original element should be on top.

Implementation issues

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Best practices to help implementation

Knut Jetlund edited this page a minute ago · 4 revisions

https://github.com/ISO-TC211/UML-Best-Practices/wiki/Best-practices-to-help-implementation

- Iterative approach to standardization and implementation - ref resolution at the 39th plenary
- Namespaces - the connection between UML packages and XML namespaces
- Dependencies - avoid dependencies that makes implementation unecessary complex
- Implementing and maintaining code lists

Resolution 684 Derived resources from UML models

ISO/TC 211 resolves that for all NWIPs and revisions of standards that include a conceptual UML model for which a derived resource, such as an XML schema or an OWL ontology, is required, shall include an annex that references where the repository for such resources resides.

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Timeline

What:

- Describe specific topics on the wiki site
- Start with base topics, go into details later

How:

- Discussion forum on Livelink
- Web meetings when needed
- Physical meeting in Southampton in June 2015 (ISO/TC211 meeting week)

Next:

- We should continue the work up to the next meeting week in October/November 2015, probably longer

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Questions?