The ISO/TC 211 Information modelling approach

Resolutions ISO/TC 211 by correspondence 1998-05-12 (N0524, N0525)

Resolution 68  Conceptual schema language for specifying ISO 15046

ISO/TC211 shall use the Unified Modelling Language (UML) static structure diagram with the ISO Interface Definition Language (IDL) basic type definitions and the UML Object Constraint Language (OCL) as the conceptual schema language for specification of the normative parts of ISO 15046. This requirement shall be implemented prior to submission of the parts for CD and DIS.

Justification:
The reason for this decision is that the goal of ISO/TC 211 is to create a framework to enable syntactic interoperability and to support semantic interoperability, while supporting multiple interchange formats and multiple service implementations. UML is selected as the conceptual schema language for producing specifications that can support the creation of such a framework.

From ISO 19103:2015
ISO/TC 211 Model Driven Architecture

The ISO/TC 211 MDA Framework

UML Modelling rules: ISO 19103 UML Profile

ISO 19103:2015 Geographic information — Conceptual schema language (Figure D.29)
UML Modelling rules:  
ISO 19109  
The General Feature Model (GFM)

ISO 19109:2015 Geographic information — Rules for application schemas (Figure 5)

**feature type**  
class of features having common characteristics

**feature**  
abstraction of real world phenomena
The Harmonized UML Model

- All UML models in one repository
  - Sparx Enterprise Architect
  - iso.sparxcloud.com
- Reuse of concepts
  - Internally in ISO/TC 211 standards
  - Externally: OGC, INSPIRE, Domain models, National models
- Foundation for model-driven implementation
Example dependencies (ISO 19116)
The UML models are the standards!

- The formal standard document presents the model as text and figures...
- ...and add normative statements, conformance classes and conformance tests...
- ...but the UML model is the original!
Accessing and working with the HM


- HM cloud repository (read/write access, for editors)
  - Cloud based, latest versions of all approved changes for all models

- Sparx ProCloud Web (open for anyone)

- Sparx ProCloud Reusable Asset Service (RAS)
  - Read access - download published versions of individual model packages directly into any EA project

- GitHub resources:
  - Standalone ‘Official’ EA project – periodically synchronized with ProCloud
  - Standalone ‘Editorial’ EA project – periodically synchronized with ‘Official’ EA project + ‘Editorial’ Packages

- ProCloud is the primary repository

- EA projects on GitHub are provided for convenience, and are used by several PTs
UML models shall be in the HM before CD/DTS ballot
UML models shall be controlled between the CD and DIS stages

**Documents shall not pass ballot until the review is completed**

Because...

- Derivation of resources for implementation - XSD, OWL
- Reuse in other standards and by other stakeholders
- Reuse in future revisions
- Automated documentation
Standardized Model-Driven Implementation

- ISO 19136 Geography Markup Language
  - XML for geospatial information
  - Rules for UML Modelling (PSMs)
  - Rules for conversion from UML to GML
- ISO 19139 XML schema implementation
  - General rules for conversion from UML to XML
- ISO 19150-2 Ontologies
  - Rules for conversion from UML to OWL
Derived Resources for Implementation

- Derived from The Harmonized UML Model:
  - XML Schemas [https://schemas.isotc211.org](https://schemas.isotc211.org)
  - OWL Ontologies [https://def.isotc211.org](https://def.isotc211.org)
  - SKOS Codelists
The schemas are the resources for implementation!

- The standard document presents the model as text and figures...
- ...and add normative statements, conformance classes and conformance tests...
- ...the UML model is the original...
- ...but the schema is the resource needed for implementation!
Application schemas and implementation schemas

Conceptual schemas – abstract schemas
ISO 19107 Spatial Schema, ISO 19108 Temporal Schema, ISO 19111 Referencing by coordinates, etc.

Conceptual schemas – application schemas
INSPIRE, OGC CityGML, LandInfra/InfraGML, etc.

Implementation schemas
Schemas for GML, OWL, GeoPackage etc, derived from application schemas

Global
OGC®

Regional
INSPIRE

National
GEONOVUM
ISO/TC 211 AG 5
The Harmonized Model Maintenance Group (HMMG)

• Core responsibility
  • Ensure that UML models and derived resources for implementation are maintained and made accessible
  • Establish, maintain and make available the Harmonized UML Model
  • Coordinate the use of UML
  • Coordinate the work on resources for implementation
    • Close cooperation with the XMG, GOM and TMG