ISO/ TC211 / WG2
Rules for Application Schema

Scope

• Description of the rules for defining an application schema, including the principles for definitions of features.
application schema
conceptual schema for a certain type of application

conceptual schema
abstract description and definition of the content, structure and restrictions applicable to information within a specific application domain
ISO/ TC211 / WG2

Features

Feature

representation of a real world phenomenon

Instances of features has

• Unique identification

is described by

• Feature attributes
• Feature relationships
• Feature functions

Example. ”Tower Bridge” is an instance of the feature ”bridge”.
The Kernel of the General Feature Model

Feature
+feature_name : string
+feature_definition : string
+feature_code : string
+feature_allias : FiniteSet[Feature]

Feature Attribute
+feature_attribute_name : string
+feature_attribute_definition : string
+feature_attribute_code : string

Feature Function
+feature_function_name : string
+feature_function_definition : string
+feature_function_code : string

Feature Relationship
+feature_relationship_name : string
+feature_relationship_definition : string
+feature_relationship_code : string
+cardinality : string
+constraints : string

Association_described_by
0..n

To_other
1..1

Depends_on
0..n

Characterized_by
0..n

Affects_values_of
0..n

Observes_values_of
1..n

Behaviour_described_by
0..n
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Modelling Geographic Data

REALITY: phenomena

universe of discourse: subset

preceived in context of geographic application

classified into feature types
(defined in an application schema or feature catalogue)

consisting of 1:n

feature instances
(a dataset)

data capture
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Application Schema
Model Integration

<<ApplicationSchema>>
PBLSchema
(from Logical View)

SpatialSchema
Temporal Schema
Portrayal Schema
QualitySchema
Gazetter Schema
Feature Catalogue
DirectPositioningSchema
Metadata Schema
The Feature Attribute

**Rule:** The Feature Attribute represents the link to other parts
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Rules for Application Schema

Main rules using UML

- Feature ==> UML CLASS
- Feature Attribute ==> [UML CLASS] + UML Attribute
- Feature Relationship ==> UML ASSOCIATION *)
- Feature Function ==> UML OPERATION

*) exceptions: Aggregations, Generalisation / Specialisation
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Spatial Rules

**Rule:** Feature attribute having Geometric Object(s) as value.

**Geometric Primitives**
- GM_Object
- GM_Point
- GM_Curve
- GM_Surface

**Topological**
- TP_node
- TP_edge
- TP_face

**Spatial Complexes**
- GM_Complex
- GM_CompositePoint
- GM_CompositeCurve
- GM_CompositeSurface
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Spatial Rules

Example

Model Integration

Application Specific Schema

Spatial Schema

Application Specific

Parcel

+ name_of_parcel : string
+ border TP face
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Temporal Rules

**Rule:** Feature attributes having temporal primitives as values
- Instant
- Period

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**Model Integration**

**Application Specific Schema**

**Station**
- `station_# : string`
- `position : point`
- `time_period : period`
- `has_a_log_of_values : measurement`

**Measurement**
- `time_of_measurement : instant`
- `measurement_value : real`
3 levels of data quality of geographic data

– (1) Quality Aspects of Datasets
   **Rule:** Metadata

– (2) Quality Aspects of Data Types
   **Rule:** Metadata

– (3) Quality Aspects of Data Instances
   **Rule:** Feature attribute
<table>
<thead>
<tr>
<th>Data Quality Element</th>
<th>Data Quality Subelement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness</td>
<td>Commision</td>
</tr>
<tr>
<td>Completeness</td>
<td>Omission</td>
</tr>
<tr>
<td>Logical consistency</td>
<td>Domain consistency</td>
</tr>
<tr>
<td>Logical consistency</td>
<td>Format consistency</td>
</tr>
<tr>
<td>Logical consistency</td>
<td>Topologic consistency</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Absolute accuracy elevation</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Absolute accuracy horizontal</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Absolute accuracy 3D</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Pixel position accuracy</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Relative accuracy elevation</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Relative accuracy horizontal</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Relative accuracy 3D</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>Shape fidelity</td>
</tr>
<tr>
<td>Temporal accuracy</td>
<td>Temporal Accuracy</td>
</tr>
<tr>
<td>Temporal accuracy</td>
<td>Temporal consistency</td>
</tr>
<tr>
<td>Temporal accuracy</td>
<td>Temporal validity</td>
</tr>
<tr>
<td>Thematic accuracy</td>
<td>Feature attribute value accuracy</td>
</tr>
<tr>
<td>Thematic accuracy</td>
<td>Classification accuracy</td>
</tr>
</tbody>
</table>
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Quality Rules

Example: Feature attribute carrying quality

Model Integration

Application Specific Schema

Spatial Schema

Quality Schema

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Application Specific Schema

<table>
<thead>
<tr>
<th>Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>+Name_of_building : string</td>
</tr>
<tr>
<td>+position_of_building : point</td>
</tr>
<tr>
<td>+position_accuracy : absolute_accuracy_horizontal</td>
</tr>
</tbody>
</table>
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Referencing by Geographic Identifier

1) Thematic attribute and Metadata
2) Feature Attribute

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**Application Specific Schema**

<table>
<thead>
<tr>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>+name : string</td>
</tr>
<tr>
<td>+post_district : Geographic Identifier</td>
</tr>
</tbody>
</table>
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Application Schema
Example

Parcel

Building

Loan

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