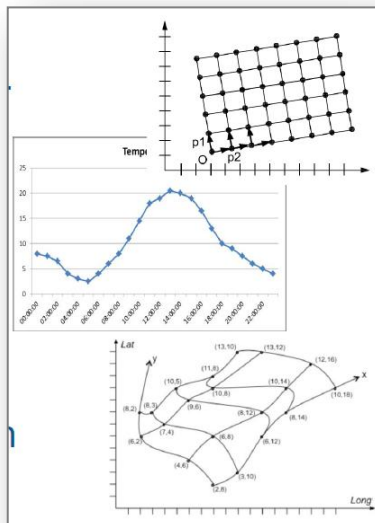


Coverages in INSPIRE

**INSPIRE Thematic Cluster on
Elevation, Orthoimagery, Reference systems and Geographical grids**

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Introduction / Coverages in INSPIRE

- **Coverage:**

Describe characteristics of real-world phenomena that vary over space and/or time (temperature, elevation, land cover, imagery...)

- **Contains** sets of values, associated to a spatial and/or temporal domain

- **Used in several INSPIRE themes:**

AC-MF, OF, ER, EL, NZ, OI, LU, LC, GE, SO

- **Elevation & Orthoimagery**

Data shall be provided using (mainly) the raster data spatial representation type – Coverages.

Introduction / Coverages in INSPIRE

- **INSPIRE** reuses the concept of coverage from ISO 19123

spatial object that acts as a function to return values from its range for any direct position within its spatial, temporal or spatiotemporal domain [Adapted from ISO 19123]

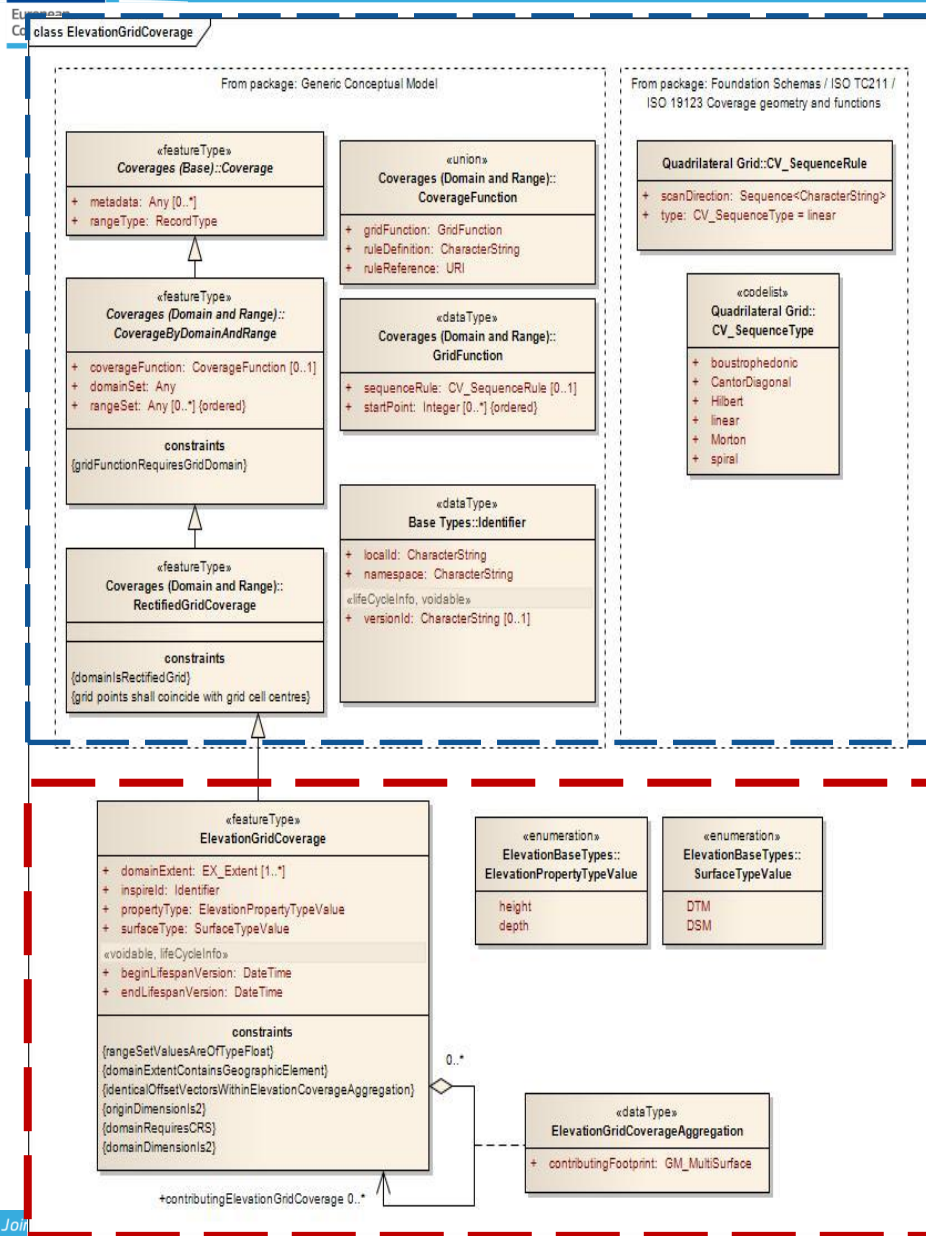
- **Main components**
 - **Domain Set**
 - **Range Set**
 - **Coverage Function**
 - **Range Type**



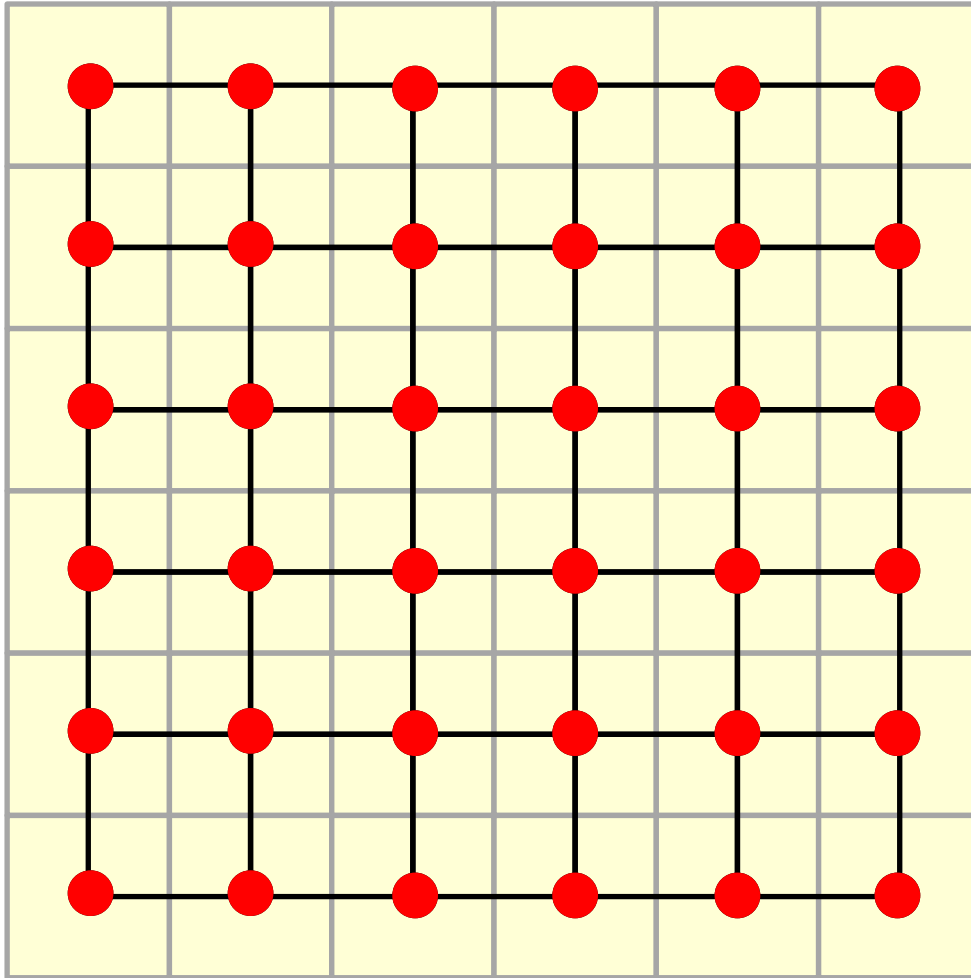
Generic Conceptual Model 'Coverage – Domain and range' schema Based on ISO 19123

EXAMPLE: INSPIRE Elevation

INSPIRE Elevation Model 'Elevation Grid Coverage' schema



Introduction / Coverages in INSPIRE



Main components:

- **Domain Set:** Spatial domain of the coverage – Point locations
- Also considered as a grid
- **Range Set:** The values of the phenomenon
- **Coverage Function:** Defines the correspondence between the domain and the range of the coverage, e.g. the rules assigning the phenomenon values to the grid
- **Range Type:** Describes the characteristics of the range values (type of phenomenon)

Encoding of INSPIRE Coverages (EL)

- **Coverage, except Range Set**
 - OGC GML Application Schema for Coverages [OGC 09-146r2]
- **Coverage Range Set**
 - **OPTION 1: Multipart representation**
 - 1st Part: GML Part (gmlcov:RectifiedGridCoverage)
 - 2nd Part: Range Set encoded using a well-known binary format (embedded in 1st Part) – TIFF / GeoTIFF (*)
 - **OPTION 2: External file encoding**
 - 1st Part: GML Part (gmlcov:RectifiedGridCoverage)
 - 2nd Part: Range Set, encoded using an external well-known binary format (gml:File) – TIFF / GeoTIFF (*)
 - **OPTION 3: Inline encoding**
 - Range Set is encoded within the XML inline (DataBlock)

(*) Alternatively, the BAG format for Hydrographic bathymetry data

Delivery of INSPIRE Coverages

Case 1 - Delivery through Predefined data sets (ATOM)

- The coverage over a certain territory is split in several pieces (e.g. map sheets), for both organizational and efficiency purposes.
- Implemented using concrete, fixed tiling schema.
- Tiling approach and server characteristics have a direct impact on efficiency of delivery.

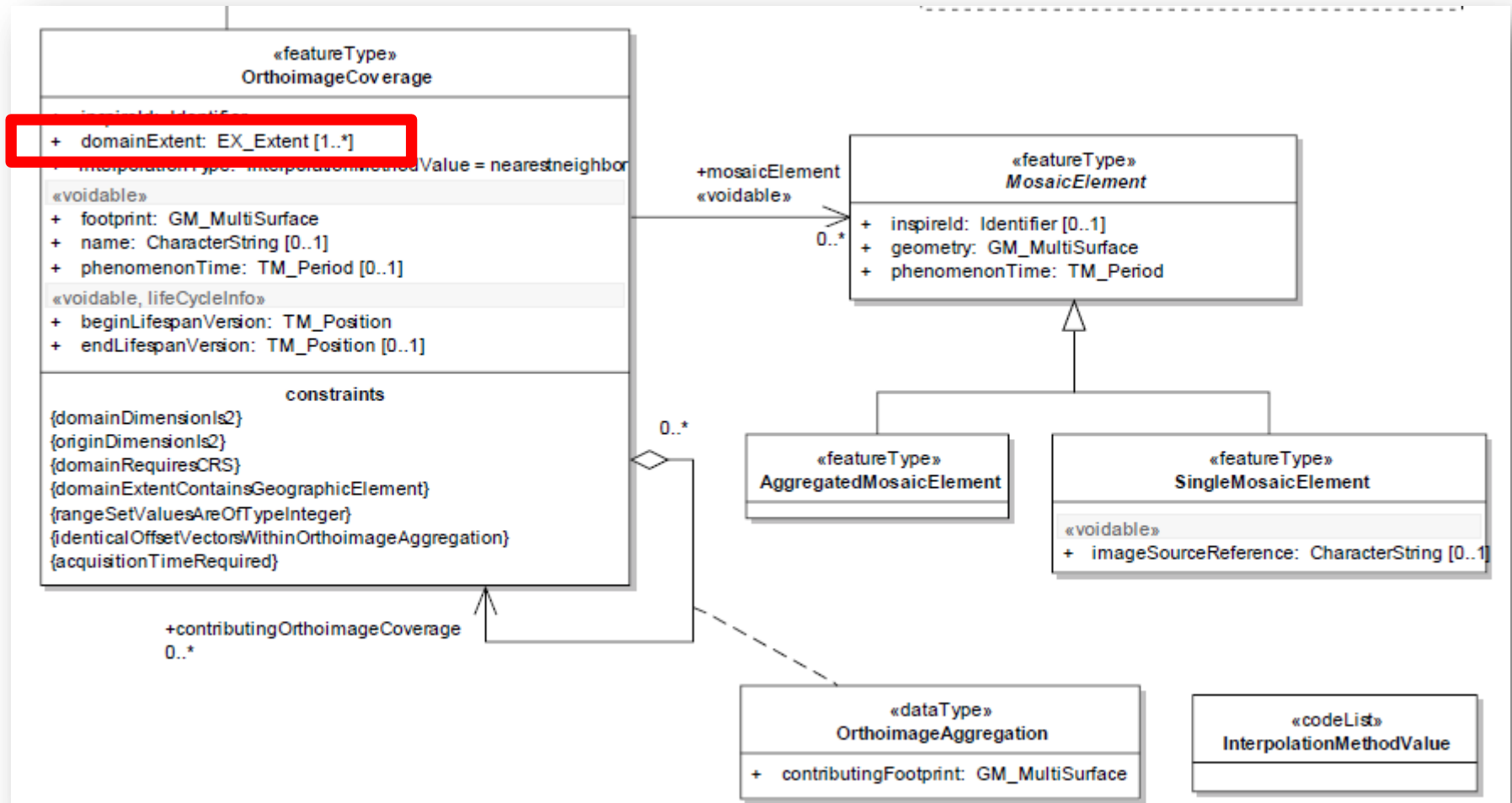
Case 2 - Delivery through WCS

- A coverage is the natural response of a WCS GetCoverage request.
- Tiling schema independent.
- Highly advisable to limit the maximum volume of data that may be requested in a single query to achieve efficiency.

INSPIRE Coverages Implementation issues

- **Terminology**
 - Coverage-related terms: Tiling, Mosaicking, Predefined datasets.
 - Mixing concepts: Grid coverage vs. Geographical grid
- **Coverage encoding**
 - Evolution of standardization: GMLCOV → CIS v1.1
 - Clarify usage of alternative encodings.
- **Extensions of OGC standard coverages** – Examples:
 - Examples: Coverage aggregation, Mosaicking, Any additional properties (e.g. 'domainExtent').
 - Extensions are ignored by the standard WCS interfaces.
- **How to deal with huge volume of coverage data**
 - Appropriate tuning of download services to achieve efficiency.
- **Unknown potential in certain communities:**
 - Big Data analytics, Data cube technologies.

Examples of INSPIRE Extensions (OI): Identification of coverage extent



Examples of INSPIRE Extensions (OI): Mosaicking and coverage aggregation



Conclusions

- Some data provider communities (e.g. NMCAs) do not have previous experience with coverage data and services (WCS).
- Neither at implementation nor at exploiting level.
- Clear solution to questions and issues is needed to achieve a successful implementation.
- Need to align INSPIRE conceptual data models to the standard implementation of coverages (OGC CIS vx.y).
- Drafting of *Technical Guidelines for providing INSPIRE coverage data using WCS* (MIG-T MIWP-7b - Task 2).

INSPIRE Thematic Cluster #3

Interoperability is better achieved



...sharing solutions in a collaborative way

Activities related to coverages in Thematic Cluster #3

- **Main activities in the scope :**

- ***Workshop: Transformation of Coverage-Based Data Themes and WCS – Barcelona (ICGC venues), 29-30 September 2015***

<https://themes.jrc.ec.europa.eu/pages/view/45690/workshop-about-transformation-of-coverage-based-data-themes-and-wcs-barcelona-29-30-september-2015>

- ***Follow-up Webinar: Coverage Data and Services, 18 January 2016***

- ***Workshop: Implementation and potential of INSPIRE coverage data and WCS - INSPIRE Conference Barcelona, 30 September 2016***

<https://themes.jrc.ec.europa.eu/pages/view/115418/results-from-the-ws-on-implementation-and-potential-of-inspire-coverage-data-and-wcs>

- **Summary of conclusions and results:**

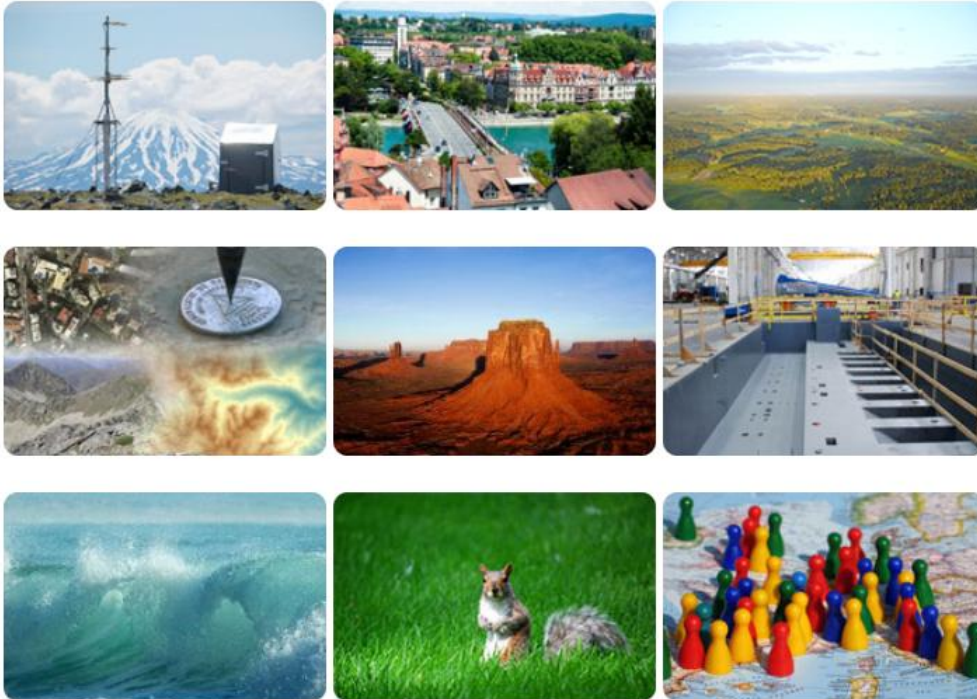
<https://themes.jrc.ec.europa.eu/file/view/115321/workshop-implementation-and-potential-of-inspire-coverage-data-and-wcs-final-minutes-with-actions>

Looking for your participation...



INSPIRE Thematic Clusters

<https://themes.jrc.ec.europa.eu/>



Open platform where implementers can ***build communities, share experiences, best practices, raise questions and resolve issues...***

- Discussion topics
- Uploaded contents
- News
- Implementation activities

**JOIN & PARTICIPATE
IN
THEMATIC CLUSTER #3**