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**
    - 1\(^{st}\) Part: GML Part (gmlcov:RectifiedGridCoverage)
    - 2\(^{nd}\) Part: Range Set encoded using a well-known binary format (embedded in 1\(^{st}\) Part) – TIFF / GeoTIFF (*)
  - **OPTION 2: External file encoding**
    - 1\(^{st}\) Part: GML Part (gmlcov:RectifiedGridCoverage)
    - 2\(^{nd}\) 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)

( strokes)

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 \(\rightarrow\) 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**
    
  
  - **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**
    

• Summary of conclusions and results:

Looking for your participation...

INSPIRE Thematic Clusters

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

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