



## INSPIRE Infrastructure for Spatial Information in Europe

### D2.10.2 INSPIRE Data Specifications – Base Models – Coverage Types

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## Foreword

INSPIRE is a Directive proposed by the European Commission in July 2004 setting the legal framework for the establishment of the Infrastructure for Spatial Information in the European Community, for the purposes of Community environmental policies and policies or activities which may have an impact on the environment.

INSPIRE should be based on the infrastructures for spatial information that are created and maintained by the Member States. The components of those infrastructures include: metadata, spatial data themes (as described in Annexes I, II, III of the Directive), spatial data services; network services and technologies; agreements on data and service sharing, access and use; coordination and monitoring mechanisms, processes and procedures.

The guiding principles of INSPIRE are that the infrastructures for spatial information in the Member States will be designed to ensure that spatial data are stored, made available and maintained at the most appropriate level; that it is possible to combine spatial data and services from different sources across the Community in a consistent way and share them between several users and applications; that it is possible for spatial data collected at one level of public authority to be shared between all the different levels of public authorities; that spatial data and services are made available under conditions that do not restrict their extensive use; that it is easy to discover available spatial data, to evaluate their fitness for purpose and to know the conditions applicable to their use.

The text of the INSPIRE Directive is available from the INSPIRE web site (<http://inspire.ec.europa.eu/>). The Directive identifies what needs to be achieved, and Member States had two years from the date of adoption to bring into force national legislation, regulations, and administrative procedures that define how the agreed objectives will be met taking into account the specific situation of each Member State. To ensure that the spatial data infrastructures of the Member States are compatible and usable in a Community and transboundary context, the Directive requires that common Implementing Rules (IR) are adopted in a number of specific areas. Implementing Rules are adopted as Commission Regulations and are binding in their entirety. The Commission is assisted in the process of adopting such rules by a regulatory committee composed by representatives of the Member States and European Parliament<sup>1</sup>. The Committee is chaired by a representative of the Commission (this is known as the Comitology procedure). The committee was established on 15 August 2007.

The IR will be shaped in their legal structure and form by the Commission legal services on the basis of technical documents prepared by especially convened Drafting Teams, for each of the main components of INSPIRE: metadata, data specifications, network services, data and service sharing, and monitoring procedures. For data specifications, the technical documents for each spatial data theme will be prepared by especially convened Thematic Working Groups.

This document represents a contribution of the Data Specification Drafting Team.

It is important to note that this document is not a draft Implementing Rule, but a document that is a basis for the development and maintenance of the thematic data specifications that will serve as technical basis for the legal text of the INSPIRE Implementing Rules. It is foreseen that relevant requirements will continue to be included in the Implementing Rules.

The document will be publicly available as a 'non-paper', as it does not represent an official position of the Commission, and as such can not be invoked in the context of legal procedures.
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<sup>1</sup> The implementing rules for interoperability of spatial data are formally adopted through regulatory procedure with scrutiny according to Council Decision of 17 July 2006 (2006/512/EC). Under this regulation, the Parliament and the Council are on equal footing for all regulatory procedures related to co-decision acts. As a consequence, all measures must be ratified by all three institutions to come into force.

## 1 Scope

This document specifies application schemas for coverage types for use by thematic application schemas in INSPIRE.

The document identifier is: D2.10.2.

## 2 Normative references

D2.5 v3.4, Generic Conceptual Model

## 3 Terms and abbreviations

The terms and definitions, abbreviations and other conventions specified in clause 3 of the Generic Conceptual Model apply.

## 4 Coverages

### 4.1 Overview

See Generic Conceptual Model, sub-clauses 10.4 and 10.5.

Note that in the GML encoding, these types are mapped to the XML elements and types of the GML Coverage application schema specified by OGC (OGC document 09-146r1).

### 4.2 Coverages (Base)

Table 1 – Feature catalogue metadata

Application Schema	INSPIRE Application Schema Coverages (Base)
Version number	1.0rc3

Table 2 – Types defined in the feature catalogue

Type	Package	Stereotypes
<a href="#">Coverage</a>	Coverages (Base)	«featureType»

#### 4.2.1 Spatial object types

##### 4.2.1.1 Coverage

Coverage (abstract)	
Name:	coverage
Definition:	Spatial object that acts as a function to return values from its range for any direct position within its spatial, temporal or spatiotemporal domain.
Description:	EXAMPLE Examples include a raster image, polygon overlay or digital elevation matrix.  NOTE In other words, a coverage is a feature that has multiple values for each attribute type, where each direct position within the geometric representation of the feature has a single value for each attribute type.
Stereotypes:	«featureType»
Attribute: metadata	
Name:	metadata
Value type:	Any
Definition:	Application specific metadata of the coverage.
Description:	NOTE The values of this property will typically be constrained in subtypes or in

### Coverage (abstract)

Multiplicity: profiles specified by information communities.  
0..\*

#### Attribute: rangeType

Name: range type  
Value type: RecordType  
Definition: Description of the structure of the range values.  
Multiplicity: 1

## 4.2.2 Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

### 4.2.2.1 Any

#### Any

Package: Records and Class Metadata  
Reference: Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

### 4.2.2.2 RecordType

#### RecordType

Package: Records and Class Metadata  
Reference: Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

## 4.3 Coverage (Domain and Range)

Table 3 – Feature catalogue metadata

Application Schema	INSPIRE Application Schema Coverages (Domain and Range)
Version number	1.0

Table 4 – Types defined in the feature catalogue

Type	Package	Stereotypes
<a href="#">CoverageByDomainAndRange</a>	Coverages (Domain and Range)	«featureType»
<a href="#">CoverageFunction</a>	Coverages (Domain and Range)	«union»
<a href="#">GridFunction</a>	Coverages (Domain and Range)	«dataType»
<a href="#">RectifiedGridCoverage</a>	Coverages (Domain and Range)	«featureType»
<a href="#">ReferenceableGridCoverage</a>	Coverages (Domain and Range)	«featureType»

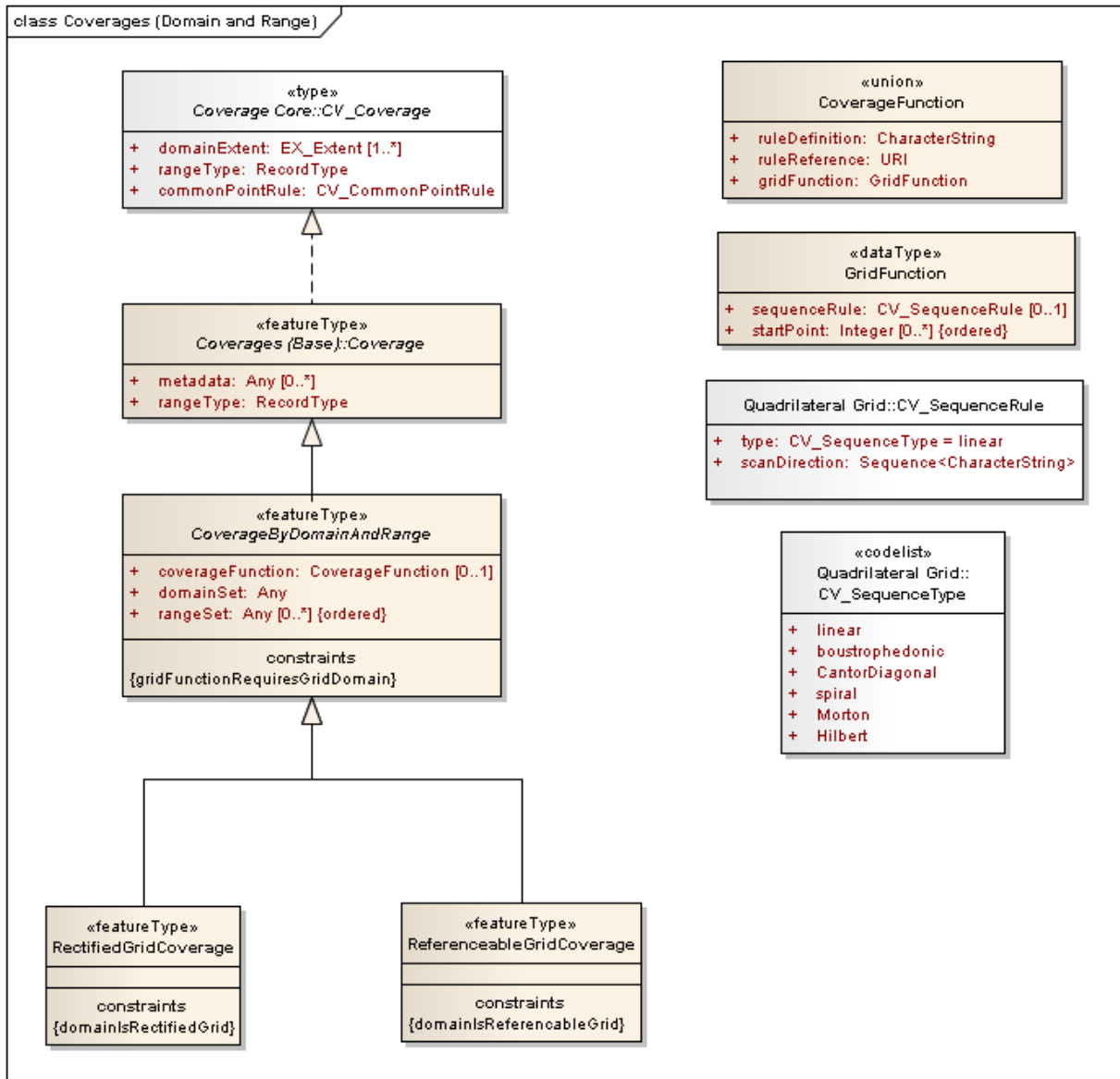


Figure 1 – Coverage representation using a domain/range pair

### 4.3.1 Spatial object types

#### 4.3.1.1 CoverageByDomainAndRange

##### CoverageByDomainAndRange (abstract)

Name: coverage (domain and range representation)  
 Subtype of: Coverage  
 Definition: Coverage which provide the domain and range as separate properties.  
 Stereotypes: «featureType»

##### Attribute: coverageFunction

Name: coverage function  
 Value type: CoverageFunction  
 Definition: Description of how range values at locations in the coverage domain can be obtained.  
 Multiplicity: 0..1

##### Attribute: domainSet

### CoverageByDomainAndRange (abstract)

Name: domain set  
Value type: Any  
Definition: Configuration of the domain of the coverage described in terms of coordinates.  
Description: NOTE The values of this property will typically be constrained in subtypes to specific spatial and/or temporal geometries.  
Multiplicity: 1

#### Attribute: rangeSet

Name: range set  
Value type: Any  
Definition: Set of feature attribute values associated by a function with the elements of the domain of the coverage.  
Multiplicity: 0..\*

#### Constraint: gridFunctionRequiresGridDomain

Natural language: The grid function shall only be valid for domains that are grids  
OCL: inv: coverageFunction.gridFunction.notEmpty() implies domainSet.ocllsKindOf(CV\_Grid)

### 4.3.1.2 RectifiedGridCoverage

#### RectifiedGridCoverage

Name: rectified grid coverage  
Subtype of: CoverageByDomainAndRange  
Definition: Coverage whose domain consists of a rectified grid  
Description: A rectified grid is a grid for which there is an affine transformation between the grid coordinates and the coordinates of a coordinate reference system.  
Stereotypes: «featureType»  
NOTE This type can be used for both discrete and continuous coverages.

#### Constraint: domainIsRectifiedGrid

Natural language: The domain shall be a rectified grid.  
OCL: inv: domainSet.ocllsKindOf(CV\_RectifiedGrid)

#### Constraint: grid points shall coincide with grid cell centres

Natural language: Grid points of a RectifiedGridCoverage shall coincide with the centres of cells of the geographical grids defined in Section 2.2 of Annex II at any resolution level.  
OCL:

### 4.3.1.3 ReferenceableGridCoverage

#### ReferenceableGridCoverage

Name: referenceable grid coverage  
Subtype of: CoverageByDomainAndRange  
Definition: Coverage whose domain consists of a referenceable grid  
Description: A referenceable grid is a grid associated with a transformation that can be used to convert grid coordinate values to values of coordinates referenced to a coordinate reference system.  
Stereotypes: «featureType»  
NOTE This type can be used for both discrete and continuous coverages.

#### Constraint: domainIsReferenceableGrid

### ReferenceableGridCoverage

Natural language:  
 OCL: inv: domainSet.ocIsKindOf(CV\_ReferenceableGrid)

## 4.3.2 Data types

### 4.3.2.1 CoverageFunction

#### CoverageFunction

Name: coverage function  
 Definition: Description of how range values at locations in the coverage domain can be obtained.  
 Description: NOTE The following variants are currently supported: a mapping rule either by inline text or by reference and a grid function that specifies the sequence of the grid points.  
 Stereotypes: «union»

#### Attribute: ruleDefinition

Name: rule definition  
 Value type: CharacterString  
 Definition: A formal or informal description of the coverage function as text.  
 Multiplicity: 1

#### Attribute: ruleReference

Name: rule reference  
 Value type: URI  
 Definition: A formal or informal description of the coverage function as reference.  
 Multiplicity: 1

#### Attribute: gridFunction

Name: grid function  
 Value type: GridFunction  
 Definition: Mapping rule for grid geometries.  
 Multiplicity: 1

### 4.3.2.2 GridFunction

#### GridFunction

Name: grid function  
 Definition: An explicit mapping rule for grid geometries  
 Stereotypes: «dataType»

#### Attribute: sequenceRule

Name: sequence rule  
 Value type: CV\_SequenceRule  
 Definition: Description of how the grid points are ordered for association to the elements of the values in the range set of the coverage.  
 Multiplicity: 0..1

#### Attribute: startPoint

Name: start point  
 Value type: Integer  
 Definition: The grid point to be associated with the first record in the range set of the coverage.  
 Description: If startPoint is omitted it is assumed to be equal to the lowest values in the



### GridFunction

envelope of the grid geometry.  
 Multiplicity: 0..\*

### 4.3.3 Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

#### 4.3.3.1 Any

##### Any

Package: Records and Class Metadata  
 Reference: Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

#### 4.3.3.2 CV\_SequenceRule

##### CV\_SequenceRule

Package: Quadrilateral Grid  
 Reference: Geographic information -- Schema for coverage geometry and functions [ISO 19123:2005]

#### 4.3.3.3 CharacterString

##### CharacterString

Package: Text  
 Reference: Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

#### 4.3.3.4 Coverage

##### Coverage (abstract)

Package: Coverages (Base)  
 Reference: INSPIRE Data Specifications – Base Models – Coverage Types, version 1.0 [DS-D2.10.2]  
 Definition: Spatial object that acts as a function to return values from its range for any direct position within its spatial, temporal or spatiotemporal domain.  
 Description: EXAMPLE Examples include a raster image, polygon overlay or digital elevation matrix.

NOTE In other words, a coverage is a feature that has multiple values for each attribute type, where each direct position within the geometric representation of the feature has a single value for each attribute type.

#### 4.3.3.5 Integer

##### Integer

Package: Numerics  
 Reference: Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

#### 4.3.3.6 URI

##### URI

Package: basicTypes  
 Reference: Geographic information -- Geography Markup Language (GML) [ISO 19136:2007]