



# INSPIRE Infrastructure for Spatial Information in Europe



## INSPIRE Domain Model

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# Table of Contents

<a href="#">1 Foreword.....</a>	<a href="#">3</a>
<a href="#">2 Background.....</a>	<a href="#">3</a>
<a href="#">3 Referenced documents.....</a>	<a href="#">3</a>
<a href="#">4 Scope of Work.....</a>	<a href="#">4</a>
<a href="#">5 Terms and abbreviations.....</a>	<a href="#">4</a>
<a href="#">5.1 Terms.....</a>	<a href="#">4</a>
<a href="#">5.2 Abbreviations.....</a>	<a href="#">4</a>
<a href="#">6 INSPIRE Domain Model.....</a>	<a href="#">5</a>
<a href="#">6.1 Description.....</a>	<a href="#">6</a>
<a href="#">6.2 Spatial Data &amp; Data Themes.....</a>	<a href="#">6</a>
<a href="#">6.3 Metadata &amp; Discovery.....</a>	<a href="#">6</a>
<a href="#">6.4 View Service &amp; Layers.....</a>	<a href="#">7</a>
<a href="#">6.5 Download Service, FeatureTypes and Predefined Datasets.....</a>	<a href="#">8</a>

# 1 Foreword

The INSPIRE domain model serves as conceptual model to define the most important (technical) entities of INSPIRE (as of data, metadata, services) and their relationships. The conceptual model serves as a domain model to help understanding the nature of the entities & relationships, their purpose, context and how they could interact to realize use cases and workflows.

As for the current work items (finalize the TGs for view and discovery services) the domain model can help identifying gaps that are not directly visible when working on single aspects. In the mid term the domain model can serve as input for an updated INSPIRE architecture document. The domain model can subsequently be extended by taking additional aspects into account.

# 2 Background

TBD

# 3 Referenced documents

- INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119 (Revised edition) 03.02.2009 - [http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/metadata/MD\\_IR\\_and\\_ISO\\_20090218.pdf](http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/metadata/MD_IR_and_ISO_20090218.pdf)
- INSPIRE Metadata Regulation 03.12.2008 - <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008R1205:EN:NOT>
- INSPIRE View Service Technical Guidance (Version 2.0) 28.07.2009 - [http://inspire.jrc.ec.europa.eu/documents/Network\\_Services/Technical%20Guidance%20View%20Services%20v%202.0.pdf](http://inspire.jrc.ec.europa.eu/documents/Network_Services/Technical%20Guidance%20View%20Services%20v%202.0.pdf)
- Technical Guidance Discovery Services (2.0) 23.07.2009 - [http://inspire.jrc.ec.europa.eu/documents/Network\\_Services/Technical%20Guidance%20Discovery%20Services%20v2.0.pdf](http://inspire.jrc.ec.europa.eu/documents/Network_Services/Technical%20Guidance%20Discovery%20Services%20v2.0.pdf)
- Draft Technical Guidance Download Services (version 2.0) 25.09.2009 - [http://inspire.jrc.ec.europa.eu/documents/Network\\_Services/INSPIRE%20Draft%20Technical%20Guidance%20Download%20\(Versions%202.0\).pdf](http://inspire.jrc.ec.europa.eu/documents/Network_Services/INSPIRE%20Draft%20Technical%20Guidance%20Download%20(Versions%202.0).pdf)
- Regulation on INSPIRE Network Services 19.10.2009 - <http://eur-lex.europa.eu/JOHtml.do?uri=OJ%3AL%3A2009%3A274%3ASOM%3AEN%3AHTML>
- Network Services Architecture (Version 3.0) 30.09.2008 - [http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/network/D3\\_5\\_INSPIRE\\_NS\\_Architecture\\_v3-0.pdf](http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/network/D3_5_INSPIRE_NS_Architecture_v3-0.pdf)

As well as all documents which are referenced in the above mentioned documents.

## 4 Scope of Work

Scope for the current work items (finalize the TGs for view and discovery services)

- Identify gaps that are not directly visible when working on single aspects, e.g. single TGs
- Get a common understanding of INSPIRE (technological wise)
- Provide input for the finalization of the technical guidance documents for view and discovery (and maybe metadata)

Mid/Long-term Scope

- Input for an updated INSPIRE architecture document (or a core element of this document)
- Subsequent extension by additional TGs (Download/Invoke/Transformation)
- Subsequent extension by taking additional aspects into account (Schema`s, Registries, Access Control/GeoRM entities)
- Base for future evolvement of INSPIRE specifications

[More TBD]

## 5 Terms and abbreviations

### 5.1 Terms

SpatialObjectType	
SpatialDataSet	
SpatialDataTheme	

[TBD]

### 5.2 Abbreviations

[TBD]



## 6.1 Description

The domain model relates real world entities and their corresponding conceptual entities. In order to make the model better understand- and readable, the following example is used:

- Netherlands publish their TOP10NL spatial dataset via Download- and View Services
- Appropriate Metadata for the spatial dataset and the services is created and accessible via the member states DiscoveryService.
- The example simplifies by assuming that TOP10NL only realizes the spatial data theme “Administrative Units” and that both, spatial data set and spatial data theme only have one associated child: spatial object type “NUTSRegion” and as real world representation a collection of spatial objects that are “NUTSRegions.NL”.

A detailed description of the entities and their relations can be found in the following chapters.

## 6.2 Spatial Data & Data Themes

Characteristics:

- NL has a member state SpatialDataSet nationally identified by “NL:TOP10NL”
- The SpatialDataSet “NL:TOPNL” realizes the INSPIRE data theme (SpatialDataTheme) “AdministrativeUnits”
- The SpatialDataTheme “AdministrativeUnits” has three SpatialObjectTypes, one of them is “NUTSRegion”
- One part of the SpatialDataSet “NL:TOPNL” is a collection of spatial objects that realize the SpatialObjectType of “NUTSRegion” for the member state NL (e.g. as Shape, Oracle Spatial tables, etc)

## 6.3 Metadata & Discovery

Characteristics:

- A discovery service “DiscoveryService.NL” has access to a metadata collection
- Contained is metadata describing the SpatialDataSet “NL:TOP10NL” as “Metadata\_Dataset” document
  - o FileIdentifier is the primary key that uniquely identifies the metadata document within the collection. It can be used by the GetRecordById Operation of the Discovery Service (this is important! ISO AP uses the FileIdentifier, NOT the ResourceIdentifier!!)
  - o ResourceIdentifier references the SpatialDataSet by name only; it is not useable for direct linkage! The document can be accessed from the Discovery Service via a GetRecords operation using the queryable “ResourceIdentifier”
  - o TransferOption allows to access one or more representations of the SpatialDataSet by a URL pointing to a predefined dataset (data as zip) that is managed by a DownloadService (can be as simple as a web folder)
- Contained is metadata describing the ViewService “ViewService-BaseData-NL” as “Metadata\_Service” document
  - o Has it’s own (local) unique FileIdentifier
  - o Relates to the Metadata\_Dataset document that describes the dataset “NL:TOP10NL” via
  - o This relation expresses: this view service operates on the “NL:TOP10NL” dataset. (Definition as in TG Metadata for ISO: <srv:operatesOn xlink:href="http://image2000.jrc.it#image2000\_1\_nl2\_multi"/>)
  - o The relation is further expressed through CoupledResource and ScopedName; they provide information on the view service endpoint (URL), the operation (GetMap) and the corresponding layer (“LYR\_NUTSRegions.NL”);
- Contained is metadata describing the DownloadService “DownloadService-BaseData-NL” as “Metadata\_Service” document
  - o Has it’s own (locally) unique FileIdentifier
  - o Relates to the Metadata\_Dataset document that describes the dataset “NL:TOP10NL” via the ResourceIdentifier. This relation expresses: this download service operates on the “NL:TOP10NL” dataset.
  - o The relation is further expressed through coupledResource and ScopeName; they provide information on the download service endpoint (URL), the operation (GetFeature) and the corresponding FeatureType (“FT\_NUTSRegions.NL”);

Findings:

- The ResourceIdentifier can not be used as internal unique identifier simply because it may not be unique! E.g. a member state could create several metadata representations/document that refer to the same SpatialDataSet. That would lead to a number of catalogue entries that have the same ResourceIdentifier!
- If a non-ambiguous link to a metadata document is required, the attribute "fileIdentifier" is to be used. Operations that support the access of single documents are:
  - o GetRecordById(FileIdentifier); can be expressed as a single URL
  - o GetRecords(FileIdentifier)
- Relation Layer <> SpatialDataSet is not unique, if a view service has one layer per SpatialObjectType, the metadata document of the view service will have several entries for ScopedName, one for each layer:
  - o Layer "ADMINISTRATIVEUNITS.NUTSREGION" = SpatialDataSet "NL:TOP10NL"
  - o Layer "ADMINISTRATIVEUNITS.ADMINISTRATIVEUNITS" = SpatialDataSet "NL:TOP10NL"
  - o A metadata document that describes a group of SpatialDataSets can be created; links to members of this group can be expressed using the "aggregationInfo". The link is realized by the resourceIdentifier which means only SpatialDataSets that locally exist can be grouped, it is not applicable for SpatialObjectTypes if they are realized through the same SpatialDataSet.
- Discovery.GetRecordById is missing
- ResourceLocator for services: can point to the service, but it is not clear how to determine the exact type (download, view, etc.)

## 6.4 View Service & Layers

### Characteristics:

- The view service "ViewService-BaseData-NL" provides viewing capabilities for a number of base map layers of the Netherlands
- Beside others (that are not in scope of INSPIRE) it provides a layer representing INSPIRE data; it displays the spatial objects that realize the SpatialObjectType of "NUTSRegion" for the member state NL.
- The layer is only one part of the SpatialDataSet NL:TOP10NL
- Following the TG, wms:Identifier links the SpatialDataSet by using its national identifier "NL:TOP10NL", wms:Name is populated with the unique name of the INSPIRE theme "ADMINISTRATIVEUNITS.NUTSREGION"

### Findings:

- Define clearly how the link to relevant metadata documents is realized through the view service capabilities; Options:
  - o MetadataURL is not defined in the TG version 2.0 (it was in version 1.0); if needed, how is the definition of this attribute? E.g. a http/get URL pointing to a metadata entry in a discovery service via the GetRecordById and FileIdentifier approach.
  - o Define the URL of the DiscoveryService als coupledResource and use the "wms:identifier" value (which matches the ResourceIdentifier) to allow clients to execute a GetRecords query
- "wms:name" is defined as to use the harmonized name of the SpatialObjectType it represents (e.g. "ADMINISTRATIVEUNITS.NUTSREGION"); "wms:name" is also used as non-ambiguous identifier for a layer. This is important e.g. if a user wants to perform an identify operation on a particular layer. Problem:
  - o The combination of the requirements "non-ambiguous identifier" and "harmonized name" leads to the fact, that there can only be one layer representing a SpatialObjectType within the view service. Meaning that there is no way of having either multiple representations of the same SpatialObjectType (e.g. scale depended differences)
- "wms:Identifier" is considered to provide a link to the SpatialDataSet that is represented through a layer; this concept is fine for the view service itself, but it can not be transferred e.g. to the Download Service as the WFS capabilities schema does not support "identifier" for featureTypes; there is no "wfs:Identifier"; Think of how and where the required information can be stored.
- In addition the attribute "wms:identifier" is currently defined as to be filled with the national identifier of the SpatialDataSet; Think of what the purpose of this linkage is and whether it would be better to e.g. provide a link to the metadata document via fileIdentifier.
- A possible solution is to incorporate the values of "identifier" & "name" as a composition and use this

composition as attribute value for “name”.

## **6.5 Download Service, FeatureTypes and Predefined Datasets**

(Not yet in focus, TG still draft)

### Characteristics:

- The download service “DownloadService-BaseData-NL” provides access capabilities for a number of featuretypes for base data of the Netherlands
- It provides direct access to the spatial objects that realize the SpatialObjectType of “NUTSRegion” for the member state NL.
- The feature type is only one part of the SpatialDataSet NL:TOP10NL
- (If the same rule as for the layer name is used) wfs:Name is populated with the unique name of the INSPIRE theme “ADMINISTRATIVEUNITS.NUTSREGION”
- In addition there is a predefined dataset of SpatialDataSet NL:TOP10NL available as file that can be downloaded;
- The metadata document for the spatial data set includes the URL to the predefined dataset file.

### Findings:

- (Same as for the view service/layer in principle)
- In addition: there is no equal to the wms:Identifier construct available in the WFS capabilities (at least not in 1.1.0); how is the link to the SpatialDataSet established?