INSPIRE
Infrastructure for Spatial Information in Europe

D3.7.2 Draft Implementing Rules for View Services
Drafting Team “Network Services”

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1 Introduction

This document contains the draft proposal for the Implementing Rule (IR) on View service as required by the INSPIRE Directive (2007/2/EC). This document is published on the INSPIRE web site[1] and is handed over to the European Commission as the final version of the Draft Implementing Rule developed by the Network Services Drafting Team. After the European Commission internal process, the Implementing Rule will be submitted to the INSPIRE Regulatory Committee for approval.

This last version takes into account:

- the comments received from the Spatial Interest Communities (SDIC) and the Legally Mandated Organizations (LMO) during the review phase that ended end of February 2008,
- the discussions with selected SDIC/LMO during the Comments Resolution Workshop at the end of May 2008,
- And comments received during the Network Services Workshop at the 2008 INSPIRE Conference.

The document is organized as follows: Section 1 is introductory to help readers understand the background and requirements without need to reference other documents. It is expected that in the final Implementing Rules this section will be removed or be strongly summarized. Section 2 is the core of the proposal. Section 2.1 defines the scope, Section 2.2 describes the view service elements to be taken into account Section 3 outlines the performance requirements for View services. Section 4 defines the process through which guidelines and instructions for implementation will be developed. Annex A defines key terms used in the text.

A separate document[2] explains how to implement the INSPIRE view services defined in Chapter 2 of this document

This version has passed a review by the SDICs and LMOs. The comment resolution process included a workshop with their representatives and an open workshop during the INSPIRE 2008 conference. Based on the discussions, the Drafting Team “Network Services” resolved the comments in this version. The table containing the comments and the resolution is available on the INSPIRE web-site.

1.1 Background

INSPIRE is a Directive (2007/2/EC) of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community[3]. The purpose of such an infrastructure is to assist policy-making in relation to policies and activities that may have a direct or indirect impact on the environment. The Directive came into force on the 15th May 2007.

INSPIRE should be based on the infrastructures for spatial information that are created by the Member States. Such infrastructures should 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 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 other public authorities; that spatial data are made available under conditions which do not unduly restrict their extensive use; that it is easy to discover available spatial data, to evaluate their suitability for the purpose and to know the conditions applicable to their use.

To achieve these aims, the Directive focuses in particular on five key areas : metadata, the interoperability and harmonization of spatial data and services for selected themes (as described in

[1] INSPIRE Website: http://www.ec-gis.org/inspire/

[2] Technical guidance to implement INSPIRE view services

[3] The text of the Directive in multiple languages is available at http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2007:108:SOM:EN:HTML

Annexes I, II, III of the Directive); network services and technologies; measures on sharing spatial data and services; and coordination and monitoring measures.

Member States are required to bring into force national legislation, regulations, and administrative procedures necessary to comply with the Directive by the 15th May 2009.

To ensure that the spatial data infrastructures of the Member States are compatible and usable in a Community and trans-boundary context, the Directive requires that common Implementing Rules (IRs) are adopted in a number of specific areas. These IRs will be adopted as Commission Regulations or Decisions, and will be 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 chaired by a representative of the Commission (this is known as the Comitology procedure[4]). The Committee was established in June 2007.

The requirements of the Directive in relation to view services are detailed below.

1.2 The Directive's Requirements for view services

In the context of INSPIRE View Services, the following articles from the Directive (2007/2/EC) are of major relevance and are quoted here for convenience reasons :

Article 7(1):
(...)Where organizations established under international law have adopted relevant standards to ensure interoperability or harmonization of spatial datasets and services, these standards shall be integrated, and the existing technical means shall be referred to, if appropriate, in the implementing rules mentioned in this paragraph.

Article 8:
The implementing rules shall address the following aspects of spatial data :
(...)
(c) the key attributes and the corresponding multilingual thesauri commonly required for policies which may have an impact on the environment ;

Article 11:
Member States shall establish and operate a network of the following services for the spatial datasets and services for which metadata have been created in accordance with this Directive :
…
(b) view services making it possible, as a minimum, to display, navigate, zoom in/out, pan, or overlay viewable spatial datasets and to display legend information and any relevant content of metadata ;

Article 12:
Member States shall ensure that public authorities are given the technical possibility to link their spatial data sets and services to the network referred to in Article 11(1). This service shall also be made available upon request to third parties whose spatial datasets and services comply with implementing rules laying down obligations with regard, in particular, to metadata, network services and interoperability.

Article 14 (2):
By way of derogation from paragraph 1, Member States may allow a public authority supplying a service referred to in point (b) of Article 11(1) to apply charges where such charges secure the maintenance of spatial datasets and corresponding data services, especially in cases involving very large volumes of frequently updated data.

Article 14(3):

[4] An explanation of the process for the development and adoption of the Implementing Rules is contained in Section 3 of the Work Programme 2007-09 see
http://inspire.jrc.it/reports/transposition/INSPIRE_IR_WP2007_2009_en.pdf

Data made available through the view services referred to in point (b) of Article 11(1) may be in a form preventing their reuse for commercial purposes.

Article 15(2) :
Member States shall provide access to the services referred to in Article 11(1) through the Inspire geo-portal referred to in paragraph 1. Member States may also provide access to those services through their own access points.

Performance criteria for INSPIRE Network Services are required in Article 16 of the INSPIRE Directive :

Article 16 :
Rules for implementation designed to amend non-essential elements of this Chapter by supplementing it, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 22(3), and shall in particular lay down the following :

*(a)technical specifications for the services referred to in Articles 11 and 12 and **minimum performance criteria for those services**, taking account of existing reporting requirements and recommendations adopted within the framework of Community environmental legislation, existing e-commerce services and technological progress ;*

And in Recital 17 :
*Network services are necessary for sharing spatial data between the various levels of public authority in the Community. Those network services should make it possible to discover, transform, view and download spatial data and to invoke spatial data and e-commerce services. The services of the network should work in accordance with commonly agreed specifications and **minimum performance criteria** in order to ensure the interoperability of the infrastructures established by the Member States. The network of services should also include the technical possibility to enable public authorities to make their spatial data sets and services available.*

The arrangements for the exchange of spatial data and the INSPIRE geo-portal are not formally part of the Network Services Implementing Rules development, but will nevertheless play an important role. Following the INSPIRE proposal, the arrangements for the exchange of spatial data depends on the harmonized data specifications implementation rules for its technical content. In addition, the INSPIRE geo-portal will not be part of the Network Services Implementing Rules as it is for Commission internal development.

The INSPIRE Directive refers to e-commerce services :

- *by way of derogation from Article 11(1), Member States may limit public access to spatial data sets and services through the services* (Article (13)(1)) ;
- *Member States shall ensure that e-commerce services are available. Such services may be covered by disclaimers, click-licenses or, where necessary, licenses* (Article (14)(4)) *and*
- *technical specifications for the services … , taking account of existing reporting requirements and recommendations adopted within the framework of Community environmental legislation, existing e-commerce services and technological progress* (Article (16)(a)).

E-commerce services specifications and Implementing Rules may refer to existing European/National legal frameworks and relevant technical documents whenever applicable. For example, the Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 defines legal aspects of information society services, in particular electronic commerce, in the Internal Market ('Directive on electronic commerce'). Particular attention will be required on Digital Rights Management and its relationship to e-commerce services.

The Directive does not mandate the use of any particular natural language for the metadata content. The Directive recognizes the importance of multi-lingual aspects and mandates the use of multi-lingual thesauri in the context of interoperability of spatial datasets and services (Art. (8)(2)(c)).

2 The View Service Implementing Rules

2.1 View Service abstract model

In the following View Service is defined only on abstract level. Details and instructions to implement such a service according to the current technology and existing standards are given in the "Technical guidance".

Name : INSPIRE View Service

Description : An INSPIRE View Service is a web service to provide a visual representation of geographic and thematic information by creating an image of these data using portrayal rules, and making it possible, as a minimum for a client application, to display, navigate, zoom in/out, pan or overlay viewable spatial datasets and display legend information and any relevant content of metadata. The datasets belong to the themes covered by the INSPIRE Directive Annexes.

According to article 12, an INSPIRE View service shall be linked to and integrated in the INSPIRE Network architecture[5].

Functions : An INSPIRE View Service must implement two functions (Get Service Metadata and Get Map), the third operation (Get Feature Information) is optional. This extension may be chargeable (article 14 of the Directive).
This View Service doesn't cover any client application using a View Service. Client application definition is out of scope.

Function	Description	M/O
Get Service Metadata	Provides all necessary information about the service to a user (service provider, layers available, access constraints …) and describes service capabilities to enable a client application to use the service (list of supported operations).	M
Get Map	Returns a map containing the geographic and thematic information coming from the datasets. This map is an image spatially referenced.	M
Get Feature Information	Returns information about the features displayed on the map at the point selected by the user.	O

M/O : Mandatory / Optional.

2.2 View Service functions

2.2.1 Get Service Metadata (mandatory supported function)

This operation (based on a request and a response), provides all necessary informations about the service to a user (service provider, layers available, access constraints, …) and describes service capabilities to enable client applications to use the service (list of supported operations).

2.2.1.1 Get Service Metadata request mandatory parameters

Parameter	Meaning
Service type	Specifies the service type requested for the current operation call. (type is "View service" in this context)
Request type	Specifies the request type for the current operation call. (type is "Get Service Metadata" in this context)

[5] D3.5 INSPIRE Network services Architecture document.

Language	Specifies client's preferred language. The value can be empty (no value) to indicate using the view service's default language. The response document shall be returned in this preferred language if it is supported. If there is no support for the requested language, the documents are returned in the service default language (generally the Member State language being one of the official 23 European languages).

- **Get Service Metadata response mandatory fields**

  - **General service mandatory fields**

Field	Meaning
Service name	Name of the service, used for machine-to-machine communication
Service title	Title of the service, used for human communication, significant enough for an optimal use
Online resource URL	Specifies the service provider's website
Contact information	Contact address, email, phone, fax
Response language	Language of the returned response
Supported languages	List of the languages supported by this service

  - **Layer mandatory fields**

Each layer should have the following response field set.

Field	Meaning
Title	Indicates the title of the layer, used for human communication, for presentation of the layer e.g. in a menu
Name	Indicates the harmonized name of the layer, used by client applications
Abstract	Sums up the specification of the layer
Keywords	Helps search engine in finding out this layer
Area covered	Give the minimum bounding rectangle in decimal degrees and all supported CRSs of the area covered by the Layer. It may be an approximation. Its purpose is to facilitate geographic searches
Coordinate Reference Systems	List the Coordinate Reference Systems (CRS) in which the layer is available (one or more)
Styles	Describes the ways the layer shall be rendered. Styles hold both a title for human being and an harmonized name for client applications
Legend URL	Contains the location of an image of a map legend appropriate to the enclosing style
Metadata URL	Points at the Discovery Service URL offering detailed, standardized metadata about the layer, and following the INSPIRE metadata IR

2.2.2 Get Map (mandatory supported function)

This operation (based on a request and a response), provides a map containing the geographic and thematic information coming from the datasets. This map is an image spatially referenced.

2.2.2.1 Get Map request mandatory parameters

Parameter	Meaning
Request type	Specifies the request type for the current operation call. (type is "Get Map" in this context)
Layers	Gives the comma-separated list valid layer names. Allowed layer names are listed in Get service metadata response under the harmonized name field
Styles	Gives the comma-separated list of styles in which layers are to be rendered. Allowed styles names are listed in the Get service metadata response under the harmonized name field. The style value may be left blank. In this case the default style applies
Coordinate Reference System	Gives the CRS in which the Bounding box parameter shall be referred
Bounding box	Indicates the coordinates of bounding rectangle to be mapped and returned to the client as an image
Image width	Indicates the output image width in pixels
Image height	Indicates the output image height in pixels
Image format	Indicates the output image format. The service shall at least support image/png and image/gif formats without compressions.
Language	Client's preferred language. (see also 2.2.1.1) for returned exception messages

2.2.2.2 Get Map response mandatory fields

No mandatory parameters, but either the image is output, either an exception is generated.

2.3 View Service elements

The implementation of these functions follows rules concerning the elements (parameters or fields) described in this section.

2.3.1 Nature of the Metadata

According to Article 11, for the view service two kinds of metadata shall be available :

- metadata for the INSPIRE View Service ;
- metadata for each datasets represented in a layer of the View Service.

These metadata shall be defined according to the INSPIRE Metadata Implementing Rules.

2.3.2 Coordinate Reference System

The View Service must support the overlay of different datasets (Article 11(b) of the INSPIRE Directive).These datasets could be defined in different Coordinates Reference Systems (CRS), but displayed in a single coordinates reference system for a given client application.
Not only Continental Europe coordinates reference systems must be taken into account but also outermost regions (French overseas departments, the Azores, Madeira and the Canary Islands) coordinate reference systems according to article 4.1.(a) of the Directive.
According to the Annex III themes of Atmosphere, Meteorology, Oceanography and Sea regions, this means that a full Global CRS needs to be used for some instances.
This IR makes the use of geographical coordinates reference systems based on ETRS89 for continental Europe or ITRF91 at epoch 1994.0 for overseas European territories mandatory for the INSPIRE view service.

2.3.3 Temporal data dimension

Following Article 8.2.d of the directive, the View Service shall address the temporal aspect of the data. Therefore for data themes with a temporal component the View Service shall allow visualizing the temporal dimension. Different ways of supporting are possible (using the time line to browse through temporal snapshots of 2-D representations of the data theme, allowing time slices along the x-t, y-t or the z-t axis and presenting the result as a 2-D representation...).

2.3.4 Other dimensions selection and display

For three-dimensional data, the View Service shall support selection over a third dimension axis.

2.3.5 Output Format

The View Service must support the overlay of different datasets. For this reason an INSPIRE View Service shall allow at least one raster output format which allows transparency, to enable the overlays at the client side. As a consequence, INSPIRE View service mandatory output formats are GIF and PNG.

2.3.6 Datasets and Layers

Geographic information from datasets is displayed in layers that create map by overlaying. A layer in a view service provider must define some elements and connect the dataset to the layer. As a minimum these mandatory elements are :

Title	for humans reading, in the language selected by the data provider
Name	for machine-to-machine communication. This name shall be harmonized at INSPIRE/European level for the related INSPIRE theme
Abstract	to describe the dataset
Keywords	to help search facilities
Coordinate Reference Systems	available for the dataset
Area covered	Bounding box expressed in available coordinate reference systems supported by the layer
Legend	The harmonized styling applying to the dataset
Metadata	The dataset description as given by Discovery Service

Correspondence between layers and INSPIRE themes

An INSPIRE theme may include several layers, such as the “transport theme”, and for each INSPIRE theme the related layer(s) shall be defined. They have the same title but in various languages (read by humans) across all the MS.

They shall have the same name (read by machines, eventually keywords from a controlled list corresponding to data themes) across Europe so that it will be possible for a client application to ask to several View Services one specific layer (using the “harmonized” name). This harmonised name is given by Data Specification Implementing Rules for each INSPIRE theme.

Organizing layers according to INSPIRE themes and related feature types is out of scope of the View Service. However, the service provides some mechanism (such as grouping layers together) to implement a defined organization.

2.3.7 Styling

Using the same style to display the same themes all over Europe is not an explicit requirement for View Service, but it is considered as a part of the interoperability necessity : datasets belonging to the same theme shall be rendered following the same portrayal rules, in a default rendering style. This style shall be defined for each layer across Europe. As a consequence, the following elements are mandatory :

Title	for humans reading, in the language selected by the data provider
Name	for machine-to-machine communication. This name shall be harmonized at INSPIRE/European level for the related INSPIRE theme

2.3.8 Legend availability and handling

The legend of the displayed dataset(s) must be provided through a URL.

2.3.9 Useful scale range

Minimum and maximum scale denominators are optional, but their use is recommended[6].

2.3.10 Multilingualism

According to article 8c of the Directive, some elements of the View service responses may be multilingual. The multilingualism applies only for exceptions raised by the INSPIRE service and for the abstract Get Service Metadata function.
The default language used for these elements is left to each MS.

2.3.11 Geo Rights Management

The datasets used by an INSPIRE View Service may be served in a form preventing their reuse for commercial purposes. Security, protection and rights management aspects shall be as transparent as possible for service users.
The functionality and display format shall be compatible with digital right managements and restriction of access and use as envisioned in the INSPIRE directive (see also [5]).
When access to a view service is restricted, then the following elements shall be given :

Access constraints	type of constraints for accessing the view service
Fees	information about pricing/licensing

3 Quality of View service requirements

Following article 16 of the Directive, the minimum performance requirements for View services must be laid down.
Here's the list of the quality of service requirements for the INSPIRE Network Services :

- performance criteria :
  - performance ;
  - capacity ;
- service maintenance criteria :
  - availability ;
  - reliability ;
- others :
  - security ;
  - compliance ;

More details and discussions on the subject can be found in [5].

The performance, capacity and availability shall be monitored and reported as part of the INSPIRE directive. For monitoring reasons 90% of the availability is taken into account to leave out peak loads.
The following values, required by the Directive, are estimated from present-day implementation experiences and technology.

3.1.1 Performance

Definition :
The performance of an INSPIRE service represents the service response time, which must be kept for the given capacity. A service request is understood as a single call to a single operation of an INSPIRE service. Response time is the time measured on the server, in which the service operation returned the first byte of the result.
This criterion is theme/layer/function independent.

[6] For instance, Cadastral maps might be displayed only at large scales – 1/500–1/20 000. Furthermore, the scale range may be closely related to the used CRS for displaying datasets

Value : For a 470 Kb image (800x600 pixels, 8 bits), shall be of maximum 5 seconds.
Normal situation is considered to be 90% of the time.

3.1.2 Capacity

Definition : The capacity of an INSPIRE service is given by a number of service request which are send in a also given time frame. Then the performance indicator has to be met for every individual service response.

Value : 20 connections per second.

3.1.3 Availability

Definition : The availability of an INSPIRE service is the probability that the system is up and running.

Value : 99%

3.1.4 Reliability

Definition : The reliability of an INSPIRE service represents the ability of a web service to perform its required functions under stated conditions for a specified time interval.
In order to allow comparison between responses, it is also recommended to provide reference datasets.

3.1.5 Security

Definition : The security of an INSPIRE service is the quality aspect of the web service of providing confidentiality and non-repudiation by authenticating the parties involved, encrypting messages and providing access control.

3.1.6 Compliance

Definition : The compliance of an INSPIRE service is the quality aspect of the Web service in conformance with the rules, the law, compliance with standards, and the established service level agreement.

4 Instructions for implementation

The European Commission shall establish, in collaboration with stakeholders and relevant standardization organizations, instructions for implementation to ensure interoperability of services (see also [2]).

Annex A : Terms and definitions

data
Interpretable representation of information in a formalized manner suitable for communication, interpretation or processing (ISOIEC23821).
NOTE : Data may be any form of information. Data may refer to any electronic file, no matter what the format (e.g. a database or binary data, text, images). Everything read and written by a computer may be considered data except for instructions in a program that are executed (software).

datasets
Identifiable collection of data (ISO19101).
NOTE : A dataset may have a hierarchical structure. Theoretically, a dataset may be as small as a single feature or feature attribute contained within a larger dataset. A hard copy map or chart may be considered a dataset.

dataset series
Collection of datasets sharing the same product specification (ISO19115).

discovery
The inquiry of the nature and content of a spatial resource.

discovery service
Distinct part of the functionality that is provided by an entity through interfaces for the inquiry of the nature and content of a spatial resource.

feature
Abstraction of real-world phenomena. A feature may occur as a type or an instance (ISO 19101).

interoperability
The possibility for spatial datasets to be combined, and for services to interact, without repetitive manual intervention, in such a way that the result is coherent and the added value of the datasets and services is enhanced (INSPIRE Directive).

layer
basic unit of **geographic information** that may be requested as a **map** from a **server**

MS
Member State

profile
Set of one or more base standards or subsets of base standards and, where applicable, the identification of chosen clauses, classes, options and parameters of those base standards that are necessary for accomplishing a particular function (ISO19106).

quality
Totality of characteristics of a product that bear on its ability to satisfy stated and implied needs (ISO 19101).

register
Structured storage containing identifiers assigned to items with descriptions of the associated items (ISO19135).

registry
Information system on which a register is maintained (ISO19135).

resource
Asset or means that fulfills a requirement. Example: dataset, service, document, person or organization.

service
Distinct part of the functionality that is provided by an entity through interfaces (ISO19119). In computing terms, a service is an application that provides information and/or functionality to other

applications. Services are typically non-human-interactive applications that run on servers and interact with applications via an interface.

NOTE : This distinct part of the functionality is a computation performed on one side of an interface in response to a request made on the other side of the interface.

NOTE : Some services may be not available via the network, where data may be on off line media.

service request
Operation specified by a service.
EXAMPLE : GETCAPABILITIES, GETMAP for WMS, GETFEATURE for WFS, GETRECORDS for CSW.

spatial data
Any data with a direct or indirect reference to a specific location or geographic area.

spatial resource
Asset or means that fulfills a requirement and has a direct or indirect reference to a specific location or geographic area. Example: dataset, dataset series, service.