UK Location Programme

Location Information Interoperability Board

Data Publisher How To Guide

Understand the background to establishing an INSPIRE View Service using GeoServer

DOCUMENT CONTROL

Change Summary

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1.0	23 Nov 2010	AR	Initial Version

References

Ref.	Title/Version/Publication Date/Author
[1]	INSPIRE Directive http://www.ec-gis.org/inspire
[2]	Place matters: the Location Strategy for the United Kingdom
[3]	EN ISO 19128:2005(E) – (WMS 1.3.0) OGC standard for Web Mapping Services
[4]	OGC Styled Layer Descriptor Profile of the Web Map Service Implementation Specification (05-078r4) OGC Implementation Specification SLD 1.1.0 (07-123r1)
[5]	OGC Symbology Encoding Implementation Specification (05-077r4)
[6]	GeoServer Documentation – Styling http://docs.geoserver.org/stable/en/user/styling/index.html

CONTENTS

1 Inspire 4

1.1 UK Location Strategy and INSPIRE 4

1.2 Target Audience 5

2 View Service 6

2.1 Standards 6

2.2 INSPIRE View Service Operations 7

2.3 INSPIRE View Service Implementation 8

3 Geoserver and PostGIS 9

4 Deployment 10

5 Styling 11

1 INSPIRE

The INSPIRE directive aims to create a European Union (EU) spatial data infrastructure. This will enable the sharing of environmental spatial information among public sector organisations and better facilitate public access to spatial information across Europe.

A European Spatial Data Infrastructure will assist in policy-making across boundaries. Therefore the spatial information considered under the directive is extensive and includes a great variety of topical and technical themes.

The INSPIRE directive came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2019.

INSPIRE should be based on the infrastructures for spatial information that are created 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 sharing, access and use,
- coordination, monitoring mechanisms, processes and procedures.

The text of the INSPIRE Directive is available from the INSPIRE web site (http://www.ec-gis.org/inspire) [1].

INSPIRE is based on a number of common principles:

- Data should be collected only once and kept where it can be maintained most effectively.
- It should be possible to combine seamless spatial information from different sources across Europe and share it with many users and applications.
- It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes.
- Geographic information needed for good governance at all levels should be readily and transparently available.
- Easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

1.1 UK Location Strategy and INSPIRE

The overall strategy for the UKLII is set out in “Place matters: the Location Strategy for the United Kingdom” [2].

The objective of the Location Strategy is to maximise the value to the public, government, UK business and industry of location information, by providing a consistent framework for its publishing, discovery, evaluation, access and re-use.

INSPIRE compliments the UK Location Strategy by providing the regulatory and standards environment for the framework envisaged by the UK Location Strategy. The manifestation of this framework is the “UK Location Information Infrastructure” (UKLII), or simply UK Location.

The parts that make up the UKLII are:

- data providers and publishers, who publish their data and associated web services that enable this data to be discovered, evaluated, accessed and exploited
- a Network, the Internet, that distributes the published data and services to the data users
- a set of common services and resources, that support the publishing of location information, its discovery, evaluation and use, including its integration with other forms of data
- an operational framework, that sets out the policies, standards and operational processes for the publishing of location information
- the Coordination and assurance of the data and services that are published
- developers and researchers, who use the published location information as part of an end user application, or piece of work
- end users, who use the location information in their workspace or at home, through the applications that have been developed

1.2 Target Audience

The target audience for the Getting Started guide are technical managers, system architects and system developers, located within data provider organisations, and their technical partners. It is chiefly written for those Data Providers who have obligations under the INSPIRE Themes, but is also relevant to those who wish to publish location information into the UKLII on a voluntary basis.

2 VIEW SERVICE

The relevant INSPIRE Network Services for a Data Publisher are the View and Download services. This document deals only with the View Service.

2.1 Standards

The INSPIRE Regulation for View Services defines the operations that the service needs to support and the quality of service criteria that it needs to meet. These operations are based on the use of the European de jure standard EN ISO 19128:2005(E) – (WMS 1.3.0) OGC standard for Web Mapping Services [3].

Two other OGC de facto standards for portraying geographic information are associated with EN ISO 19128:2005(E):

- OGC Styled Layer Descriptor Profile of the Web Map Service Implementation Specification (05-078r4) and its corrigendum1 for OGC Implementation Specification SLD 1.1.0 (07-123r1) [4]
- OGC Symbology Encoding Implementation Specification (05-077r4) [5], which is a language used for styling feature and coverage data, and independent of any service interface specification.

The INSPIRE directive asks Member States in article 11(1) (b) to establish and operate “view services making it possible, as a minimum, to display, navigate, zoom in/out, pan or overlay viewable spatial data sets and to display legend information and any relevant content of metadata”. Where public authorities levy charges for view services, the Member States shall ensure that e-commerce services (including rights management services) are available (article 14(4)).

The process of laying down implementing rules for the directive highlights the following aspects of a view service:

- Nature of the Metadata
- Common coordinate reference system
- Temporal data dimension
- View geometry selection
- Multiple datasets view output format
- Styling
- Rights Management
- Legend availability and handling
- Correspondence between layers and INSPIRE themes
- Multilingualism
- Relationship with client applications

2.2 INSPIRE View Service Operations

There are a number of aspects of the INSPIRE View Service regulation that have a bearing on the complexity of setting up and running a View Service. These need to be factored into your initial plans, including work and cost estimates.

Portrayal

There are no specific requirements relating to Styles, other than providing a list of rendering styles available for a given layer.

Coordinate Reference Systems

Coordinate Reference Systems enable locations on Earth to be specified as a set of coordinates (x, y, z) or as a latitude, longitude and height. The term Spatial Reference System is also used. A number of different systems are in use and these can lead to significant positional inaccuracies when used in combination.

To improve interoperability, INSPIRE requires that View Services are published in at least the ETRS89 coordinate reference system for two-dimensional geodetic coordinates (latitude and longitude). For more information, please refer to draft commission regulation 2007/2/EC.

Image Format

The INSPIRE View Service must support at least one of the following image formats:

- Portable Network Graphics (PNG)
- Graphics Interchange Format (GIF), without compression.

Feature Information

There are no INSPIRE requirements for the support of Feature information, but you may wish to optionally provide this service as part of your Web Map Service (WMS).

The WMS operation “Get Feature” enables feature information to be displayed alongside a map image. This would typically be some associated text about the feature in question, e.g. disease outbreaks might be shown as points on a map, with details of the outbreak being displayed as feature information.

This is an optional operation within the OGC standard and is not specified in the INSPIRE regulation, but you are free to provide it as part of your service. In some cases this feature data may represent the primary re-use value of the dataset and therefore be critical to its evaluation for re-use.

Note that not all clients (map viewers) will necessarily support this function.

Quality of Service

The following quality of service criteria are specified in the INSPIRE regulation:

- **Performance** - The response time for sending the initial response to a Get Map Request from a view service needs to be a maximum 5 seconds. This is on the basis of a 470 Kilobytes image

and excludes the impact of third party cascaded effects, i.e. the required response time is measured from the point of receipt to the point of response

- **Capacity** - The minimum number of served simultaneous service requests to a view service against the required response time is 20 per second.
- **Availability** - The required availability of the View Service is 99% of the time. This equates to 87 hours 36 minutes downtime a year.

2.3 INSPIRE View Service Implementation

The View Service is hosted on a web server that can run a Web Map Service (WMS). There are a range of commercial and open source products that support the creation of these services. Some open source WMS implementations are: GeoServer, MapServer, MapGuide, Mapbender and Deegree. These can be run on a variety of web servers, such as the open source Apache Tomcat, Jetty, Glassfish and others.

See the Data Publishers Tools Reference Implementation for details on how to set up a View Service WMS. In the next section we will discuss two of the underlying technologies that can be used, GeoServer and PostGIS.

3 GEOSERVER AND POSTGIS

GeoServer is an open source software server written in Java that allows users to share and edit geospatial data. It is designed for interoperability, and publishes data from any major spatial data source using open standards.

It is a community-driven project, and so GeoServer is developed, tested, and supported by a diverse group of individuals and organizations from around the world.

GeoServer is the reference implementation of the Open Geospatial Consortium (OGC) Web Feature Service (WFS) and Web Coverage Service (WCS) standards, as well as a high performance certified compliant Web Map Service (WMS).

GeoServer is licensed under the GNU General Public License.

PostgreSQL is a powerful, open source object-relational database system. It has more than 15 years of active development and a proven architecture that has earned it a strong reputation for reliability, data integrity, and correctness. It runs on all major operating systems, including Linux, UNIX, and Windows.

PostgreSQL is released under the PostgreSQL License, a liberal Open Source license, similar to the BSD or MIT licenses.

PostGIS adds support for geographic objects to the PostgreSQL object-relational database. In effect, PostGIS "spatially enables" the PostgreSQL server, allowing it to be used as a backend spatial database for geographic information systems (GIS), much like ESRI's SDE or Oracle's Spatial extension. PostGIS follows the OGC Simple Features Specification for SQL and has been certified as compliant with the "Types and Functions" profile.

PostGIS is licensed under the GNU General Public License.

4 DEPLOYMENT

Own Server

The client provides all the hardware, infrastructure and personnel to maintain and monitor the system. This has the highest initial cost and ongoing maintenance, but could be shared with an existing web service.

Hosted Server

This is where you rent server capacity from an Internet Hosting Service and can be split into shared hosting and dedicated hosting. On a shared server you share a machine’s resources with other clients and processes, whereas on a dedicated server you have control over the entire machine.

Cloud Server

Cloud computing is similar to a hosted server and is the result of widespread use of machine virtualisation. It provides access to computing resources as a utility to be used on demand - similar to the electricity grid.

5 STYLING

The styling of the different map layers can be accomplished by using a Styled Layer Descriptor (SLD).

Publishers are responsible for creating their own SLDs as appropriate for their own data sets.

Further guidance on styling can be found in the GeoServer Styling Guide [6].