Infrastructure for Spatial Information in the European Community

The INSPIRE Community Geoportal

EC INSPIRE GEOPORTAL TEAM

European Commission
Joint Research Centre
Institute for Environment and Sustainability
Spatial Data Infrastructures Unit
Welcome to INSPIRE geoportal

The INSPIRE geoportal provide the means to search for spatial data sets and spatial data services, and subject to access restrictions, view and download spatial data sets from the EU Member States within the framework of the Infrastructure for Spatial Information in the European Community (INSPIRE) Directive. INSPIRE aims at making available relevant, harmonised and quality geographic information to support formulation, implementation, monitoring and evaluation of policies and activities which have a direct or indirect impact on the environment.

What does it include

This version is a prototype INSPIRE geoportal and allows for discovery and viewing of spatial data sets and services. It's aim is to identify issues related to its implementation and accessing distributed INSPIRE services, to help towards the development of the operational geoportal.

The prototype INSPIRE geoportal currently accesses a limited number of discovery and view services and therefore only a few metadata for spatial data sets and services may be found and viewed. These will increase as more services become available from the EU Member States.

To ensure that the INSPIRE geoportal has a full functional access to the Discovery and View services testing is done in close cooperation with the Member States.

This allows performing any necessary modifications or adjustments to improve interoperability and the overall architecture performance and in general facilitate the way towards the full operating capability.

We depend on your feedback to help us make the geoportal better. If you have questions or comments about the site, please contact us.

http://www.inspire-geoportal.eu
INSPIRE Geoportal - Tools

- INSPIRE service
  - Discovery
    - Discovery Client
    - Discovery Proxy
  - View Service Client
    - View Client
    - View Proxy

- Geoportal auxiliary service
  - Metadata Editor
  - Metadata Validator
    - Metadata Validator Service
    - Metadata Validator Client
“The discovery client application allows searching of spatial data sets and spatial data services published by the EU Member States and is based on the search criteria defined in the INSPIRE regulation on Network Services.”
Discovery - standards used

INSPIRE Geoportal

INSPIRE Web Portal discovery client

Search → GeoRSS

Discovery Server

ISO 19139

cache

INSPIRE Reg. Discovery

OGC CSW ISO AP

Search/response

XML (POST)

Community Discovery Service

Community Discovery Service
- N-tier (J2EE)
- Reusability
- Scalability
- Performance
Discovery - Presentation Tier (1)

ui Search

Search

Simple Search

Advanced Search

Browse

About

Map
Discovery - Presentation Tier (3)

- Implementation (1)
  - Presentation formats
    - Html
    - Css
    - GeoRss
    - Json

Browsing Tree
(Json, Extjs API)

Input suggestion
(Json, Extjs API)
Discovery Client - geoRSS

- GeoRss issue
  - Multi bounding boxes per record is not supported
- Solution
  - Attach bounding boxes in the link tag

```xml
<item>
  <title>European Topsoil Organic Carbon content (OCTOP)</title>

  <link>http://139.191.16.45:8080/GeoportalCatalogClient/searchResultDetails.do?idMd=14267&amp;bbox=[[35.0,-15.0,75.0,40.0],[30.0,10.0,50.0,-10.0],[70.0,10.0,80.0,30.0]]</link>

  <description>Topsoil Organic Carbon content for Europe ; data result from calculations taking into account soil, climate, landcover and topography....</description>

  <guid>http://139.191.16.45:8080/GeoportalCatalogClient/searchResultDetails.do?idMd=14267&amp;bbox=[[35.0,-15.0,75.0,40.0],[30.0,10.0,50.0,-10.0],[70.0,10.0,80.0,30.0]]</guid>

  <georss:box>70.0 10.0 80.0 30.0</georss:box>
</item>
```
- Implementation (2)
  - Input manipulation, map, layout and result rendering
    - Javascript
    - AJAX request
    - Javascript frameworks
      - Mapfish
      - Extjs
      - OpenLayers
  - Browsers
    - Internet Explorer 7, Firefox 3, Safari 4

Result in bounding boxes and in text (GeoRSS, OpenLayers, Extjs)
Web layer
- Model-View-Controller design pattern
- Separate presentation from business layer
- Supporting messages in multiple languages
- Implementation
  - Java
  - Struts Web application framework
Discovery Core

- Generic component to be shared
- Core business logic processing
  - Query metadata
  - Rank result
  - Create statistics
  - Create GeoRSS result file
- Implementation
  - Java
  - GeoRSS module for the java rss library 'rome'
  - JSON for Java

Discovery Proxy
Discovery - Application Tier (3)

- **Data Access Layer**
  - Persistent objects of database tables
  - Performing basic Create, Read, Update and Delete operations on objects
  - Shared between the Client and the Proxy
  - Implementation
    - Hibernate
Discovery Client – Service Tier

- Discovery services
  - Image 2000
  - EC JRC Community Image Data
  - Metadata from MS Discovery (testing in progress)

- Auxiliary Services
  - Metadata Cache
    - Implementation: Oracle
  - View services (Discovery Map)
    - World Generic Map Service with EuroGlobalMap data for Europe
## Discovery – Implementation

<table>
<thead>
<tr>
<th>Presentation tier</th>
<th>Application Tier</th>
<th>Service Tier</th>
</tr>
</thead>
</table>
| - Ext JS JavaScript library 2.0.1  
  - OpenLayers 2.5  
  - MapFish 1.0 | **Web layer**  
  - Struts 1.3.8  
  - J2EE Servlets  
  - Rome-0.9, jdom 1.0  
  **Data access layer**  
  - Hibernate 3.2.5 | **Discovery Service:**  
  OGC 19139 ISO AP.  
**View Services:**  
ISO 19128 (WMS 1.3.0), WMS 1.1.1  
**Persistence Service**  
- Oracle RDBMS |
Wien, 18-19 January 2010

Discovery– Tier Interaction

Display Metadata Details

Presentation Tier

Application Tier

Service Tier

INSPIRE Geoportal User

Discovery GUI

SearchAction

Discovery Core

Metadata Cache

Discovery Service

displayMetadataDetails( )

reqMetadataDetails( )

processMdDetailsReq( )

getMdDetails( )

extractMetadataRecord( )

getRecordById( )

(from Actors)
Discovery Proxy – Federation Strategies

- **Real time**
  - metadata up to date
  - Questions on performance

- **Full cache**
  - Performance depends only on geoportal
  - Need regular updates to ensure metadata are up to date

- **Partial cache**
  - Only information necessary for searching is cached (INSPIRE elements)
  - Full Metadata record retrieved from MS discovery service
Federation actions:
1. update
2. create response
3. create metadata file
4. validation
5. populate the cache.
Discovery Proxy – Up to Date

- Full Updating
- Incremental Updating
  - **Pre-condition**
    - An initial cache of the datasets and services from this Member State Discovery Service has been processed.
    - The Member State Catalogue service supports XML encoding per ISO/TS19139 and HTTP protocol binding.
    - The Member States have accurately maintained the Creation and Revision dates of each metadata entry.
    - The Creation and Revision date formats must be valid ISO 8601 dates.
    - Database server is running.
“Registration” of the service, is used by the INSPIRE geoportal team to acquire the information necessary for federating the MS Service. This step is currently performed manually.

The “Access” step has the role to establish the connection, validate the service and if required to cache metadata or capabilities of the MS services to the INSPIRE geoportal.

- The sub-steps in Access for Discovery and View Service are: connection, validation and caching but they are slightly different

**Reference:** “[INSPIRE GEOPORTAL Testing.pdf](https://example.com/INSPIRE_GEOPORTAL_Testing.pdf)” (IOC 04/11/09)
interoperability MD open issues (1)

- **Language**
  - **Codes**: alpha-3 codes of ISO 639-2 (three-letter codes)
  - **Implementation**: “most interoperable”, “most compliant”
  - **Embedded Translation**: “locale” (language, country, encoding)

- **Character encoding**
  - Character Encoding of data [1] {free text} or MD_Metadata.locale[0,1]
  - Format: UTF-8.

- **Date creation, publication, revision**
  - ISO 8601 - “yyyy-mm-dd”

- **Temporal Extent** (TimePeriod)
  - ISO 19108/ISO19136 - “yyyy-mm-ddThh:mm:ss” - by value; by reference combination.
interoperability MD open issues (2)

- **Spatial Resolution**
  - Equivalent scale (denominator(integer)) – Distance (distance (uom + number))

- **Spatial Data Service**
  - language neutral name (discovery, view, download, transformation, invoke, other)

- **ISO schema location**
  - GML
  - Service
(*) At least one of the transactional operations

- OGC CSW specified that the servers shall implement the HTTP GET, servers may optionally implement the HTTP POST. The binding protocol in INSPIRE isn’t mentioned.

<table>
<thead>
<tr>
<th>INSPIRE Discovery Services operation</th>
<th>INSPIRE Cardinality</th>
<th>OGC CSW ISO AP operations</th>
<th>OGC CSW ISO AP cardinality</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPIRE.GetDiscoveryService</td>
<td>M</td>
<td>OGC_Service.GetCapabilities</td>
<td>M</td>
</tr>
<tr>
<td>Metadata</td>
<td></td>
<td>CSW Discovery.GetRecords</td>
<td>M</td>
</tr>
<tr>
<td>INSPIRE.DiscoverMetadata</td>
<td>M</td>
<td>CSW Discovery.GetRecordByld</td>
<td>M</td>
</tr>
<tr>
<td>Not Requested</td>
<td>n.a.</td>
<td>CSW Discovery.DescribeRecord</td>
<td>M</td>
</tr>
<tr>
<td>Not Requested</td>
<td>n.a.</td>
<td>CSW Discovery.GetDomain</td>
<td>O</td>
</tr>
<tr>
<td>INSPIRE.PublishMetadata.Push</td>
<td>M (*)</td>
<td>CSWT Manager.Transaction</td>
<td>O</td>
</tr>
<tr>
<td>INSPIRE.PublishMetadata.Pull</td>
<td>M (*)</td>
<td>CSWT Manager.Harvest</td>
<td>O</td>
</tr>
<tr>
<td>INSPIRE.LinkDiscoveryService</td>
<td>M</td>
<td>?</td>
<td>n.f.</td>
</tr>
</tbody>
</table>
INSPIRE Discovery mapping OGC (2)

- INSPIRE GetDiscoveryService
  - Language
- INSPIRE DiscoverMetadata
  - Language Parameter
  - Query granularity
  - elementSetName=full
- OGC GetRecordById
- PUSH
  - Language
- LinkDiscoveryService
  - Not implemented in OGC
The View Service
Client lists and displays layers offered by View Services.

Features a free-text search functionality for layers (multi-language search is enabled for INSPIRE themes).
Support of ISO 19128 (OGC WMS 1.3.0) as described in the Technical Guidance to implement INSPIRE View services

Selection of a View Service from a predefined list.

Support of multiple coordinate reference systems (WGS84, ETRS89, ETRS-LAEA, ETRS-LCC).
The presentation layer is designed to execute inside the user’s web browser.

The web layer deals with the communication with:
- the user’s web browser
- all services except the persistence service

The data access layer deals with the communication with the persistence service.
The presentation layer runs inside the user’s web browser.

Map layers are displayed using OpenLayers.

Map layers images are obtained through a direct connection between the browser and the View Service.
View Service capabilities is collected by the Application tier.

ISO 19128 (OGC WMS 1.3.0) documents are expected but the system also works with versions 1.1.0 and 1.1.1.

capabilities documents are parsed by the Application tier to extract information which is sent to the Presentation tier.
The web layer requests capabilities documents to view services if not present in the cache or cache expired.

Cache is used also by the search layers functionality.
The presentation layer receives the capabilities elements relevant to INSPIRE as described in the Technical Guidance to implement INSPIRE View services.
View Client – capabilities

- capabilities documents are cached so that View Services are not requested repeatedly the same document.
- capabilities documents are parsed and persisted in a format that optimizes free text search.
View Service Client – Service Metadata language

- The View Service Client does not make any assumption on the language used in textual elements of the metadata as this information is currently not available.

- An INSPIRE extension/profile to ISO 19128:2005(E) is described in the “Technical Guidance to implement INSPIRE View services” but has not yet been implemented.
## View – Implementation

<table>
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<tr>
<th>Presentation tier</th>
<th>Application Tier</th>
<th>Service Tier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ext JS JavaScript library</td>
<td><strong>Web layer</strong></td>
<td>Thesaurus: GEMET RPC API</td>
</tr>
<tr>
<td>OpenLayers</td>
<td>• J2EE Servlets</td>
<td>View Services: ISO 19128 (WMS 1.3.0), WMS 1.1.1</td>
</tr>
<tr>
<td>MapFish</td>
<td>• GeoTools library</td>
<td><strong>Persistence Service</strong></td>
</tr>
<tr>
<td></td>
<td>• GEMET Java library</td>
<td>• Oracle RDBMS</td>
</tr>
<tr>
<td></td>
<td><strong>Data access layer</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Java Persistence API</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• EclipseLink as persistence engine implementation</td>
<td></td>
</tr>
</tbody>
</table>
Currently the list of services considered by the Discovery and the View is fixed.

The creation of a registry for services would enable Member States to register Discovery Services.

The View could then derive the list of view services from the Discovery Cache.

Open issue: the resource locators found in the service metadata are not necessarily valid service endpoints.
INSPIRE Metadata Validator - steps

1. xml well-formed
2. namespace correctness
3. ISO 19139 validation
4. ISO 19115 validation
5. INSPIRE compliancy (schematron)
Web Service

End point
http://www.inspire-geoportal.eu/INSPIREValidatorService/resources/validation/inspire

Supported method: POST

Supported response formats: XML, HTML

Request parameter: dataFile

Implementation
- Java
- Jersey
Graphical User Interface
- Upload XML metadata file (1 record per file)
- Start validating process
- Result reporting Invalid elements and valid elements

Implementation
- Extjs
- Java
- Struts
- Apache Commons FileUpload
- Apache http client
### Validator – Implementation

<table>
<thead>
<tr>
<th>Client</th>
<th>Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Java 1.6</td>
<td>- Java 1.6</td>
</tr>
<tr>
<td>- Extjs 2.3.0</td>
<td>- Jersey 1.0</td>
</tr>
<tr>
<td>- Java 1.6</td>
<td></td>
</tr>
<tr>
<td>- Struts 1.3.8</td>
<td></td>
</tr>
<tr>
<td>- Apache Commons FileUpload 1.2.1</td>
<td></td>
</tr>
<tr>
<td>- Apache http client 4.0.1</td>
<td></td>
</tr>
</tbody>
</table>
INSPIRE Geoportal technologies overview

**Geoportal Application Server**
- Disk space = 28 GB
- OS = Linux Redhat
- Processor = 4 x Intel(R) Xeon(TM) CPU 3.20GHz
- RAM = 4 GB

**Database Server**
- Oracle 10g

**Discovery Proxy Application Server**
- JRE 1.6.0_12

**Discovery Service Server**
- Discovery Proxy Application Server
- Discovery Service
- Catalog Service
- Cache [Ig20]

**View Service Server**
- Web Map Service 1.3.0
- Tomcat 5.5.23
- HTTP Connector
- Apache HTTP Server 2.2
- ColdFusion Engine

**Web Map Service**
- GeoportalCatalogClient.war {Discovery}
- INSPIRViewServiceClient.war {Viewer}
- InspireEditor.war {Md Editor}
- geoportalSearchResults {Rss file server}
- InspireGeoportal20.jar {Discovery proxy}

**TCP/IP**
- Deploy
- Deploy
- Deploy
- Deploy
- Deploy

**HTTP Connector**
- Deploy
- Deploy
- Deploy
- Deploy
- Deploy

**Apache HTTP Server**
- Deploy
- Deploy
- Deploy
- Deploy
- Deploy

**ColdFusion Engine**
- Deploy
- Deploy
- Deploy
- Deploy
- Deploy
INSPIRE Geoportal technologies References

- Overview Document
  - http://commons.apache.org/fileupload/
  - http://struts.apache.org/1.x/
  - https://jersey.dev.java.net/
Web Site: http://www.inspire-geoportal.eu

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