INSPIRE & Linked Data: Bridging the gap

Session I: Linked INSPIRE
Session II: GeoKnow tools for linked INSPIRE data

Workshop @ Geospatial World Forum, 29.05.2015, Lisbon, Portugal

INSPIRE & Linked Data: Bridging the gap

Session I: Linked INSPIRE

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Outline

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- Examples of INSPIRE Linked Data
- Linking INSPIRE with web of data:
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  - Exposing SDI metadata to Semantic web
- Benefits & Risks
- Stakeholder’s support

Standardisation perspective

- Spatial Data on the Web Working Group

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Mission

The mission of the **Spatial Data on the Web Working Group** is to clarify and formalize the relevant standards landscape. In particular:

- to determine how spatial information can best be integrated with other data on the Web;
- to determine how machines and people can discover that different facts in different datasets relate to the same place, especially when 'place' is expressed in different ways and at different levels of granularity;
- to identify and assess existing methods and tools and then create a set of best practices for their use;

where desirable, to complete the standardization of informal technologies already in widespread use.

The Spatial Data on the Web WG is part of the Data Activity and is explicitly chartered to work in collaboration with the Open Geospatial Consortium (OGC), in particular, the Spatial Data on the Web Task Force of the Geosemantics Domain Working Group. Formally, each standards body has established its own group with its own charter and operates under the respective organization's rules of membership, however, the 'two groups' will work together very closely and

OGC

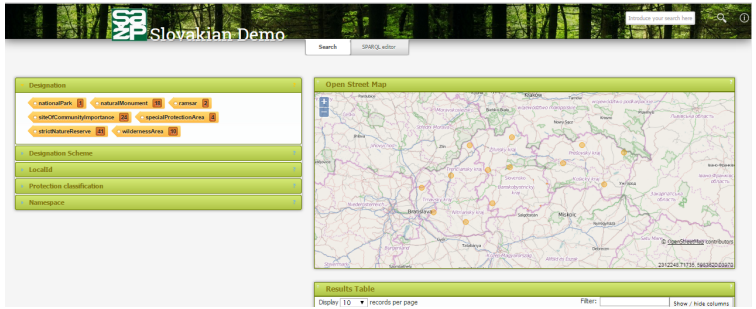
Examples of INSPIRE Linked Data

All examples are still under the development !

Samples from Slovakia

- Based on SmOD INSPIRE vocabularies
- OpenDataNode transformation approach
- Current INSPIRE content
  - Protected sites
  - Land Cover
  - Biogeographical regions
  - Species distribution
- Non INSPIRE
  - Contaminated sites/ environmental burdens
- GeoSparql end point provided via Parliament triplestore
- RDF dumps

- Visualisation examples:
  - SEFARAD Demo



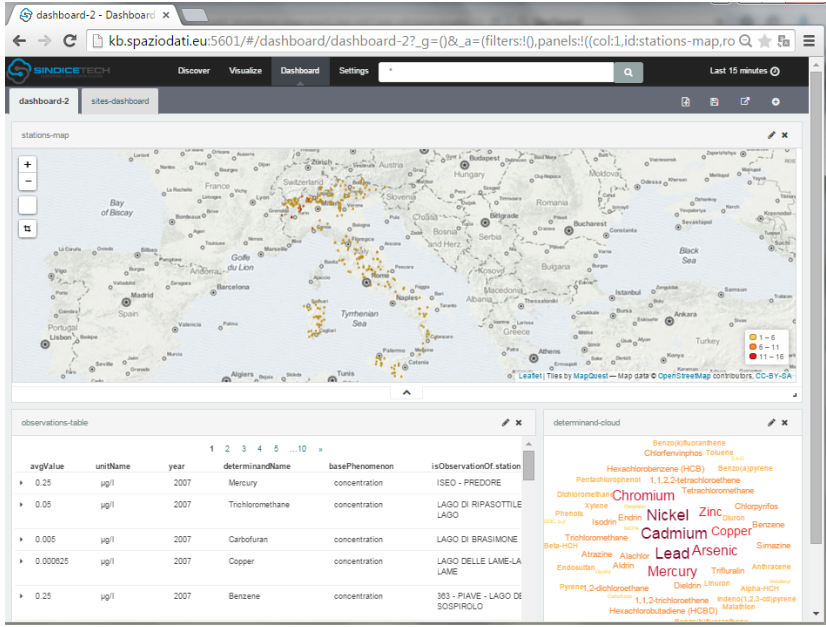
- Foreseen linkages:
  - Linking transformed RDF resources with relevant linked data
    - i. Geonames > SK Protected sites
    - ii. Geonames > SK Contaminated sites
  - Further potential links:
    - i. EEA Natura 2000 Standard Data Flow reporting > SK Protected sites
    - ii. SK Contaminated sites > WISE-SoE Reporting: Lakes Water Quality:

Examples of INSPIRE Linked Data

Samples from Italy (Incl.data for other countries)

- Based on SmOD INSPIRE vocabularies
- Refine transformation approach
- Content:
  - NATURA2000SITES.rdf - protected sites from Natura2000
  - Lakes-Stations.rdf - definitions of the lakes stations from the Waterbase - Lakes database
  - Lakes-Haz-Substances.rdf - observations from the stations (I used the Data Cube vocabulary to represent them); you will need these additional files to interpret observations :
    - data structure definition
    - component properties
  - Haz-Substances-UoM.rdf - definitions of the units of measures
  - Haz-Substances-determinand.rdf - definitions of the determinants

- RDF dump
- Visualisation example Demo:



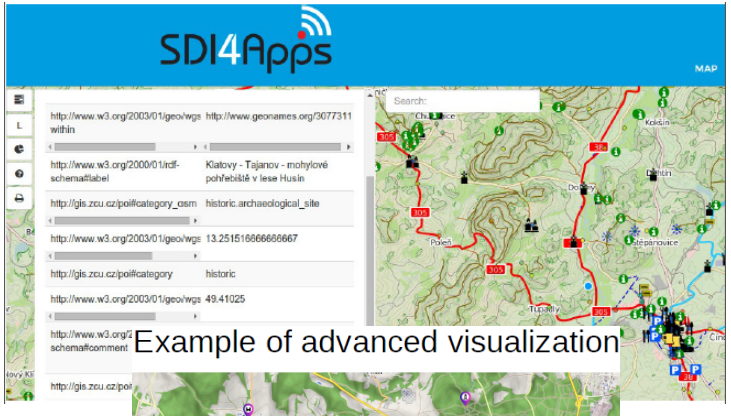
Examples of INSPIRE Linked Data

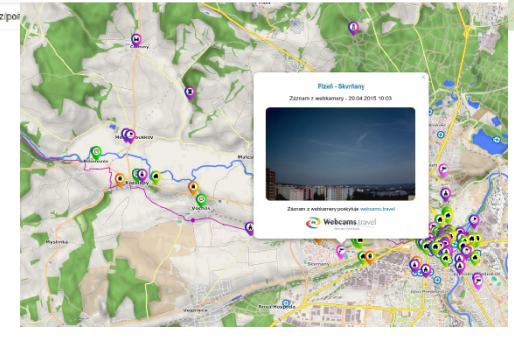
Samples from Czech republic

- SmartTouristData
- INSPIRE profile based routing transport network derived from OSM including forest routes in Czech Republic
- XSLT data transformation
- Content:
  - Collection of existing data representing Points Of Interests (POI) related to biking and cyclotourism
  - The current version of covers almost all Europenan countires and contains more than 3 500 000 POIs
  - OpenStreetMap, Habitats, CentraLab, E.L.F.
- Sparql Endpoint (Virtuoso) containing Point of Interests

See on http://portal.sdi4apps.eu/tourist-data

- Visualisation examples:

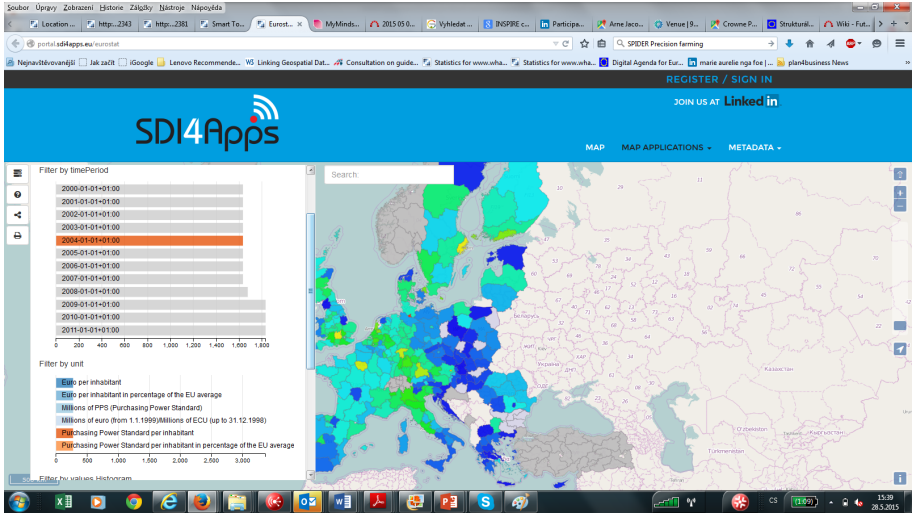




Examples of INSPIRE Linked Data

EUROSTAT RDF data stored in Virtuoso

INSPIRE based on NUTs 3 regions



More then 350 GB of triples stored in Virtuoso
http://portal.sdi4apps.eu/eurostat

Advanced visualisation based on HSLayers NG and CrossFilter

Linking INSPIRE with web of data:

SmOD INSPIRE Vocabularies & Related slides

SmOD INSPIRE Vocabularies

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This document is also available in Turtle and RDF/XML.

Abstract

The SmartOpenData project, SmOD, developed a Linked Data model based on the European Union's INSPIRE data specifications. The SmOD work lead to the creation of a set of very small vocabularies that define classes and properties that mirror those in INSPIRE that were useful to a series of pilots, focusing on the rural economy, tourism, protected sites etc.

This document describes and aggregates the set of SmOD-INSPIRE vocabularies.

Status of this Document

This vocabulary is stable. Definitions *may* be updated to clarify semantics if appropriate but the basic definitions will not change. If you wish to add terms in the INSPIRE model not included here, please contact Phil Archer

This is not a W3C standard and has not been endorsed by the W3C Membership.

Linking INSPIRE with web of data:

Exposing SDI metadata to Semantic web:

I. DCAT AP “INSPIRE” implementation exercise

Example of links to RDF metadata represetation via Micka

Search
Found
New record
Admin
Help
About

Search > Found (22)

Found: 22

Sort by: Title Ascending

1GE SGU 1M Površinska geologija

Ta podatkovni niz prikazuje geološke enote površinske geologije Švedske in je izdelan za potrene projekta OneGeology-Europe z nadomestitvijo izdankov kamninske podlage v 'Površinske geologije Švedske 1:1M' s podatki o kamninski podlagi v 'Kamninska podlaga Švedske 1:1M'.

Public Metadata Contact: Tomas Lindberg, Date Stamp: 2011-05-04

Bedrock Geology of Estonia 1:400 000

The service presents an overview of Estonian bedrock and fault zones at a scale of 1:400 000.

Private Metadata Contact: Sten Suuroja, Date Stamp: 2011-05-04

Carte géologique du Bouclier Fennoscandinave au 1:1 M

Datasættet skitserer de væsentligste elementer af Sveriges grundfjelds geologi. Det viser grundfjeldet afgrænsede områder af bjergarter og aldre. gangsværme, tektoniske strukturer, impaktstrukturer og basalter er også vist. Grundfjeldsområder er også tildelt tektoniske enheder. Kortet er sammensat af data fra flere kortlægningskampagner, der er foregået over flere årtier, og derfor er nøjagtigheden variabel.

Public Metadata Contact: Tomas Lindberg, Date Stamp: 2011-05-04

CZE INSPIRE Download Service - Addresses

WFS download service for the theme Addresses (AD) is a public download service for provision of data from the INSPIRE theme Addresses (AD) that makes possible repetitive download of these data in files by municipalities and an online access to these data using the WFS 2.0.0. technology. The download service provides harmonised data from the theme Addresses (AD) in GML formate according to INSPIRE. The service is available for the whole territory of the Czech Republic. The service fulfils technical guidance for INSPIRE download services v. 3.0.1 and simultaneously fulfils the OGC WFS 2.0.0 standard.

Not finished Metadata Contact: , Date Stamp: 2014-09-02

Snap of single MD record


```
- <rdf:RDF>
  - <dcat:Catalog rdf:about="http://dev.bnhelp.cz:80/projects/metadata/trunk/csw/../micka_main.php?ak=detail&uuid=5405b887-72a4-4cec-968d-1ee87f000001">
      <dct:title xml:lang="en">CZE INSPIRE Download Service - Addresses</dct:title>
    - <dct:description xml:lang="en">
        WFS download service for the theme Addresses (AD) is a public download service for provision of data from the INSPIRE theme Addresses (AD) that makes possible repetitive download of these data in files by municipalities and an online access to these data using the WFS 2.0.0. technology. The download service provides harmonised data from the theme Addresses (AD) in GML formate according to INSPIRE. The service is available for the whole territory of the Czech Republic. The service fulfils technical guidance for INSPIRE download services v. 3.0.1 and simultaneously fulfils the OGC WFS 2.0.0 standard.
      </dct:description>
      <rdf:type rdf:resource="http://www.w3.org/ns/dcat#Catalogue"/>
      <dct:type rdf:resource="http://inspire.ec.europa.eu/codelist/SpatialDataServiceType/WFS"/>
    - <dct:spatial>
      - <dct:Location>
        - <locn:geometry rdf:datatype="http://www.opengis.net/rdf#GMLLiteral">
          - <gml:Envelope srsName="http://www.opengis.net/def/crs/OGC/1.3/CRS84">
              <gml:lowerCorner>10 43</gml:lowerCorner>
              <gml:upperCorner>22 55</gml:upperCorner>
            </gml:Envelope>
          </locn:geometry>
        </dct:Location>
      </dct:spatial>
    - <dcat:distribution>
      - <dcat:Distribution>
        - <dcat:landingPage>
            http://services.cuzk.cz/wfs/inspire-ad-wfs.asp?SERVICE=WFS&REQUEST=GetCapabilities
          </dcat:landingPage>
        </dcat:Distribution>
      </dcat:distribution>
```

3 plugins developed for CKAN:

1. Import of all INSPIRE metadata elements
2. Visualisation inside CKAN
3. DCAT AP (Geo) export

Additional Info

Field	Value
State	active
access_constraints	["Jen nekomer\u010dn\u00ed vyu\u017eit\u00ed (v\u011bda v\u00fdzkum, v\u00fdvoj, \u0161kola)"]
bbox-east-long	19.13
bbox-north-lat	51.59
bbox-south-lat	48.12
bbox-west-long	11.87
contact-email	identification@env.cz
coupled-resource	[]
dataset-reference-date	[{"type": "revision", "value": "2007-05-25"}]
frequency-of-update	unknown
guid	ca238200-8200-1a23-9399-42c9fca53542
licence	["podm\u00ednky nejsou zn\u00e1my"]
metadata-date	2009-11-03
metadata-language	cze
metadata-party	'organisationName': 'Ministerstvo životního prostředí ČR', 'individualName': '', 'positionName': '', 'phone': '', 'deliveryPoint': 'Vršovická 65', 'city': 'Praha 10', 'postalCode': '100 10', 'country': 'Česká republika', 'email': 'podatelna@env.cz', 'url': '' 'role': '

Metadata language	cze
Metadata party	**Ministerstvo životního prostředí ČR** Vršovická 65 Praha 10 100 10 e-mail : podatelna@env.cz
Progress	
Resource id	code : CZ-00164801-MZP-CORINE-1990, codeSpace :
Resource type	dataset
Responsible party	name : Ministerstvo životního prostředí ČR, roles : custodian
Responsible party1	**Ministerstvo životního prostředí ČR** Vršovická 65 Praha 10 100 10 e-mail : podatelna@env.cz
Spatial data service type	
Spatial reference system	32633
Spatial resolution	100000
Spatial harvester	true
Topic category	environment

Linking INSPIRE with web of data:

Exposing SDI metadata to Semantic web:

II. Publishing crawled OGC WxS Metadata via Sparql endpoint

List of crawled OGC WxS endpoints

Currently displayed OGC services: 2548

ID	Crawled Title	Type	Version	Crawled URL	Server location	Crawling Date	Status	Checking Date
		wms					a	
1	?"WMS Capabilities Request - NEO - NASA"	wms	1.1.1	http://neowms.sci.gsfc.nasa.gov/wms/wms?version=1.1.1&service=W...	United States	15:28:55 13/...		28/05/2015 21:24:37
2	"WMS - British Geological Survey"	wms	1.1.1	http://maps.bgs.ac.uk/ArcGIS/services/BGS_Detailed_Geology/Map...	United Kingdom	18:21:51 24/...		28/05/2015 21:24:39
3	"Get Capabilities - British Geological Survey"	wms	1.3.0	http://maps.bgs.ac.uk/ArcGIS/services/BGS_Detailed_Geology/Map...	United Kingdom	18:45:33 24...		28/05/2015 21:24:40
6	"GetCapabilities - MapServer Demonstrations"	wms	1.1.1	http://demo.mapserver.org/cgi-bin/wms?SERVICE=WMS&VERSION...	United States	18:38:17 25/...		28/05/2015 21:25:42
7	"Get Capabilities - FIRMS - Nasa"	wms	1.1.1	http://firms.modaps.eosdis.nasa.gov/wms/?request=GetCapabilities...	United States	23:23:46 31...		28/05/2015 21:25:43
8	"e-atlas.org.au/geoserver/wms?service=wms&request=G..."	wms	1.1.1	http://e-atlas.org.au/geoserver/wms?service=wms&request=GetCapa...	Australia	18:38:19 25/...		28/05/2015 20:05:19
9	"My GeoWebCache - Junta de Andalucía"	wms	1.1.1	http://www.juntadeandalucia.es/educacion/educasig/geowebcache/se...	Spain	18:38:24 25...		28/05/2015 21:25:44
10	"No such operation wms null getCapabilities?SERVICE=WMS"	wms	1.3.0	http://geoserver.thehumanjourney.net/geoserver/wms?request=getCa...	United Kingdom	18:38:30 25...		28/05/2015 20:18:37
11	"Get Capabilities"	wms	1.1.1	http://gis4.natr.gov.ns.ca/wmsconnector/com.esri.wms.Esrimap/nsd...	Canada	18:38:35 25...		28/05/2015 21:25:46
12	"Get Capabilities - GRB - AGIV"	wms	1.3.0	http://grb.agiv.be/geodiensten/raadpleegdiensten/GRB/wms?request...	United States	18:38:40 25...		28/05/2015 21:25:47
14	"CZE INSPIRE View Service - Geographical Names"	wms	1.3.0	http://geoportal.cuzk.cz/wms_inspire_gn/WMSService.aspx?service=...	Czech Republic	18:38:51 25/...		28/05/2015 21:26:48
15	"WMS-Toporama"	wms	1.1.1	http://wms.ess-ws.nrcan.gc.ca/wms/toporama_en?VERSION=1.1.1&...	Canada	18:38:56 25...		28/05/2015 21:26:49
16	"Tile_Server"	wms	1.1.1	http://geoint.nrlssc.navy.mil/nrltileserver/wms?REQUEST=GetCapa...	United States	15:28:59 13/...		28/05/2015 21:26:50
19	"WMS"	wms	1.3.0	http://sampleserver1.arcgisonline.com/ArcGIS/services/Specialty/ES...	United States	18:39:06 25...		28/05/2015 21:26:53
20	"map connect WMS"	wms	1.1.1	http://mapconnect.ga.gov.au/wmsconnector/com.esri.wms.Esrimap?...	Australia	18:39:12 25/...		28/05/2015 21:26:57
21	"WMS - GeoCommunicator"	wms	1.3.0	http://www.geocommunicator.gov/ArcGIS/services/Basemaps/MapS...	United States	18:39:14 25/...		28/05/2015 21:26:58
23	"GDR Web Map Service: GDR_E"	wms	1.1.1	http://gdr.ess.nrcan.gc.ca/wmsconnector/com.esri.wms.Esrimap/gdr...	Canada	18:39:23 25...		28/05/2015 21:27:01
24	"Metacarta WMS VMaplvo"	wms	1.3.0	http://vmapo.tiles.osgeo.org/wms/vmapo?REQUEST=GetCapabilitie...	United States	18:39:27 25/...		28/05/2015 21:27:02
26	"Boundaries WMS Layers from the National Atlas of the United States"	wms	1.3.0	http://webservices.nationalatlas.gov/wms/boundaries?SERVICE=W...	United States	18:39:37 25/...		28/05/2015 21:27:04
27	"Get Capabilities - Omniscale"	wms	1.1.1	http://osm.omniscale.net/proxy/service?request=GetCapabilities&ser...	Germany	18:39:41 25/...		28/05/2015 21:27:04
31	"GetCapabilities - Global Risk Data Platform - UNEP"	wms	1.3.0	http://preview.grid.unep.ch:8080/geoserver/ows?service=WMS&req...	Switzerland	18:39:58 25...		28/05/2015 20:10:23
32	"Get Capabilities"	wms	1.3.0	http://www.rae.gr/geoserver/ows?SERVICE=WMS&REQUEST=Get...	Greece	18:40:03 25...		28/05/2015 21:27:06
33	"NRCS Soil Data Mart Data Access Web Map... - Soil Data Access"	wms	1.1.1	http://sdmdataaccess.nrcs.usda.gov/Spatial/SDM.wms?SERVICE=W...	United States	18:40:08 25...		28/05/2015 21:27:08
34	"Canadian Geographical Names Web Map Service"	wms	1.1.1	http://cgns.nrcan.gc.ca/wms/cubeserv.cgi?version=1.1.1&service=wm...	Canada	18:40:12 25...		28/05/2015 21:27:09
36	"Cropland Data Layer WMS Service"	wms	1.1.1	http://dss.csiss.gmu.edu/cgi-bin/wms_cdlall?SERVICE=WMS&VER...	United States	18:40:21 25...		28/05/2015 21:27:10
37	"View OGC Web Map Service (WMS) - Parent directory - INSIDE Ida...	wms	1.3.0	http://cloud.insideidaho.org/ArcGIS/services/imageryBaseMapsEarth...	United States	18:40:26 25...		28/05/2015 20:05:...
38	"NGU Bedrock and Superficial Geology"	wms	1.3.0	http://geo.ngu.no/cgi-bin/NGU_Bedrock_and_Superficial_Geology/...	Norway	18:40:31 25...		28/05/2015 21:27:12
39	"MNDNR Data Deli WMS Server - Minnesota Department of Natural..."	wms	1.1.1	http://deli.dnr.state.mn.us/cgi-bin/wms?map=DELI_WMS_MAPFIL...	United States	18:40:36 25...		28/05/2015 21:27:13
41	"Get Capabilities - British Geological Survey"	wms	1.3.0	http://mapapps.bgs.ac.uk/arcgis/services/HydroMap/HydroMap/Ma...	United Kingdom	18:40:45 25...		28/05/2015 21:27:14
42	"View OGC Web Map Service (WMS) - Parent directory - INSIDE Ida...	wms	1.3.0	http://cloud.insideidaho.org/ArcGIS/services/imageryBaseMapsEarth...	United States	18:40:50 25...		28/05/2015 20:05:21

gnk_wms

Basic statistics:

First crawling date: 18:21:51 on Thursday 24th October 2013
Last crawling date: 14:55:40 on Thursday 30th April 2015
Last status date: 09:04:07 on Friday 29th May 2015
Number of services: 15036
Number of "online" services: 11159

Web GUI to browse crawled metadata (GeoNetwork)

csw-wms (1343)

csw-layers (57761)

csw-wfs (1196)

csw-features (47230)

csw-wcs (1991)

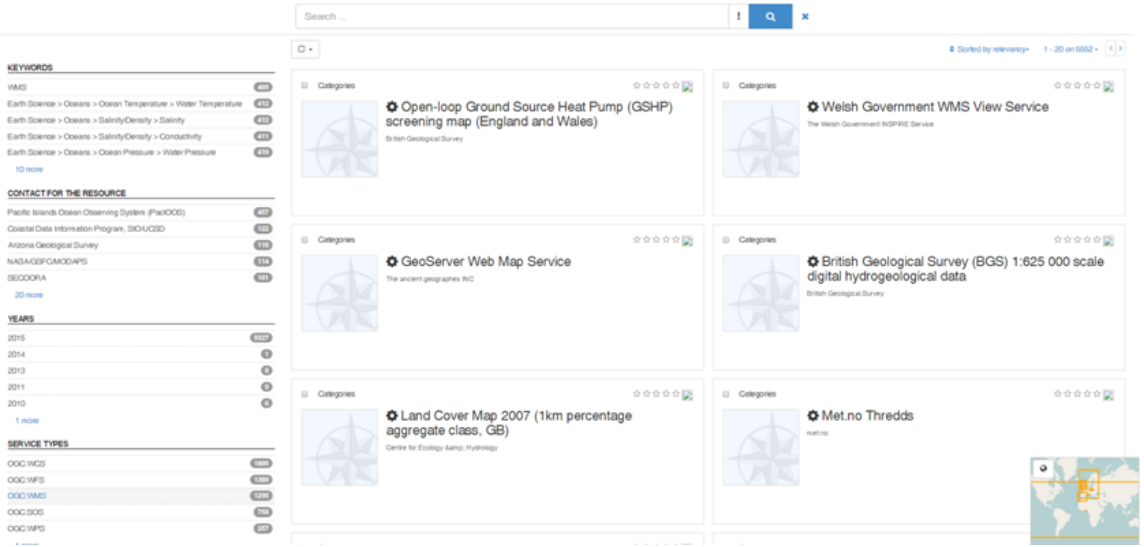
csw-coverages (13754)

csw_sos (758)

csw-observations (8145)

csw_wps (265)

csw_csw (539689)



GeoKnow/**TripleGeo-CSW**

sparql endpoint

Example of sparql query to the GeoCrawler sparql endpoint

sparql.carsten.io

Refresh list | svn.aksw.org/pr... | Finding OGC WM... | 84 11.7.2005 Pr... | WMS Tiling Clien... | Closure Tools — ... | Ustanova Upravlj... | Mo

SPARQL Editor

Add new endpoint ->

http://31.147.204.152/sparql

```
PREFIX dc: <http://purl.org/dc/elements/1.1/>
SELECT *
WHERE {
?s dc:title ?title .
FILTER ( REGEX( ?title , "*ecosystem*" ))
}
```

Submit

```
<?xml version="1.0"?>
<csw:GetRecords xmlns:csw="http://www.opengis.net/cat/csw/2.0.2"
xmlns:gmd="http://www.isotc211.org/2005/gmd" service="CSW"
version="2.0.2">
  <csw:Query typeNames="csw:Record">
    <csw:Constraint version="1.1.0">
      <Filter xmlns="http://www.opengis.net/ogc"
xmlns:gml="http://www.opengis.net/gml">
        <PropertyIsLike wildCard="*" singleChar="_" escapeChar="\">
          <PropertyName>title</PropertyName>
          <Literal>*ecosystem*</Literal>
        </PropertyIsLike>
      </Filter>
    </csw:Constraint>
  </csw:Query>
</csw:GetRecords>
```

```
    <dct:Standard>
      <dct:title xml:lang="en"/>
      <dct:issued rdf:datatype="http://www.w3.org/2001/XMLSchema#date"/>
    </dct:Standard>
  </dct:conformsTo>
</rdf:Description>
<rdf:Description rdf:about="urn:uuid:7e96be10eecf60213377349d6c0ef9d136ae25e8">
  <foaf:primaryTopic rdf:resource="http://openmaps.gov.bc.ca/mapserver/geology-and-soils?service=WMS&amp;"/>
  <dct:language rdf:datatype="http://purl.org/dc/terms/ISO639-2"/>
  <dct:modified rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2015-05-12T09:06:57</dct:modified>
  <dct:creator>
    <foaf:Organisation>
      <foaf:name xml:lang="">Province of British Columbia</foaf:name>
      <foaf:mbox rdf:resource="mailto:"/>
    </foaf:Organisation>
  </dct:creator>
</rdf:Description>
<rdf:Description rdf:about="http://openmaps.gov.bc.ca/mapserver/geology-and-soils?service=WMS&amp;">
  <foaf:primaryTopicOf rdf:resource="urn:uuid:7e96be10eecf60213377349d6c0ef9d136ae25e8"/>
  <dct:language rdf:datatype="http://purl.org/dc/terms/ISO639-2"/>
  <dct:title xml:lang="">Terrestrial Ecosystem Information (TEI) Project Scanned Map Boundaries - Outlined</dct:title>
  <dct:description xml:lang="">Environmental Performance Index, 2014 Release (2002-2011): Ecosystem Vitality Objective - Biodive
  vitality objective, biodiversity and habitat category that includes the following indicators: critical habitat protection, mar
  national biome protection. See more information at http://dx.doi.org/10.7927/H48913SG.</dct:description>
  <rdf:type rdf:resource="http://www.w3.org/ns/dcat#Dataset"/>
  <dcat:landingPage rdf:resource="http://openmaps.gov.bc.ca/mapserver/geology-and-soils?service=WMS&amp;"/>
  <dct:identifier rdf:datatype="http://www.w3.org/2001/XMLSchema#string"/>
  <dct:subject/>
  <dct:spatial>
    <dct:Location>
      <locn:geometry rdf:datatype="http://www.openlinksw.com/schemas/virtrdf#Geometry">BOX2D(-140.58 47.0331,-109.658 61.1846)</
    </dct:Location>
  </dct:spatial>
  <dct:modified rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2015-05-12T09:06:57</dct:modified>
```

Benefits and risks:

I. Benefits
   - Support for persistent URIs
   - Promoting INSPIRE data to new communities
   - Provision of data beyond the INSPIRE scope
   - Creating the new added value

II. Risks
   - Open vs. Closed world assumption
   - Availability & maintenance of ontologies and vocabularies
   - Availability of the content for linking
   - Maturation of the software
   - Lack of skilled experts
   - Availability of the apps

Stakeholders support:

I. Who are the target stakeholders?
   - Academia, R&D, SMEs, Public sector...
II. Where they can find the information
   - Related projects websites
   - Open data portals
   - Conferences, workshops,webinars
III. How to target them?
   - Share info about the ontologies/vocabularies
   - Examples of data, info about the software, apps as evidence
   - Interact (Surveys, Hackathons, Webinars)
   - Support the analysis about the socioeconomical potencial

Short summary

https://docs.google.com/document/d/1YBdnCMnz8pj1AacfhQTILBV0Jk-m8u44zQHksK8meBQ/edit?usp=sharing

Contacts

SmartOpenData: http://www.smartopendata.eu/contacts

SDI4Apps: http://sdi4apps.eu/contact/

COMSODE: http://www.comsode.eu/index.php/consortium/

BOLEGWEB: http://bolegweb.geof.unizg.hr/

Thank you!

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INSPIRE & Linked Data: Bridging the gap

Session II: GeoKnow tools for linked INSPIRE data

Workshop @ Geospatial World Forum, 29.05.2015, Lisbon, Portugal