

SDI, REST, and Semantic Web

deegree day 2008

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www.semantic-network.de

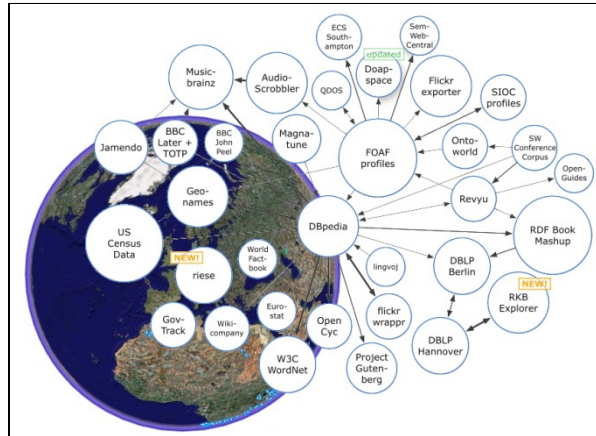
Overview

What is Geo-referenced Information about?

Mainstreaming SDIs

The RESTful Approach

Geo-referencing the Semantic Web



What is Geo-referenced Information about?

Two Approaches to Localized Information

What: Features of a given location

- Select a location and I'll tell you more about it
- “What’s in my back yard?” = information by postal code
- Convenient solutions available in the SDI and in the Web

Where: Spatial occurrences of non-spatial topics

- Select a topic and I show you its spatial occurrences
- “Where can I find ...?”
- Convenient solutions available in the Web, but not in the SDI



ISO 19115 descriptiveKeywords in INSPIRE

Metadata Implementing Rules: At least one keyword from GEMET
(General Multilingual Environmental Thesaurus)

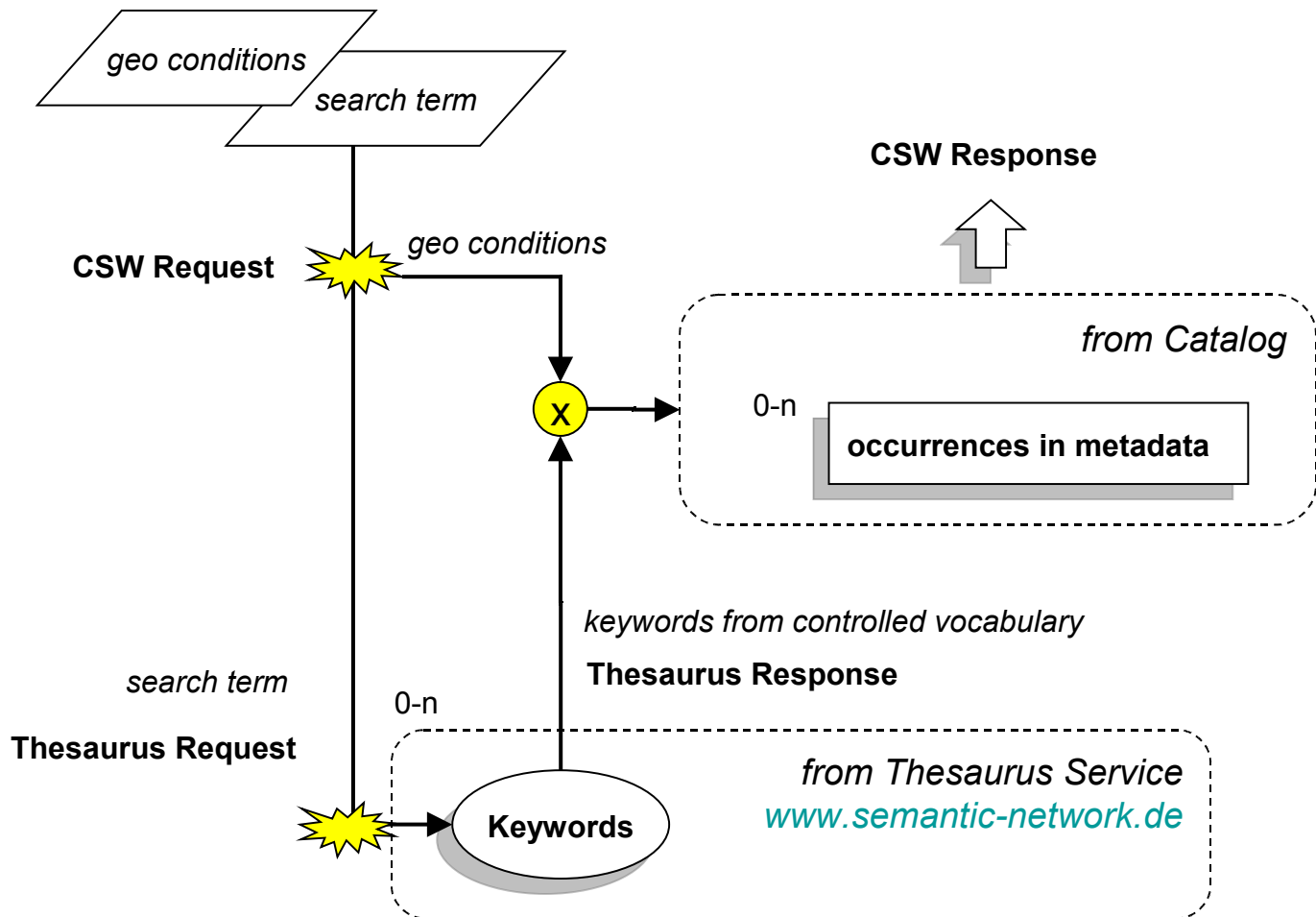
A rather poor support of non-spatial topics. Example:

```
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <!-- Part B 3.1 Keyword Value -->
    <gmd:keyword>
      <gco:CharacterString>Hydrography</gco:CharacterString>
    </gmd:keyword>
    <!-- Part B 3.2 Originating Controlled Vocabulary -->
    <gmd:thesaurusName>
      <gmd:CI_Citation>
        <gmd:title>
          <gco:CharacterString>GEMET Thesaurus version 1.0</gco:CharacterString>
        </gmd:title>
      </gmd:CI_Citation>
    </gmd:thesaurusName>
  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>
```

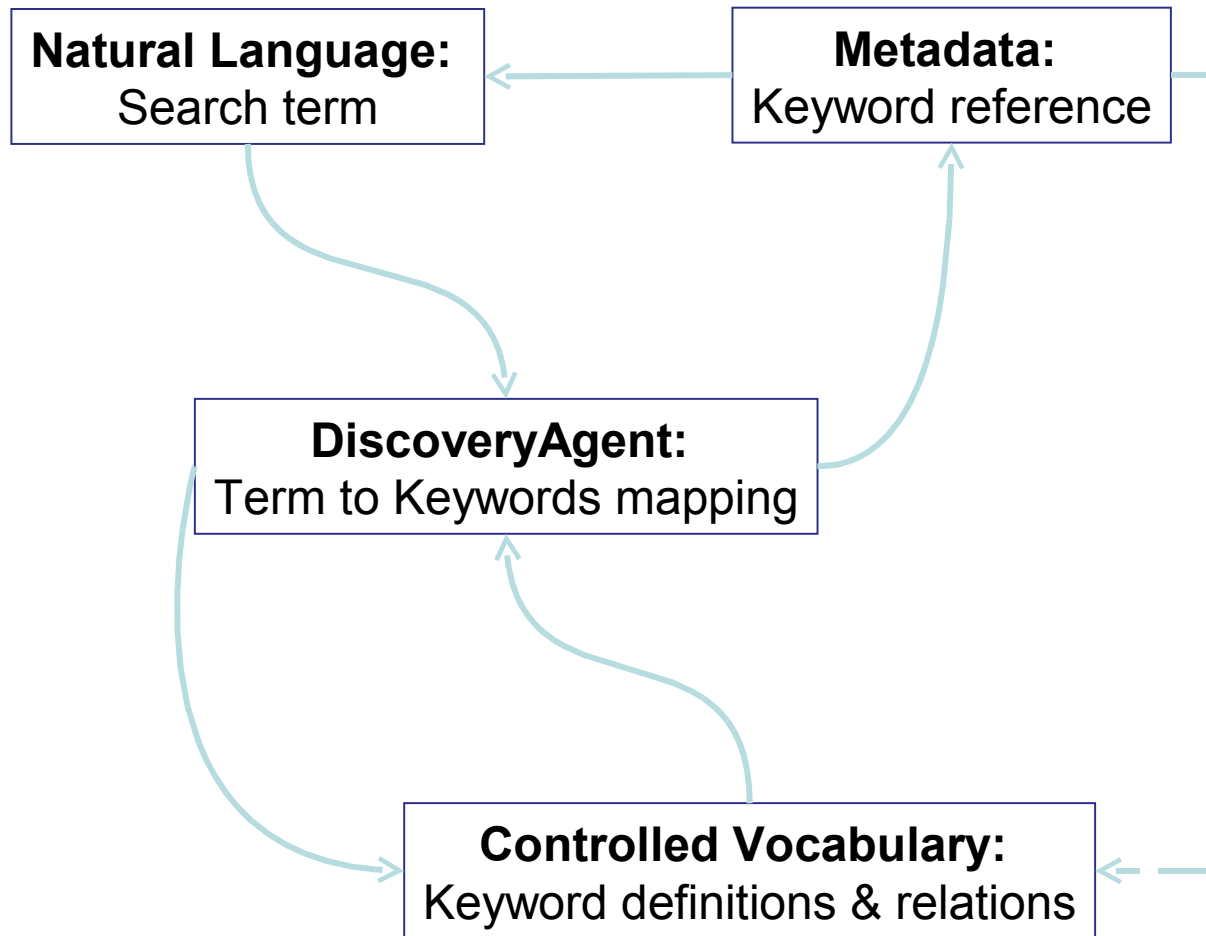
www.semantic-network.de will provide GEMET keywords for INSPIRE
via www.portalu.de, the German Environmental Information Portal

A Proposed Thesaurus Support in CSW

Cascading CSW X-Border* Proposal in 2007-11 by



A Rather Complex Scenario in a Closed World



“Mainstreaming SDIs”

As a follow up of the **GSDI-10 conference**, discussion at <http://lists.gsdi.org/pipermail/technical/2008-March/thread.html>:

Some quotes:

- **don't invent fringe protocols that keep geospatial SDI communities separate from visibility to most web citizens.**
 - Interface with existing search engines -- expose metadata for data and services to **mainstream search engines**;
 - Support catalog search ... through use of **Web search APIs** such as OpenSearch that have native support in all browser toolbars.
 - Use RSS (Really Simple Syndication), and in particular **GeoRSS**, to advertise the availability of new resources with a geographic extent.
 - Web Map Services ... may be very useful as overlays in **map mashups** ... in clients like Google Earth or ArcGIS Explorer.

<http://earth.google.com/outreach/index.html>

- August 2005: Hurricane Katrina, National Oceanic & Atmospheric Administration (NOAA) monitoring flood in real time in Google Earth
- Today: Hundreds of NGOs publishing with Google Outreach



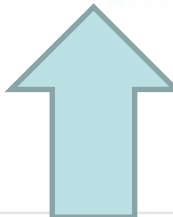
Latest News

Climate change in our world

Posted by Ed Parsons, Geospatial Technologist and Phil Verney, Google Earth Community Development

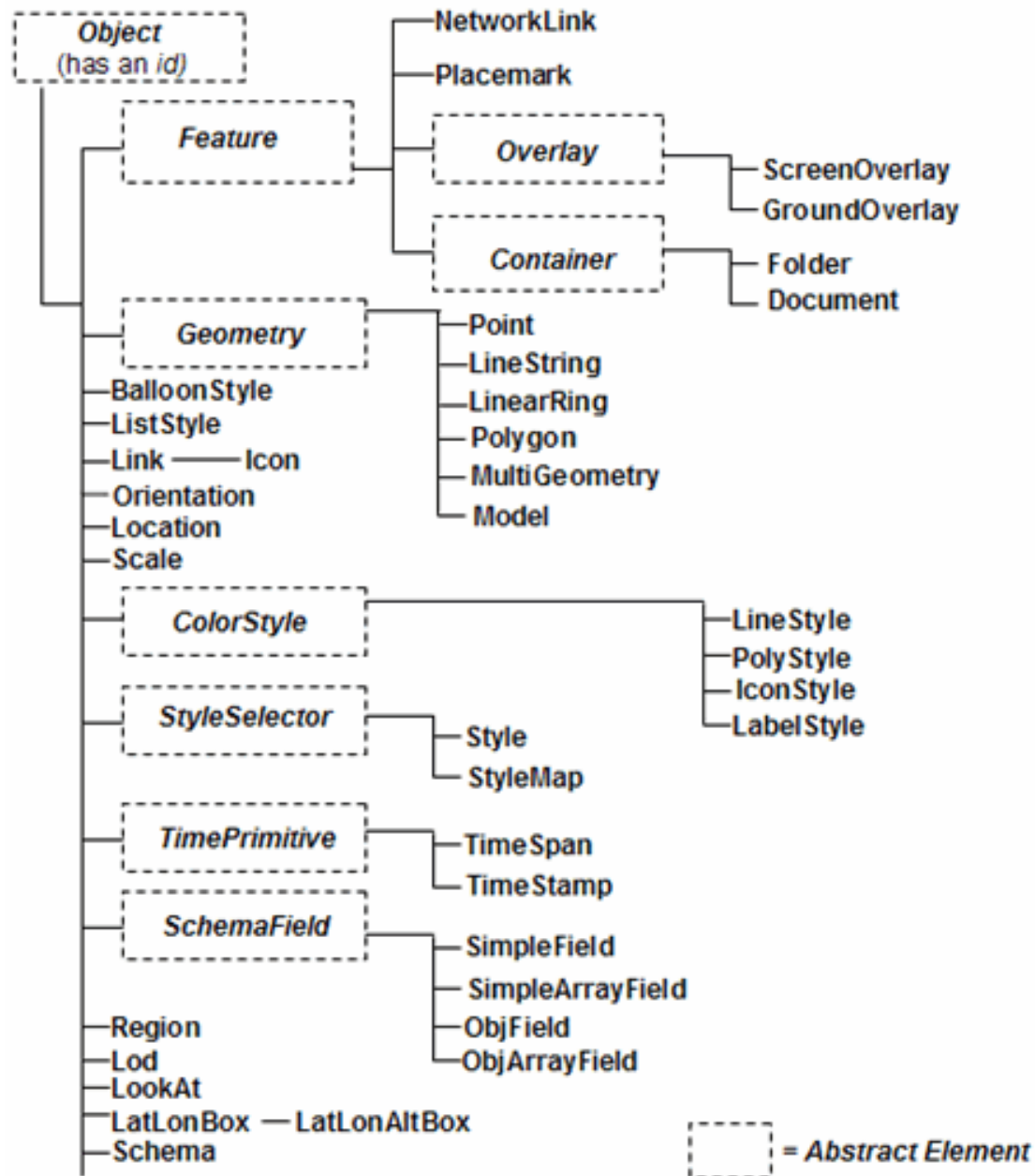
Of the challenges surrounding global climate change, communicating its potential impact and increasing public awareness of the scientific research undertaken to monitor and model its effect on society are quite pressing.

Today we are pleased that the British Government is launching with Google Earth Outreach, and in... [Learn more](#)



next »

- Using Google's Keyhole Markup Language KML



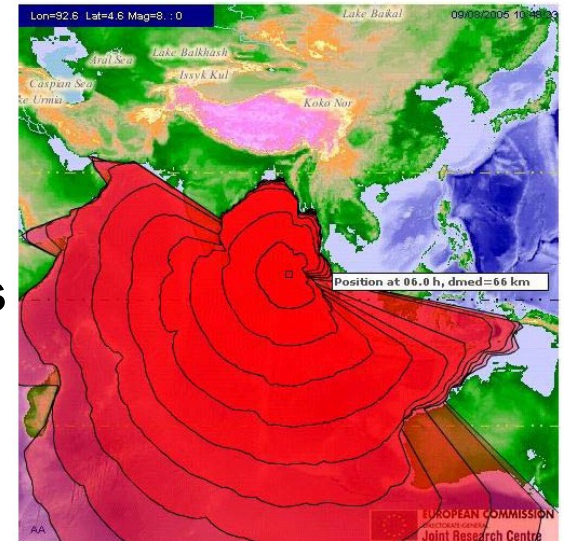
- **Keyhole Markup Language KML**
 - originates from the *Keyhole EarthViewer* by Keyhole Inc., refers to a series of 300 US reconnaissance satellites (named “Keyhole”)
 - Google acquired Keyhole Corp. in 2004 and submitted KML to OGC to become an adopted OGC implementation standard
- **2007: KML 2.2 – An OGC Best Practice:**
 - http://portal.opengeospatial.org/files/?artifact_id=23689 , some quotes:
 - “KML is an XML language focused on geographic visualization, including annotation of maps and images.”
 - “Geographic visualization includes ... also the control of the user's navigation in the sense of where to go and where to look.”
 - **“From this perspective, KML is complementary to most of the key existing OGC standards”**
 - “Currently, KML (2.2) utilizes certain geometry elements derived from GML (version 2.1.2).”
 - **“The OGC and Google have agreed that there can be additional harmonization of KML with GML”**

OGC® Approves KML as Open Standard

- Wayland, Mass., **April 14, 2008** - The members of the Open Geospatial Consortium, Inc. (OGC) today announced the approval of the OpenGIS® KML Encoding Standard (OGC KML), marking KML's transition into an open standard which will be maintained by the OGC. Developers will now have a standard approach for using KML to code and share visual geographic content in existing or future web-based online maps and 3D geospatial browsers like Google Earth™.
- "We are pleased to see the adoption of KML as an OGC standard," said Ron Lake, chairman and chief executive officer of Galdos Systems Inc. "We believe that this is a major step forward for the OGC and for the entire geographic information community, as it provides the first broadly accepted standard for the visualization of geographic information."
- <http://www.opengeospatial.org/standards/kml>

GeoRSS, OGC, 2006-07-19

- **Carl Reed:**
An Introduction to GeoRSS: A Standards Based Approach for G
- GeoRSS definitely holds promise to put the rich geospatial content directly in the hands of the consumer community, **allowing individuals with no deeper technology skills than mastery of blogging to become geospatial data publishers.** We may even be close to seeing Powerpoint-esque map publishing tools that combine Internet services like WMS and GeoRSS to make mapping a standard part of the business graphics toolset. How far from this day are we?
- http://portal.opengeospatial.org/files/?artifact_id=15755
2006-07-19

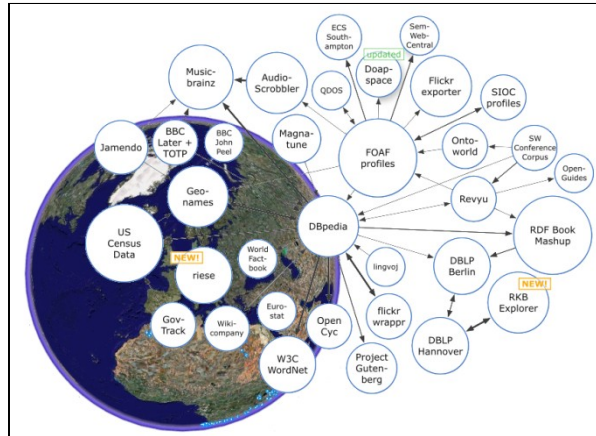


Visualization of a Tsunami model from GeoRSS

Amazon's A9 OpenSearch and INSPIRE

- Article: http://www.terradue.com/news/_news.asp?id=28
- Open Search Geo Extension: http://www.opensearch.org/Specifications/OpenSearch/Extensions/Geo/1.0/Draft_1

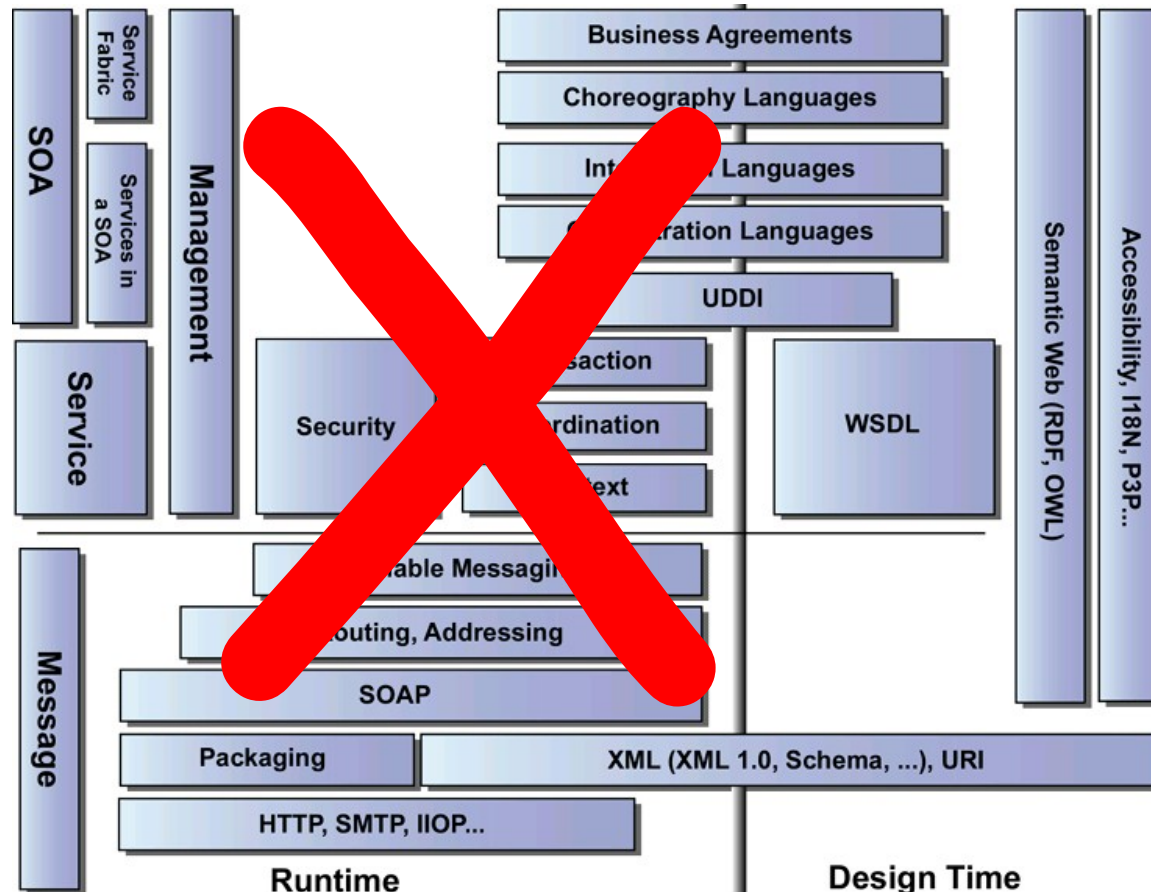




The RESTful Approach

SDI: from POX to Web Services

- OGC Services initially was “**Plain Old XML**” over HTTP
- OGC *Web Services*: “using the W3C's WSDL and SOAP standards for publishing, finding and binding geoprocessing services”



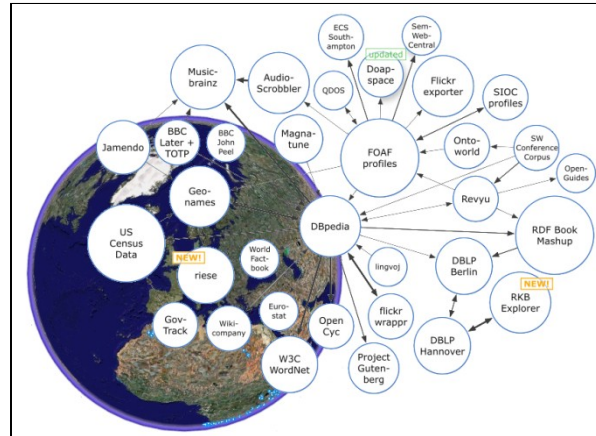
REpresentational State Transfer: REST

REST is the Architecture of the Web, based on HTTP Protocol

- **Give everything an ID** – a dereferencable URL (vs. URN)
- **Link things together** – let agents navigate smoothly
- **Use standard methods** – HTTP GET, PUT, POST, DELETE
- **Provide multiple representations** – such as HTML, RDF, ...
- **Communicate statelessly** – keep it simple

vs. Service Oriented Architecture (SOA):

- Hide everything behind obscure Service interfaces
- Isolation of “Objects”
- Billions of individual Service “operations”
- XML representation only
- enforcing transactions across Service boundaries

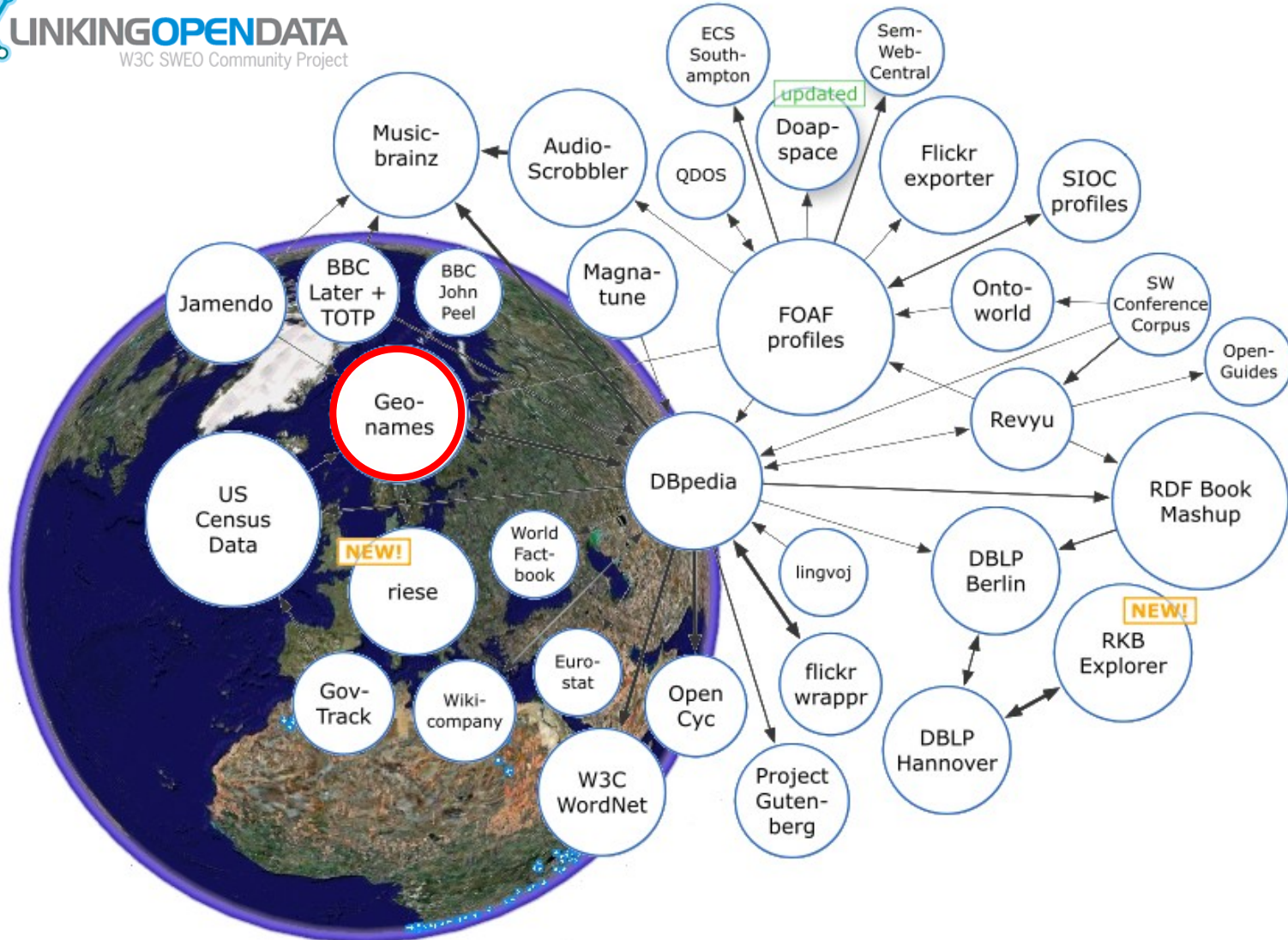


Geo-referencing the Semantic Web





Linking Open Data (LOD)



<http://esw.w3.org/topic/SweoIG/TaskForces/CommunityProjects/LinkingOpenData>

LOD Design Issues



<http://www.w3.org/DesignIssues/LinkedData.html>

3. Use URIs as names for things
4. Use HTTP URIs so that people can look up those names.
5. When someone looks up a URI, provide useful information.
6. Include links to other URIs, so that they can discover more things.

(Tim Berners-Lee)

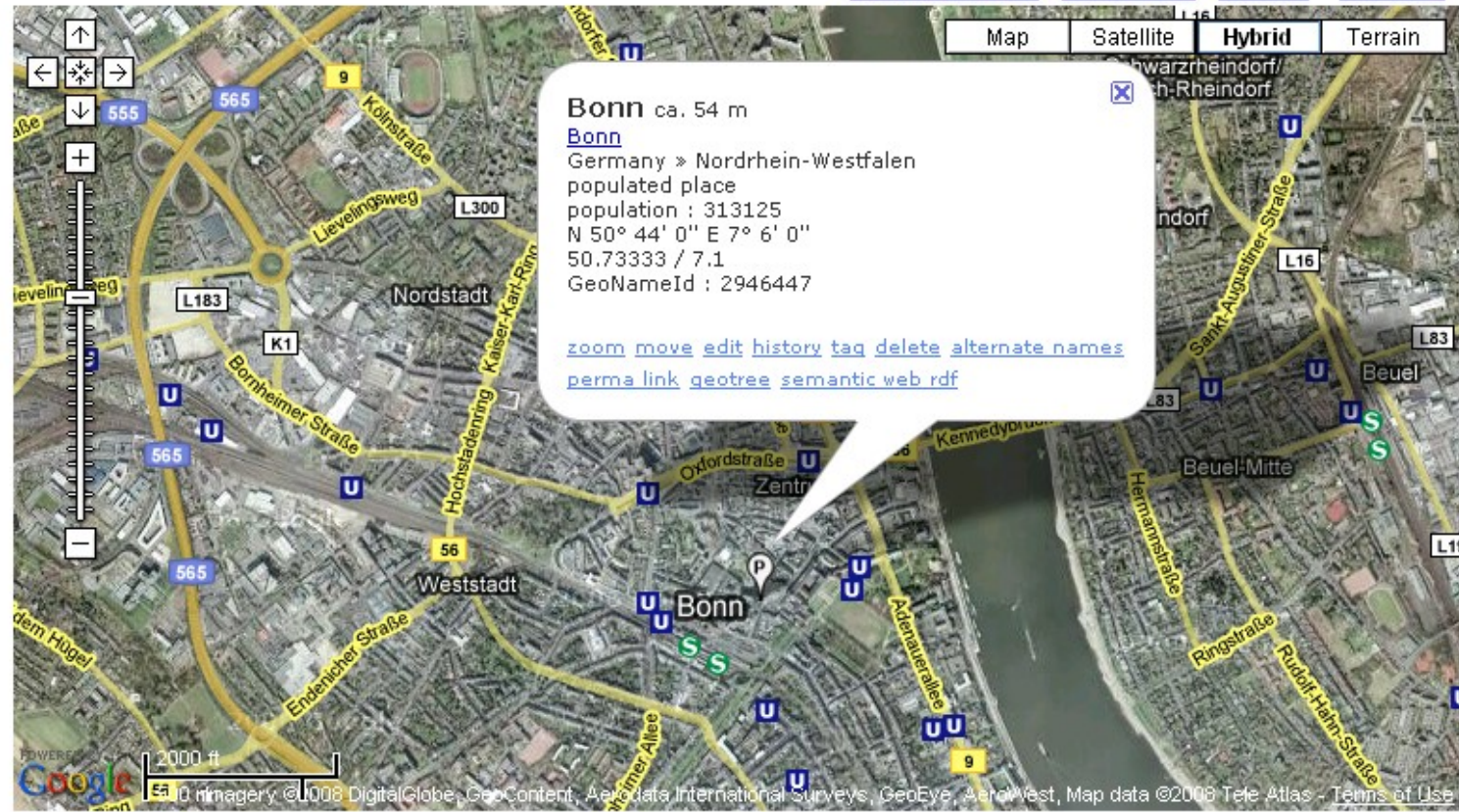


Map center : N 50° 44' 19" E 7° 6' 0"



displaying Geonames id : 2946447
[refresh](#) to display all features in area

[GeoNames](#) [Wikipedia](#)



A Google Maps Mashup, btw.



```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<rdf:RDF xmlns="http://www.geonames.org/ontology#" xmlns:foaf="http://xmlns.com/foaf/0.1/"
xmlns:owl="http://www.w3.org/2002/07/owl#" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:wgs84_pos="http://www.w3.org/2003/01/geo/wgs84_pos#">
  <Feature rdf:about="http://sws.geonames.org/2946447/">
    <name>Bonn</name>
    <alternateName xml:lang="de">Bonn</alternateName>
    <featureClass rdf:resource="http://www.geonames.org/ontology#P"/>
    <featureCode rdf:resource="http://www.geonames.org/ontology#P.PPL"/>
    <inCountry rdf:resource="http://www.geonames.org/countries/#DE"/>
    <population>313125</population>
    <wgs84_pos:lat>50.7333333</wgs84_pos:lat>
    <wgs84_pos:long>7.1</wgs84_pos:long>
    <parentFeature rdf:resource="http://sws.geonames.org/2861876/">
    <nearbyFeatures rdf:resource="http://sws.geonames.org/2946447/nearby.rdf"/>
    <locationMap>http://www.geonames.org/2946447/bonn.html</locationMap>
    <wikipediaArticle rdf:resource="http://de.wikipedia.org/wiki/Bonn_%28Stadtbezirk%29"/>
    <wikipediaArticle rdf:resource="http://ro.wikipedia.org/wiki/Bonn_%28district_urban%29"/>
  </Feature>
</rdf:RDF>
```

Another representation of the same Resource



Berlin

Type

Location > Administration-Entity > Community

Related Information

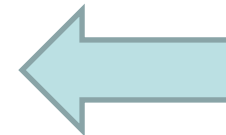
[display in google maps](#)

Bounding Box

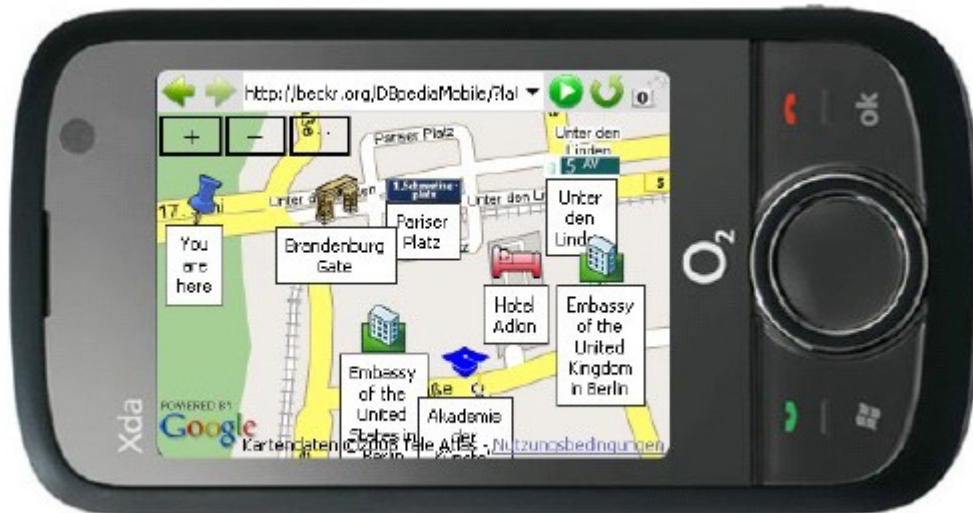
(13.088929, 52.676224) - (13.760469, 52.338818)

Associations

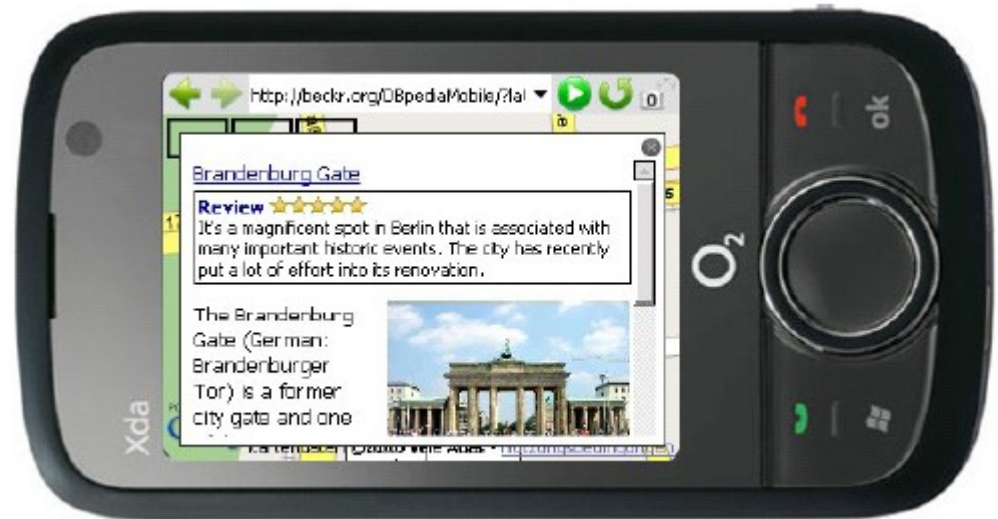
26 %	Spatial Intersection	Berlin-Fürstenwalder Spreetalniederung (Location)
26 %	Spatial Intersection	Teltow (Location)
23 %	Spatial Intersection	Teltowplatte (Location)
20 %	Spatial Intersection	Havel von Spree bis Nuthe (Location)
19 %	Spatial Intersection	Niederbarnim (Location)
14 %	Spatial Intersection	Barnim (Location)
13 %	Spatial Intersection	Barnimplatte (Location)
11 %	Spatial Intersection	Ostbrandenburgisches Heide- und Seengebiet (Location)
1 %	Spatial Intersection	Wildau (Location)
	Administrative Hierarchy	Berlin (Superordinated Unit)
	Event Location	Emissions Trading (Event)
	Event Location	First UNFCCC conference in Berlin (Event)
	Event Location	Limit Values for Fine Dust Exceeded (Event)



Example: DBpedia Mobile



- Geospatial entry point into the Web of Data
- Uses DBpedia, Revyu and Flickr



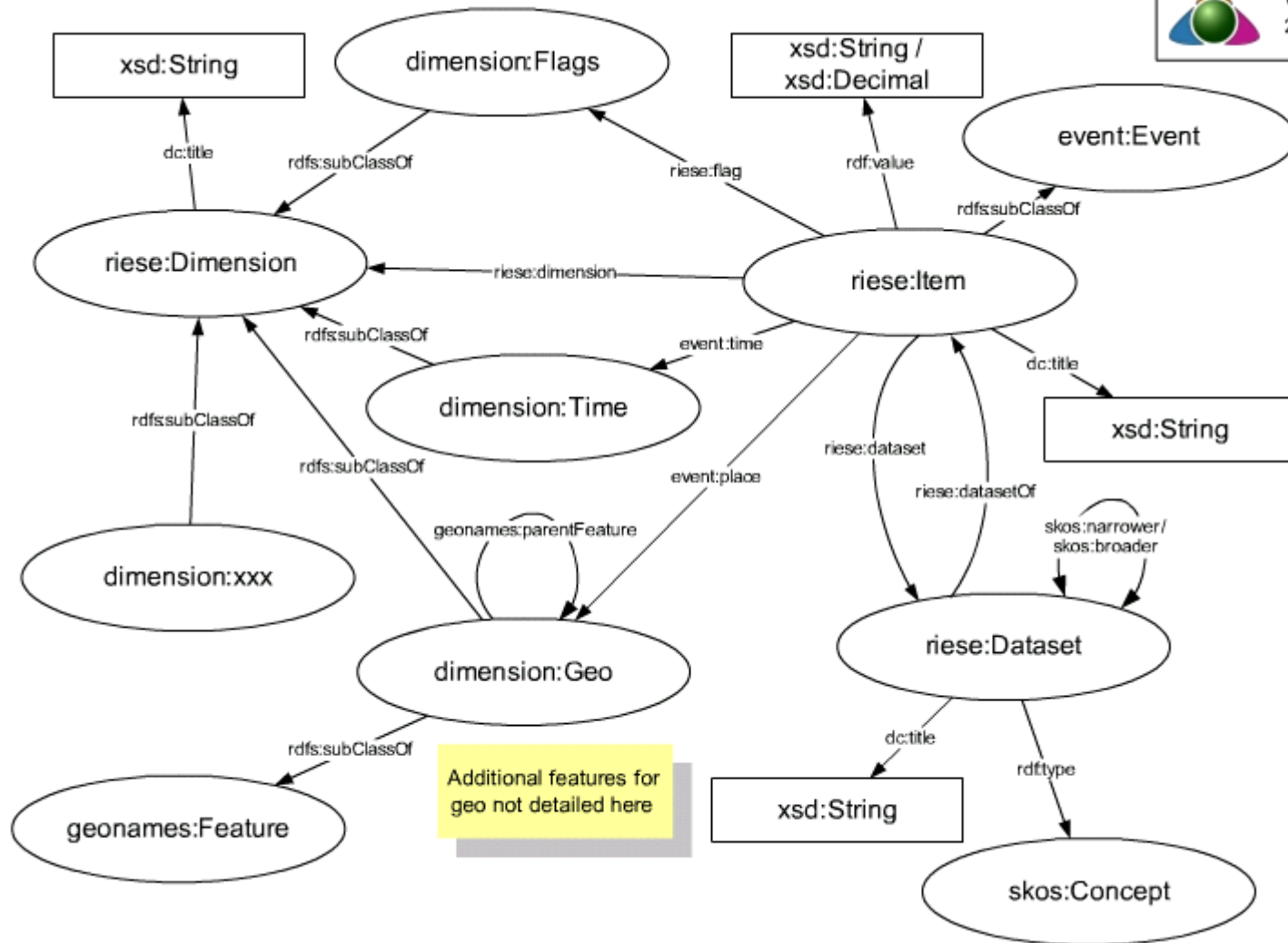
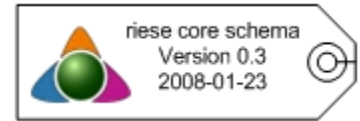
Geo-Browsing by Topics: ExploreOurPla.net



- Earthquakes, Storms, CO2 Emitters, Nuclear Power Plants, ...









Announced: EuroStat Data (Riese*)







*RDFizing & Interlinking the EuroStat Dataset Effort


Social Networks: geo-referenced FOAF






▼ <http://bandholtz.eu/foaf.rdf>      


Type ▶  RDFDocument
▶  PersonalProfileDocument

Mentions ▶  Person
▶  PersonalProfileDocument


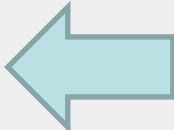
Maker ▶  Thomas Bandholtz


Primary topic

▼ **Thomas Bandholtz**   

Type ▶  Person


Label Thomas Bandholtz

Based near ▶  <http://sws.geonames.org/2946447/about.rdf> 

Depiction 

Family_name ▶ Bandholtz

Given name ▶ Thomas

Homepage ▶  <http://www.bandholtz.eu>

Only 20 Minutes ...

What I could not talk about:

- [OWS Common 1.2 SWG](#) "RESTful Additions and / or Changes"
- Sensor Web Enablement [SWE](#) WG and Web Ontologies
- [OpenStreetMap](#) API, OSGeo [Tile Map Service](#), and MetaCarta's [FeatureServer](#)
- Shared Environmental Information System ([SEIS](#)) of the European Commission
- Semantics in "Towards a Single Information Space for the Environment in Europe" [SISE](#).
- Ontologies in the Reference Model for the [ORCHESTRA](#) Architecture
- ... and many other related issues

