



# Wide access to spatial Citizen Science data

ECSA 2016, Berlin

Paul van Genuchten, Lieke Verhelst, Clemens Portele



*OpenStreetMap*



ARe<sup>3</sup>NA



**BITS OF FREEDOM**



# About the authors

**Paul van Genuchten** is a software engineer at “**GeoCat BV**”, supporting governments to publish (spatial/open) data on the web.

**Lieke Verhelst** is owner of “**Linked Data Factory**”. Lieke is a linked data expert and has developed multiple ontologies in the scope of food-safety, soil science, nature reserves, water management

**Clemens Portele** is managing director of “**interactive instruments GmbH**”. interactive instruments is a software engineering company in the spatial data infrastructure domain and is an active contributor to multiple **OGC** standards.

# COBWEB

COBWEB is a research project to empower citizens with the ability to collect environmental information using mobile devices, which will then be made suitable for use in research, decision making and policy formation.

GeoCat improves **GeoNetwork** opensource, targeting citizen science data discovery and visualisation in the scope of the **COBWEB FP7** project.

The project has received funding from the European Union under grant agreement No 308513

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## Gelderse Vallei

needs information

 last update: 17 November 2015 10:52:21, by @OSM  
[see more list](#) ▾

33.33% Complete

 ..please update address

lat: 52.0228555, long: 5.645384

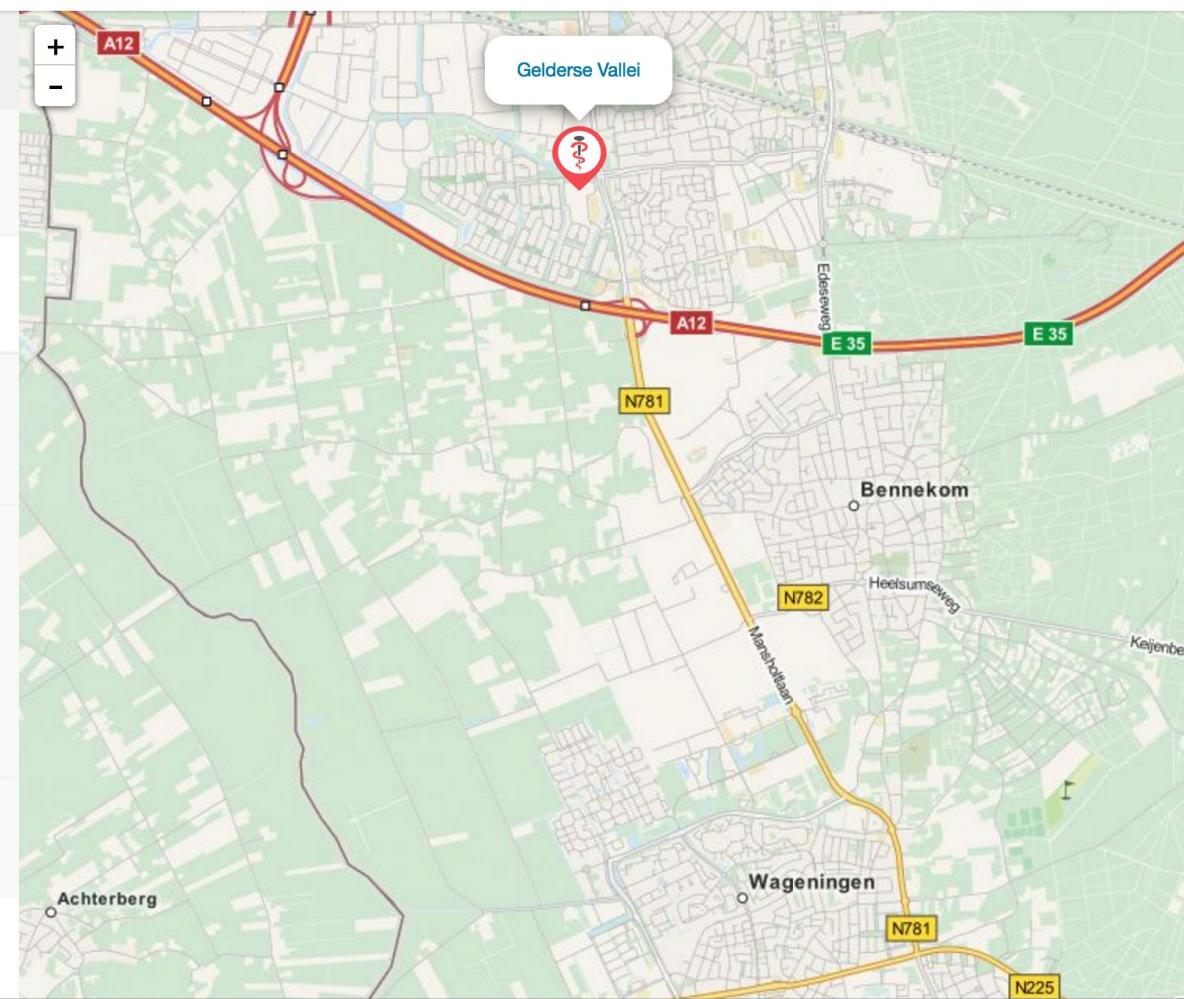
 ..please update number

 ..please define operating hours

 [Raw Data](#)

 scope of service

..please define scope of service  
ancillary services

[share](#)[edit](#)[+ add new](#)



## HEALTH WORKFORCE

 Search All topics Policy Mobility Indicators ProjectsGo back to [Health workforce](#) > [Indicators](#) Select an indicator European Core Health Indicators (ECHI)

An indicator is a quantitative or qualitative measure of how close we are to achieving a set goal (policy outcome).

They help us analyse and compare performance across population groups or geographic areas, and can be useful for determining policy priorities.

## » European Core Health Indicators (ECHI)

## ECHI Data Tool

 Choose your indicator(s) ▾ Select Indicators in chapters Reset Hospital beds

- Total number of hospital beds per 100,000 inhabitants (ECHI)
  - Curative care (acute care) hospital beds per 100,000 inhabitants (ECHI)
  - Psychiatric care hospital beds per 100,000 inhabitants (ECHI)
  - Long-term care hospital beds (except psychiatric) per 100,000 inhabitants (ECHI)
- Hospital day-cases as percentage of total patient population (in-patients & day-cases), selected diagnoses
  - Hospital day-cases as % of total patient population, for all causes (ISHMT code 0000 = ICD-10 codes A00-Z99 excluding V, W, X, Y and Z38) (ECI)
  - Hospital day-cases as % of total patient population, for infectious and parasitic diseases (ISHMT code 0100 = ICD-10 codes A00-B99) (ECI)
  - Hospital day-cases as % of total patient population, for neoplasms (ISHMT code 0200 = ICD-10 codes C00-D48) (ECI)
  - Hospital day-cases as % of total patient population, for malignant neoplasm of colon, rectum & anus (ISHMT code 0201 = ICD-10 codes C18-C21) (ECI)
  - Hospital day-cases as % of total patient population, for malignant neoplasm of trachea, bronchus & lung (ISHMT code 0202 = ICD-10 codes C32-C34) (ECI)

 Select Countries

- Minimum
- Average
- Maximum
- Belgium
- Czech Republic
- Denmark
- Germany
- Estonia
- Ireland
- Spain
- France
- Croatia
- Italy
- Cyprus
- Latvia

 Select Years

- 2013
- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
- 2004
- 2003
- 2002
- 2001
- 2000
- all



## INSPIRE Infrastructure for Spatial Information in Europe

### D2.8.III.6 Data Specification on *Utility and Government Services* – Technical Guidelines

## C.1 INSPIRE Application Schema 'AdministrativeAndSocialGovernmentalServices'

<b>generalMedicalService</b>
Name: general medical service
Definition: General medical services delivered by general medical clinics and general medical practitioners.
Parent: outpatientService
<b>specializedMedicalServices</b>
Name: specialized medical services
Definition: Specialized medical services delivered by specialized medical clinics and specialist medical practitioners. Specialized medical clinics and specialist medical practitioners differ from general medical clinics and general medical practitioners in that their services are limited to treatment of a particular condition, disease, medical procedure or class of patient.
Parent: outpatientService
<b>paramedicalService</b>
Name: paramedical service
Definition: Provision of paramedical health services to outpatients; Administration, inspection, operation or support of health services delivered by clinics supervised by nurses, midwives, physiotherapists, occupational therapists, speech therapists or other paramedical personnel and of health services delivered by nurses, midwives and paramedical personnel in non-consulting rooms, in patients' homes or other non-medical institutions.
Parent: outpatientService
<b>hospitalService</b>
Name: hospital service
Definition: Services concerned with hospitalization. Hospitalization is defined as occurring



## INSPIRE Infrastructure for Spatial Information in Europe

### D2.8.II/III.5 Data Specification on Human Health and Safety – Draft Guidelines

<b>antiFireWaterProvision</b>
Name: anti-fire water provision
Definition: Location, installation or designated area from where water for fire-fighting is provided.
Parent: fireProtectionService
<b>fireDetectionAndObservationSite</b>
Name: fire detection and observation site
Definition: Location, facility, construction or device for the detection and observation of fires.
Parent: fireProtectionService
<b>rescueService</b>
Name: rescue service
Definition: Services dedicated to the search-and-rescue of people, animals and goods in emergency situations.
Parent: publicOrderAndSafety
<b>rescueStation</b>
Name: rescue station
Definition: Services concerned with the housing of technical staff, equipment and auxiliary elements of land rescue teams.
Parent: rescueService
<b>rescueHelicopterLandingSite</b>
Name: Rescue helicopter landing site
Definition: A designated area from which rescue helicopters can take off and land.
Parent: rescueService



# INSPIRE GEOPORTAL

Enhancing access to European spatial data

EUROPEAN COMMISSION > INSPIRE > INSPIRE GEOPORTAL > Discovery / Viewer

Find a place in: Europe

Powered by GeoName

Data Sources and Credits Frisian Is.

100 km  
50 mi

INSPIRE Metadata CLOSE THIS WINDOW

Microsoft®  
Translator

Translate this page?

English



Translate this page English

Microsoft® Translator



(NL) - Ziekenhuizen in Nederland (september 2013)

#### Spatial data set

Metadata Language Resource Language

Dutch Dutch

Metadata Date

2015-08-04

Metadata Point Of Contact

RIVM, E-mail: [atlas@rivm.nl](mailto:atlas@rivm.nl)

Responsible Party

Principal Investigator: RIVM, E-mail:  
[geodata@rivm.nl](mailto:geodata@rivm.nl)

#### Conditions Applying To Access And Use

geen beperkingen

#### Limitations On Public Access

<http://creativecommons.org/publicdomain/mark/1.0/deed.en.html>  
<http://creativecommons.org/publicdomain/zero/1.0/>

[Get Map](#)

#### Resource Title

Ziekenhuizen in Nederland (september 2013)

#### Spatial Data Theme

Human health and safety  
(Menselijke gezondheid en veiligheid)

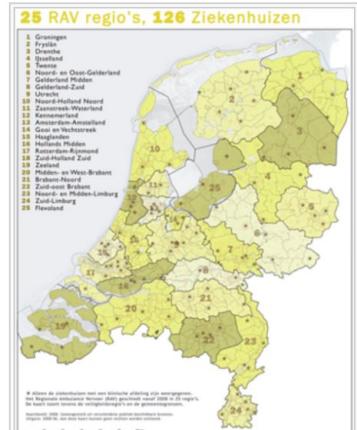


# Lijst van Nederlandse ziekenhuizen

In deze **lijst van Nederlandse ziekenhuizen** staan alle **ziekenhuizen van Nederland**, gerangschikt per provincie. Opgenomen zijn alleen ziekenhuizen voor algemene gezondheidszorg met een **klinische afdeling**, dus geen **psychiatrische ziekenhuizen**, **dagziekenhuizen** of vestigingen met alleen **(buiten-)poliklinieken**.

**Inhoud** [verbergen]

- 1 Overzicht
- 2 Zie ook



De 126 ziekenhuizen met een **klinische afdeling** (2008) per ambulanceregio

## Overzicht

 [ bewerken ]

Naam	Plaats	Provincie	Kenmerk <sup>[1]</sup>	Aantal eerste polikliniekbezoeken (2013) <sup>[2]</sup>	Bedden (2013) <sup>[2]</sup>	HSMR <sup>[3]</sup>
Admiraal de Ruyter Ziekenhuis	Goes, Vlissingen	Zeeland	algemeen	136.168	725	110
Albert Schweitzer Ziekenhuis	Dordrecht, Zwijndrecht, Sliedrecht	Zuid-Holland	algemeen	206.485	675	112
Academisch Medisch Centrum	Amsterdam	Noord-Holland	academisch		1002	119
Amphia ziekenhuis	Breda	Noord-Brabant	algemeen	254.165	854	-
Antonius Ziekenhuis	Sneek	Friesland	algemeen	94.793	304	115
St. Antonius Ziekenhuis	Nieuwegein, Utrecht, Houten, De Meern	Utrecht	algemeen	243.233	1102	112
Atrium Medisch Centrum Parkstad	Heerlen	Limburg	algemeen	194.570	651	89
Bernhoven	IJden	Noord-Brabant	algemeen	141.886	460	80



# The open data challenges

- Discovery; people can't find the data
- Format; the data is exposed in complex services/formats
- License; the license is restrictive
- Aggregation level; “raw data now” \*

\* Rufus Pollock, 2007 <http://blog.okfn.org/2007/11/07/give-us-the-data-raw-and-give-it-to-us-now/>

# Background

One of the objectives of COBWEB is to publish citizen science data to GEOSS

GEOSS has a focus on spatial standards (CSW, SensorWeb, WMS/WFS)

Major part of citizen science community is not aware of these standards

Average users use search engines to discover data and common formats to analyse data

How to bridge the gap between services in GEOSS and search engines

[HOME](#)[SEARCH](#)citizen science x

Total Results: 27

[All](#)[Monitoring and Observation Systems](#)[Websites and documents](#)[Alerts, RSS, and information Feeds](#)[Legend](#)

Total Results: 27

[1](#)[2](#)[3](#)[NEXT](#)[LAST](#)

Search Granule

[Maui Citizen Science Coastal Water Quality Data](#)

A network of citizen science volunteers periodically monitors water quality at several beaches across the island of Maui in the State of Hawaii  
[Click to read more...](#)

[Web-based Biodiversity Citizen Science Database \(assembled 2012\)](#)

The collective impact of humans on biodiversity rivals mass extinction events defining Earth's history, but does our large population also pre  
[Click to read more...](#)

[Workshop report: Developing a Citizen Science framework for the U.S. Fish and Wildlife Service](#)

This workshop report summarizes the development of a citizen science framework for use by the U.S. Fish and Wildlife Service. The report detail  
[Click to read more...](#)



birds of samaria



Alle

Afbeeldingen

Maps

Video's

Nieuws

Meer ▾

Zoekhulpmiddelen

Ongeveer 329.000 resultaten (0,52 seconden)

Tip: Alleen in het **Nederlands** zoeken. U kunt uw zoektaal instellen in de [Voorkeuren](#)

### Flora and fauna of the Samaria gorge - West Crete

[www.west-crete.com/samaria-gorge-flora-fauna.htm](http://www.west-crete.com/samaria-gorge-flora-fauna.htm) ▾ [Vertaal deze pagina](#)

A wide variety of **birds** inhabit the **Samaria** gorge: it is full of partridges which can usually be found near the springs. Owls, hawks and ravens inhabit the cliffs and ...

### Birds of Crete - species names and birdwatching location in Crete

[www.we-love-crete.com/birds-of-crete.html](http://www.we-love-crete.com/birds-of-crete.html) ▾ [Vertaal deze pagina](#)

The **Birds of** Crete include rare species such as the Bearded Vulture and ... and may be found on the road from Chania to **Samaria** Gorge, 5 km south of Chania.

### (MEET) Birds of Samaria

[opendatacat.net/geonetwork-geo4web/doc/.../8aef4f0c-8972-446e-b771-45178aaa9d...](http://opendatacat.net/geonetwork-geo4web/doc/.../8aef4f0c-8972-446e-b771-45178aaa9d...) ▾

25 sep. 2015 - "Mediterranean Experience of Ecotourism" \_\_\_\_Record **bird** species flying over the area \_\_\_\_ Καταγράψτε πουλιά της περιοχής\_\_\_\_ ...

### Birds eye view of the city of Samaria, Palestine.

[ark.cdlib.org/ark:/13030/kt4x0nd576](http://ark.cdlib.org/ark:/13030/kt4x0nd576) - [Vertaal deze pagina](#)

Rights: REQUIRED CREDIT LINE MUST STATE: Keystone-Mast Collection, UCR/California Museum of Photography, University of California at Riverside.

Alle

**Afbeeldingen**

Maps

Shopping

Video's

Meer ▾

Zoekhulpmiddelen



# Geonovum testbed

The gap between OGC and WEB standards is a general challenge

W3C and OGC have set up a [joint working group](#) to develop best practices

At the start of 2016 Geonovum (dutch national government) organised a [testbed](#) to move the 'spatial data on the web' best practices forward.

# What search engines expect

HTML (text) output on unique persistent url's

An index that lists links to all url's to discover

HTML documents annotated with "schema.org"-markup transform web pages into structured data

## Full Hierarchy

Schema.org is defined as two hierarchies: one for textual property values, and one for the things that they describe.

### Thing

This is the main schema.org hierarchy: a collection of types (or "classes"), each of which has one or more parent types. Although a type may have more than one super-type, here we show each type in one branch of the tree only. There is also a parallel hierarchy for [data types](#).

Select vocabulary view:

- Core vocabulary  Core plus all extensions

### Core plus extension vocabularies

- [Thing](#)
  - [Action](#)
    - [AchieveAction](#)
      - [LoseAction](#)
      - [TieAction](#)
      - [WinAction](#)
    - [AssessAction](#)
      - [ChooseAction](#)
        - [VoteAction](#)
      - [IgnoreAction](#)
      - [ReactAction](#)
        - [AgreeAction](#)
        - [DisagreeAction](#)

[Alle](#) [Maps](#) [Afbbeeldingen](#) [Nieuws](#) [Video's](#) [Meer ▾](#) [Zoekhulpmiddelen](#)

Ongeveer 489.000 resultaten (0,42 seconden)

## Kulturbrauerei

[www.kulturbrauerei.de/](http://www.kulturbrauerei.de/) ▾ [Vertaal deze pagina](#)

Street Food auf Achse – Sonntagsmarkt in der Kulturbrauerei. jeden Sonntag ... Street Food auf Achse bietet den in Berlin und Umgebung beheimateten tollen, ...

[Kulturbrauerei - Impressum](#) - [Geschichte](#)

## Kulturbrauerei in Berlijn, uitgaanscentrum voor iedereen - Berlijn Blog

[berlijn-blog.nl/uitgaan/kulturbrauerei\\_berlijn/](http://berlijn-blog.nl/uitgaan/kulturbrauerei_berlijn/) ▾

De Kulturbrauerei is gelegen in de wijk Prenzlauer Berg en is makkelijk te ... Verder moet men huiswerk maken als men met de trein naar Berlin komt, het is daar ...

## Kulturbrauerei – Wikipedia

<https://de.wikipedia.org/wiki/Kulturbrauerei> ▾ [Vertaal deze pagina](#)

Die Berliner Kulturbrauerei ist ein 25.000 m<sup>2</sup> großes Bauensemble. Sie steht mit ihren Höfen und ihrer einzigartigen Architektur seit 1974 unter Denkmalschutz ...

## Kulturbrauerei - Wikipedia, the free encyclopedia

<https://en.wikipedia.org/wiki/Kulturbrauerei> ▾ [Vertaal deze pagina](#)

The Berlin Kulturbrauerei (literally "Culture Brewery") is a 25,000 square metres (270,000 sq ft) building complex in Berlin, Germany. Originally built and ...

## Kulturbrauerei - Berlin.de

[www.berlin.de/.../3560308-3558930-kulturbrauerei.html](http://www.berlin.de/.../3560308-3558930-kulturbrauerei.html) ▾ [Vertaal deze pagina](#)

# Kulturbrauerei Weihnachtsmarkt

[Website](#)[Routebeschrijving](#)

4,2 ★★★★☆ 74 Google-recensies

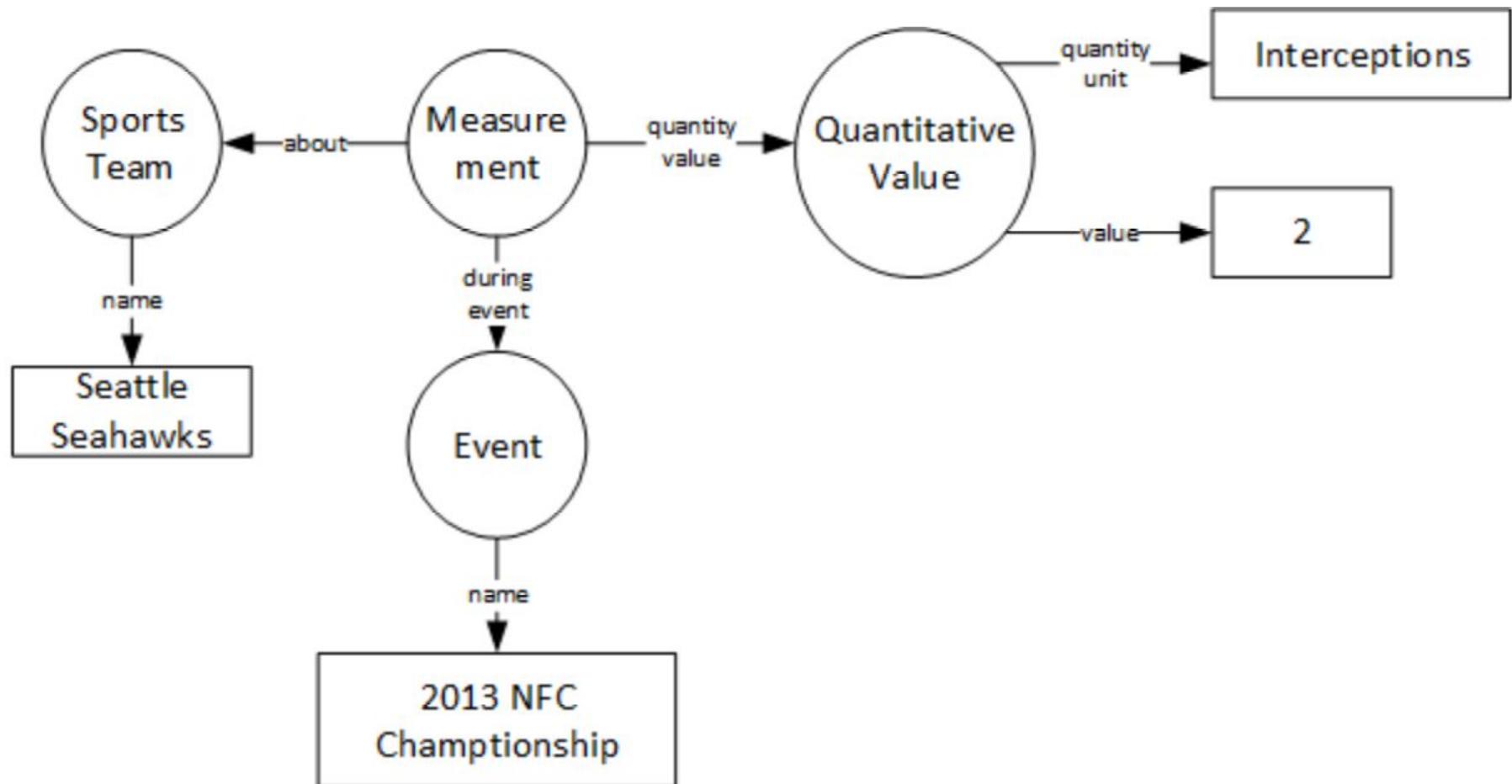
Cultureel centrum

**Adres:** Schönhauser Allee 36, 10435 Berlin, Duitsland**Telefoon:** +49 30 44352614**Openingstijden:** Vandaag geopend · 08:00–00:00 ▾[Een bewerking voorstellen](#)

# Schema.org and Citizen Science

The Schema.org ontology currently does not provide classes for citizen science projects and observations

An extension to schema.org can be proposed to model citizen science communities and observations, for example based on [schema.org/Measurement](#)



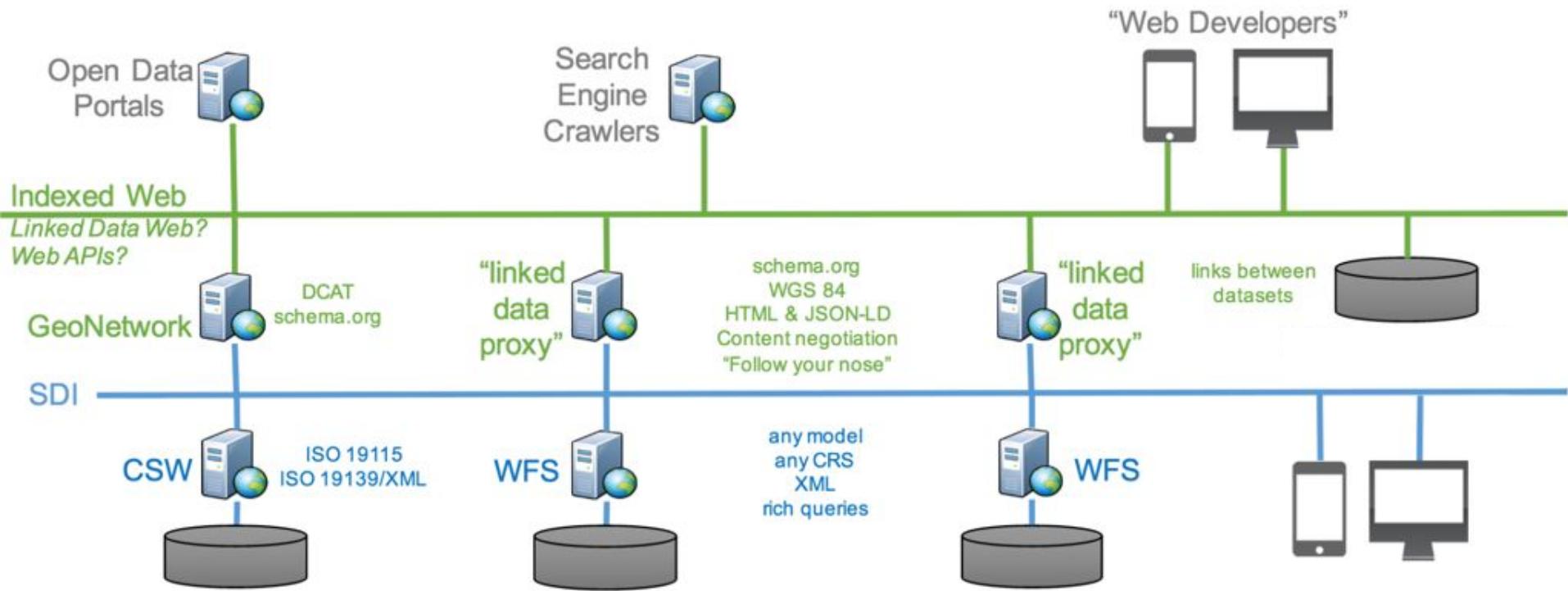
# A proxy approach

A proxy layer transforms WFS/CSW requests to HTML annotated with schema.org

The CSW proxy approach is implemented in GeoNetwork opensource

For the WFS proxy approach a new open source product has been released by interactive instruments, called '[LDproxy](#)'





[Alle](#)[Afbeeldingen](#)[Maps](#)[Video's](#)[Nieuws](#)[Meer ▾](#)[Zoekhulpmiddelen](#)

Ongeveer 329.000 resultaten (0,52 seconden)

Tip: Alleen in het **Nederlands** zoeken. U kunt uw zoektaal instellen in de [Voorkeuren](#)

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### (MEET) Birds of Samaria

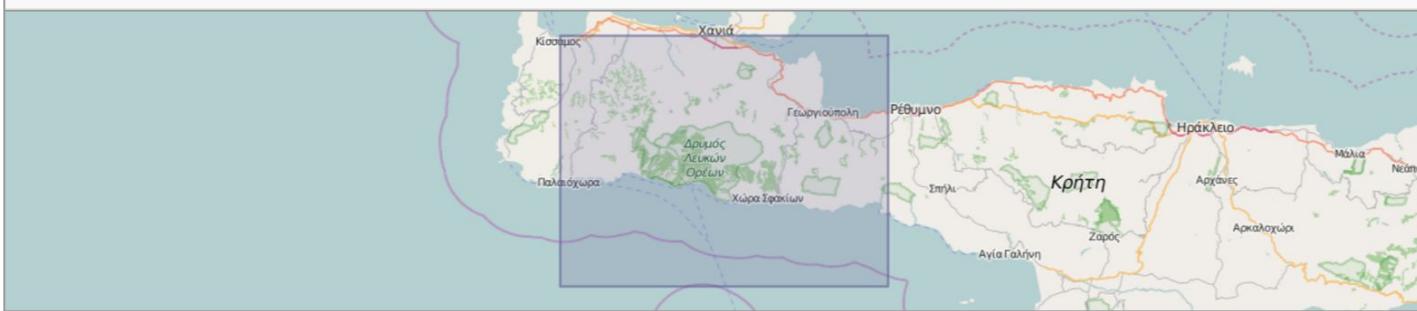
[opendatacat.net/geonetwork-geo4web/doc/.../8aef4f0c-8972-446e-b771-45178aaa9d...](http://opendatacat.net/geonetwork-geo4web/doc/.../8aef4f0c-8972-446e-b771-45178aaa9d...) ▾

25 sep. 2015 - "Mediterranean Experience of Ecotourism" \_\_\_\_Record **bird** species flying over the area\_\_\_\_ Καταγράψτε πουλιά της περιοχής\_\_\_\_ ...

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Rights: REQUIRED CREDIT LINE MUST STATE: Keystone-Mast Collection, UCR/California Museum of Photography, University of California at Riverside.



## (MEET) Birds of Samaria

### Standaard

#### Datum(publication)

2015-04-05

#### Samenvatting

"Mediterranean Experience of Ecotourism" Record bird species flying over the area Καταγράψτε πουλιά της περιοχής <http://www.medecotourism.org/>.

#### Voorbeeldweergave



#### uitgever

OIKOM

Mediterranean Experience of Ecotourism (MEET)

#### Taal

#### Onderwerp

economie

**FETCH & VALIDATE**

CANCEL

Shortlink

```
1 <html>
2   <html>
3     <head>
4       <title>Oude Maas vaarweg en oeverloding grid prod.11-
1992</title>
5       <meta name="description" content="Hoogte van de bodem.
Afhankelijk van het belang van de lokatie wordt deze regelmatig
gemeten. Denk bijvoorbeeld aan het belang voor de scheepvaart." />
6       <link rel="alternate" hreflang="nl"
7 href="http://opendatacat.net/" />
8       <link href="/getbootstrap.com/dist/css/bootstrap.min.css"
9 rel="stylesheet" />
10      <style>.toggler,.view-outline,.summary-links-associated-link {
11 display:none }
12 .coord { float:left; width:25%; padding:2px; padding: 3px; }
13 .extent img { clear:both; padding: 5px; }
14 header { padding-top:50px; }</style>
15 </head>
16 <body>
17   <nav class="navbar navbar-default" style="margin-bottom:0px;">
18     <div class="container">
19       <div class="navbar-header">
20         <button type="button" class="navbar-toggle collapsed"
21 data-toggle="collapse" data-target="#navbar" aria-expanded="false"
22 aria-controls="navbar">
23           <span class="sr-only">Toggle</span>
24           <span class="icon-bar" />
25           <span class="icon-bar" />
26           <span class="icon-bar" />
```

Results - Filter by use case ▾

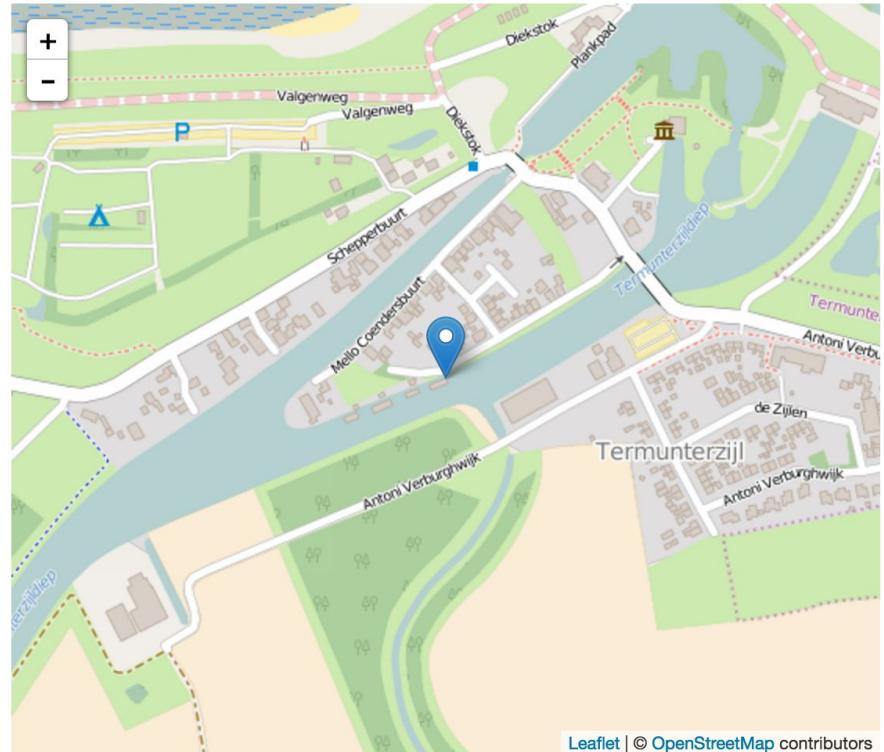
## Dataset (1)

All good ✓

Dataset:	<a href="http://opendatacat.net/geonetwork-geo4web/doc/dataset/B0D466F-F-D2CA-4A72-9BCE-57F5DEED14AD">http://opendatacat.net/geonetwork-geo4web/doc/dataset/B0D466F-F-D2CA-4A72-9BCE-57F5DEED14AD</a>
name:	Oude Maas vaarweg en oeverloding grid prod.11-1992
dateCreated:	2003-11-06
description:	Hoogte van de bodem. Afhankelijk van het belang van de lokatie wordt deze regelmatig gemeten. Denk bijvoorbeeld aan het belang voor de scheepvaart.
thumbnailUrl:	<a href="http://geoservices.rws.nl/opendata/img/OMS016.jpg">http://geoservices.rws.nl/opendata/img/OMS016.jpg</a>
keywords:	HoogteVervoersnetwerken
keywords:	aardrijkskundehoogtelandschapwaterOude Maas vaargeul en oevelodingOMS016
license:	Geo Gedeeld licentie
license:	<a href="http://geoservices.rws.nl/opendata/licenties/Licentie_Geo_gedeeld_bodemhoogte.pdf">http://geoservices.rws.nl/opendata/licenties/Licentie_Geo_gedeeld_bodemhoogte.pdf</a>
dateCreated:	9999-09-09
keywords:	hoogte
fileFormat:	( )
datePublished:	2010-12-08
url:	<a href="http://opendatacat.net:80/geonetwork-geo4web/doc/dataset/B0D466F-F-D2CA-4A72-9BCE-57F5DEED14AD">http://opendatacat.net:80/geonetwork-geo4web/doc/dataset/B0D466F-F-D2CA-4A72-9BCE-57F5DEED14AD</a>
isBasedOnUrl:	<a href="http://www.nationaalgeoregister.nl/geonetwork/resource/B0D466F-F-D2CA-4A72-9BCE-57F5DEED14AD">http://www.nationaalgeoregister.nl/geonetwork/resource/B0D466F-F-D2CA-4A72-9BCE-57F5DEED14AD</a>
about [Thing]:	
name:	Monitoring van de nautische diepte van de vaarweg en de morfologische ontwikkeling

# Termunterzijl, Mello Coendersbuurt 21D

<b>id</b>	inspireadressen.56
<b>streetAddress</b>	Mello Coendersbuurt 21D
<b>addressLocality</b>	Termunterzijl
<b>postalCode</b>	9948PM
<b>latitude</b>	53.29961608460737
<b>longitude</b>	7.032778637122975



# A proxy approach to reach other communities

A similar approach can be used to expose OGC services to other communities, such as citizen science developer community

- CSW/iso19139 metadata exposed as DCAT/VOID in RDFa or rdf/xml
- SOS/WFS/GML exposed as [Darwin Core](#) in RDFa or json-ld
- A json API for web developers

Also interesting would be to look at a vice versa approach, in which a proxy is used to expose unstructured citizen science data to the geoss community as WFS/SOS.

# Privacy and the search engines

Some of the search engines are generally perceived as a challenge for privacy

However; in this case it is the campaign organiser that should take measures

A complicating factor is that citizens tend to like to advertise that they made a contribution, or even claim ownership of a contribution

# Privacy by design

Minimise the transport and storage (timespan) of data that could be used to derive identity (minimise, separate, aggregate & hide\*)

Communicate transparently about the transport and storage strategy

Offer users the ability to review and remove their personal data

*Transport a location/timestamp to the level of detail that is required for the use case*

*Use a wallet with reliability-credits instead of keeping a user history for reliability assessment*

\* <https://www.pilab.nl/wp-content/uploads/2013/12/Privacy-design-strategies-JHH-5-12-2013.pdf>

*“Privacy awareness is growing,  
it’s comparable with the stage of environmental awareness 40 years ago” \**

\*Jaap-Henk Hoepman, Privacy & Identity Lab, Radboud University Nijmegen

# Conclusions

A proxy approach for CSW is a good way to make existing published datasets more widely discoverable via alternative channels

A proxy approach for WFS/SOS has potential to bridge the gap between OGC services and search engines, however currently the search engines have limited implementations for using the schema.org annotations

Adopting an established standard helps in making data more widely available.

There's a growing number of tools available to facilitate to engage with open data