



***Florian Thiery & Sophie C. Schmidt & Timo Homburg  
Martina Trognitz & Monika Przybilla***



# SPARQLing Geodesy for Cultural Heritage

New Opportunities for Publishing and  
Analysing Volunteered Linked (Geo-)Data





**Timo**



**Martina**



**Sophie**

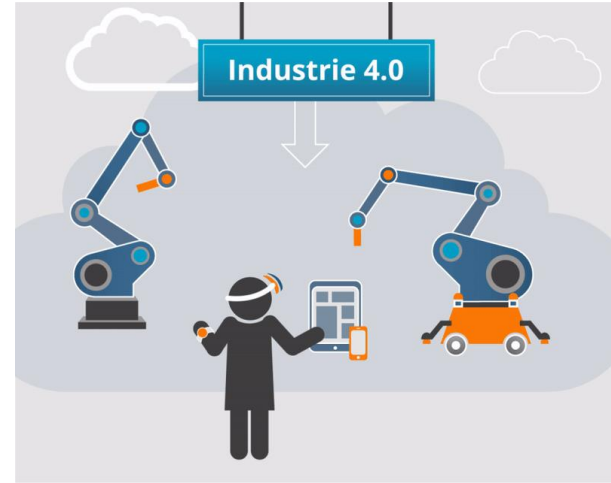
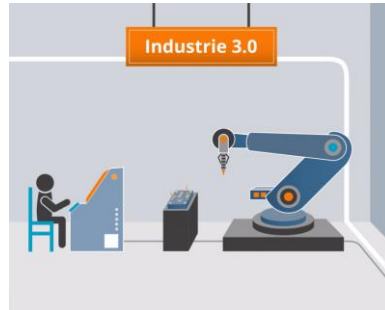
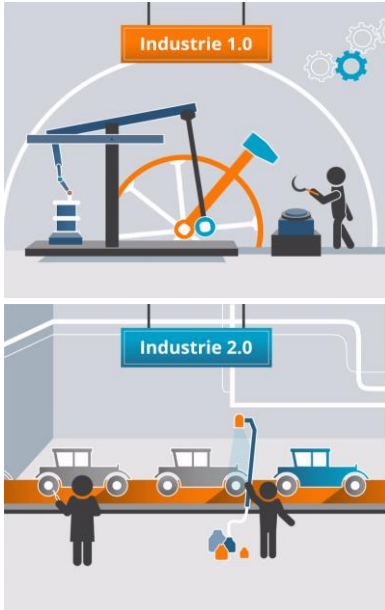


**Florian**



**Monika**



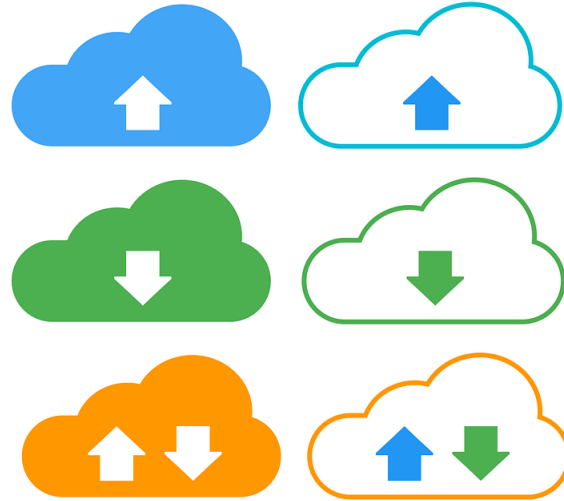


**Wir erleben Industrie 4.0 im Arbeitsalltag und bereiten  
uns auf eine Geodäsie 2030 vor**



**Linked  
Open  
Usable  
Geodata**

**Linked (Open) Data**  
**Open Data**  
**Open Source Software**  
**Open Access**  
**Geo Data**  
**Usable Data/Interfaces**



**Digitales Arbeiten findet in der Cloud statt**



## Bereitstellung von Daten im Internet in Standards

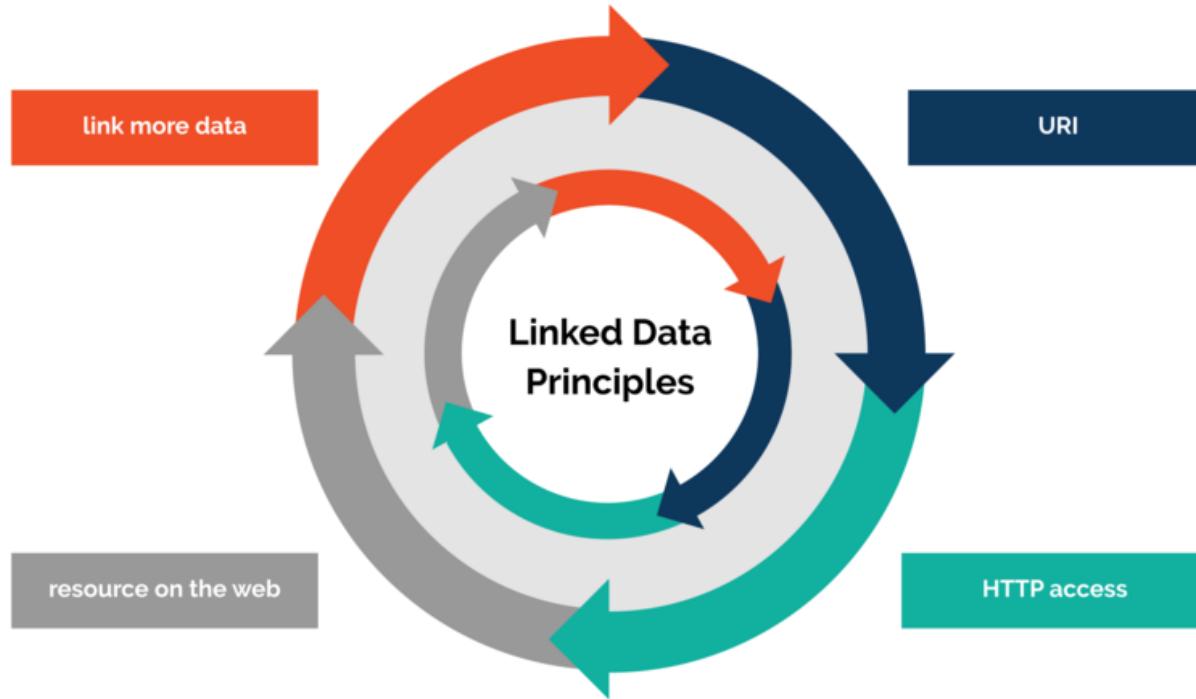


**Subjekt**

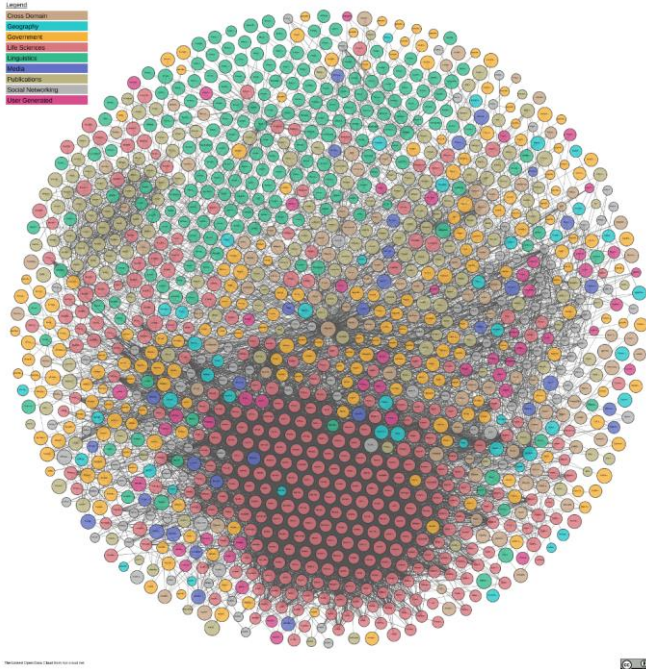
**Prädikat**

**Objekt**

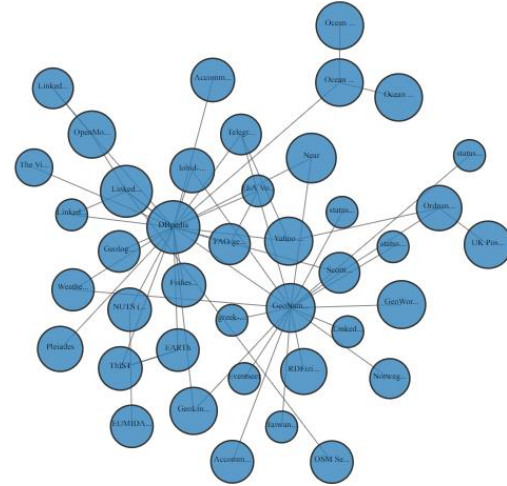








**Legend**  
 Geography



The Geography Linked Open Data Cloud from lod-cloud.net



**The Linked Data Cloud via <https://lod-cloud.net>**



# data.geohive.ie

Serving Ireland's geospatial information as Linked Data.

## About the Initiative

The goal of Ordnance Survey Ireland's (OSI) initiative with ADAPT is to develop a platform to publish OSI's geospatial data as Linked Data on the Web whilst adhering to best practices in the domain of geospatial information. The publication of Linked Data enables third parties to explore and consume rich data in a meaningful manner via a combination of simple, standardized technologies (e.g., RDF and URI) that operate over the Web's existing HTTP infrastructure.

[View details »](#)

## Download

Ordnance Survey Ireland's geospatial data is available via a Linked Data frontend (e.g., by following the HTTP URI of County Dublin) and as downloadable datasets for local use.

[View details »](#)

## Contact and Legal

Contact us:

- [Corporate](#)
- [Geohive](#)

Or send us an email via [geohive@osi.ie](mailto:geohive@osi.ie).

Legal:

- [Corporate](#)
- [Privacy](#)
- The data served by the OSI via the Linked Data frontend, query endpoints and files is licensed under CC BY 4.0.



© 2019 Ordnance Survey Ireland.

## DUBLIN at OSI Geohive

<http://data.geohive.ie/resource/county/2ae19629-144f-13a3-e055-000000000001>

Property	Value
geo:hasGeometry	<geometrical_recessation>
rdfs:label	<ul style="list-style-type: none"> <li>• Baile Atha Cliath (ga)</li> <li>• DUBLIN (en)</li> <li>• DUBLIN</li> </ul>
geohive:loganmid	<https://www.loganm.ie/ga/100002>
owl:similarTo	<http://dbpedia.org/resource/County_Dublin>
rdf:type	<ul style="list-style-type: none"> <li>• geohive:County</li> <li>• geo:Feature</li> </ul>

[As Turtle](#) | [As RDF/XML](#)



© 2019 [Ordnance Survey Ireland](#) Linked Data Frontend powered by [Pubby](#).



Property	Value
geo:hasGeometry	<https://data.geohive.ie/resource/county/2ae19629-144f-13a3-e055-000000000001>

# LOD im Ordnance Survey Irland



RSE

**Ordnance Survey**

You are here: [linked-data](#) > [ordnance-survey-linked-data](#)

## Ordnance Survey Linked Data

The Ordnance Survey is Great Britain's national mapping agency, providing the most accurate and up-to-date geographic data, relied on by government, business and individuals.

OS OpenData is the opening up of Ordnance Survey data as part of the drive to increase innovation and support the "Making Public Data Public" initiative. As part of this initiative Ordnance Survey has published a number of its products as Linked Data.

This dataset combines three separate linked data resources: the 1:50 000 Scale Gazetteer, Code-Point Open and the administrative geography gazetteer for Great Britain.

**Explore this dataset** [Read more about this dataset](#)

Find things by keyword powered by SEARCH

Enter a keyword... [Examples](#)

[Find](#) [Reset](#)

Find things using a query powered by SPARQL

Lookup an identifier powered by LOOKUP

Turn labels into identifiers powered by RECONCILIATION

### Dataset Summary

**OS OpenData**

License:	OS Open Data License
Created:	October 25th, 2010
Updated:	August 30th, 2018
Size:	60,136,519 triples
Coverage:	England, Scotland, Wales

**Ontologies**

- Postcode Ontology
- The administrative geography and civil voting area ontology
- Geometry Ontology
- Spatial Relations Ontology
- 50k Gazetteer

Export the dataset metadata as JSON, XML, or Turtle or download the raw data

Ordnance Survey © Crown copyright 2018 [Contact us](#)

**Ordnance Survey**

You are here: [linked-data](#) > [ordnance-survey-linked-data](#) > [edinburgh](#)

## Edinburgh

Map powered by OS OpenSpaces

Zoom to: Country County District City Area City Street

© Crown copyright and database rights 2018 Ordnance Survey

Edinburgh is a Named Place

### Objects related to "Edinburgh"

TwentyKMGrid Reference	NT26
Feature Type	City
OneKMGrid Reference	NT2773
Map Reference	66

referenced via Primary Topic by: [Description of http://data.ordnancesurvey.co.uk/id/50kGazetteer/3103](http://data.ordnancesurvey.co.uk/id/50kGazetteer/3103)

### Core facts about "Edinburgh"

Type	Named Place
Label	Edinburgh
Name	Edinburgh
Northing	673500
Easting	327500

Use this data in your app! Explore the underlying dataset and APIs or export the information about Edinburgh as JSON, XML, or Turtle.

Find Edinburgh products in the OS Online Shop

Find maps, clothing, GPS, and more

# LOD im Ordnance Survey Großbritannien



LinkedGeoData.org

Adding a spatial dimension to the Web of Data.

Project created by:



- About / News
- Downloads
- Online Access
- RDF Mapping
- Use Cases
- LGD Browser
- Publications
- Community
- Blog
- Contact / Imprint

2018 May 7: [Linked Data interface operation back to normal](#)  
[Quick Links](#) | [Downloads](#) – [SPARQL](#) – [Virtual-SPARQL](#) by [Sparqlify](#) – [HTML interface](#) – [Example Queries](#)

LinkedGeoData is an effort to add a spatial dimension to the Web of Data / Semantic Web. LinkedGeoData uses the information collected by the OpenStreetMap project and makes it available as an RDF knowledge base according to the Linked Data principles. It interlinks this data with other knowledge bases in the Linking Open Data initiative.



#### News

[LinkedGeoData: New RDF versions of OpenStreetMap datasets available](#)

The AKSW research group is happy to announce that a new LinkedGeoData maintenance release with more than 1.2 billion triples based on the OpenStreetMap planet file from 2015-11-02 is now online. Enjoy! [Quick Links Project Website Downloads SPARQL Endpoint Virtual](#) ... [Continue reading](#) -->

[AKSW at #ISWC2014. Come and join, talk and discuss with us!](#)

Hello AKSW Follower! We are very pleased to announce that nine of our papers were accepted for presentation at ISWC 2014. In the main track of the conference we will present the following papers: [AGDISTIS – Graph-Based Disambiguation of Named](#) ... [Continue reading](#) -->

[AKSW at TU Dresden PLT](#)

On June 8, I (Jens) visited the process control engineering research group (PLT) of Leon Urbas at the Dresden University of Technology. We first met on the Leipzig Semantic Web Day where Leon Urbas presented interactive Linked Data applications and ... [Continue reading](#) -->

### The LinkedGeoData Knowledge Base

In order to employ the Web as a medium for data and information integration, comprehensive datasets and vocabularies are required as they enable the disambiguation and alignment of other data and information. Many real-life information integration and aggregation tasks are impossible without comprehensive background knowledge related to spatial features of the ways, structures and landscapes surrounding us.

LinkedGeoData uses the comprehensive [OpenStreetMap](#) spatial data collection to create a large spatial knowledge base. It consists of more than 3 billion nodes and 300 million ways and the resulting RDF data comprises approximately 20 billion triples. The data is available according to the Linked Data principles and interlinked with DBpedia and Geo Names.

# Community driven LOD via LinkedGeodata.org (OSM)



- Hauptseite
- Gemeinschaftsportal
- Forum
- Ein neues Datenobjekt erstellen
- Ein neues Lexem erstellen
- Letzte Änderungen
- Zufälliges Datenobjekt
- Query Service
- In der Nähe
- Hilfe
- Spenden
- Druckexportieren
- Buch erstellen
- Als PDF herunterladen
- Druckversion
- Werkzeuge
- Links auf diese Seite
- Änderungen an verbundener Seiten
- Spezialseiten
- Permanenter Link
- Seiteninformationen
- Konzept-URI
- Seite zitieren

Datenobjekt **Stuttgart** (Q1022) Lesen Versionsgeschichte

Landeshauptstadt von Baden-Württemberg, Deutschland bearbeiten

Stuttgarten

**Sprache** **Bezeichnung** **Beschreibung** **Auch bekannt als**

Sprache	Bezeichnung	Beschreibung	Auch bekannt als
Deutsch	Stuttgart	Landeshauptstadt von Baden-Württemberg, Deutschland	Stuttgarten
Englisch	Stuttgart	capital city of German federated state Baden-Württemberg	
Polnisch	Stuttgart	miasto niemieckie, stolica kraju związkowego Badenia-Wirtembergia	
Französisch	Stuttgart	ville d'Allemagne	

Ale eingegebenen Sprachen

**Aussagen**

ist ein(e) **Großstadt** bearbeiten

Startzeitpunkt 1875 bearbeiten

• 0 Fundstellen + Fundstelle hinzufügen

ist ein(e) **Landeshauptstadt** bearbeiten

von **Baden-Württemberg** bearbeiten

Sitzzeitpunkt 25 April 1952 bearbeiten

• 0 Fundstellen + Fundstelle hinzufügen

**Wikipedia** (135 Ereignisse) bearbeiten

- af Stuttgart
- als Stuttgart
- am به‌سۆت
- an Stuttgart
- ar ستوتغارت
- ast Stuttgart
- ay Stuttgart
- az Ştutgart
- bar Stuggart
- be\_x\_old Штутгарт
- be Штутгарт
- bg Штутгарт
- bn শতুগার্ট
- br Stuttgart
- bs Stuttgart
- ca Stuttgart
- ceb Stuttgart (kapital sa estado pederal)
- ce Штутгарт
- ckb شتوتگارت
- co Stuccarda
- cs Stuttgart
- cy Stuttgart
- da Stuttgart
- de Stuttgart
- dsb Stuttgart
- el Στουτγκάρδη

**Identifikatoren**

**Antiklicher Gemeindegchlüssel** bearbeiten

06111000

+ eine Fundstelle + Wert hinzufügen

**OpenStreetMap-Relations-ID** bearbeiten

2793104

+ 0 Fundstellen + Fundstelle hinzufügen

+ Wert hinzufügen

**GND-Kennung** bearbeiten

4058282-6

+ eine Fundstelle + Wert hinzufügen

Datenobjekt **Florian Thiery** (Q66666633) Lesen Versionsgeschichte

Deutscher Geodät, Research-Software-Engineer und Wissenschaftler bearbeiten

**Sprache** **Bezeichnung** **Beschreibung** **Auch bekannt als**

Sprache	Bezeichnung	Beschreibung	Auch bekannt als
Deutsch	Florian Thiery	Deutscher Geodät, Research-Software-Engineer und Wissenschaftler	
Englisch	Florian Thiery	German geodesist, Research-Software-Engineer (RSE) and Scientist	
Polnisch	Florian Thiery	niemiecki geodeta i inżynier	
Fransösisch	Florian Thiery	ingénieur géodésiste allemand	

**Aussagen**

ist ein(e) **Mensch** bearbeiten

• 0 Fundstellen + Fundstelle hinzufügen

+ Wert hinzufügen

**IMB** bearbeiten

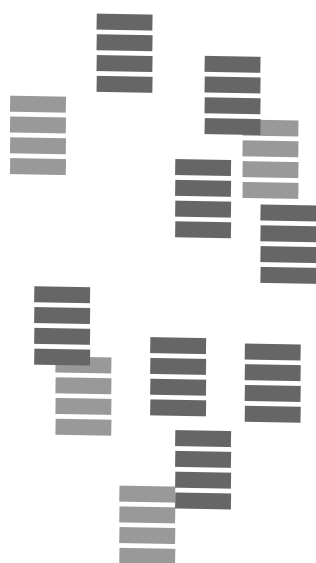
# Community driven LOD via Wikidata



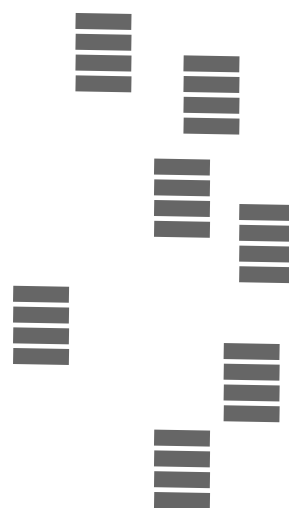
local (offline)



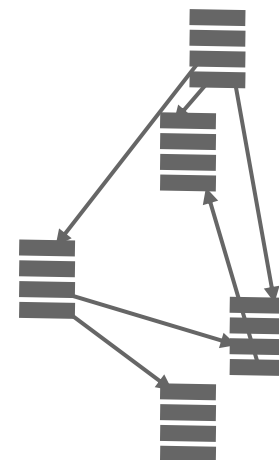
online



online & open



part of LOD



**Nicht viele Datenbanken sind online. Wenige Datenbanken davon sind offen und erreichbar. Noch weniger sind Teil der Linked Data Cloud.**



Ich  
könnte...



[wikidata.org](https://wikidata.org)



Kennt ihr  
Wikidata?

Wie kann die Community Daten offen veröffentlichen?



- ❖ **freie und offene knowledge base**  
→ **jeder kann Einträge hinzufügen und editieren**
- ❖ zentrale Speicherung strukturierter Daten für **Wikimedia** Projekte

Data in **Wikidata** sind:

- ❖ verfügbar mit freien Lizenzen (CC 0)
- ❖ mehrsprachig
- ❖ [verfügbar](#) für Menschen und Maschinen (GUI & API & SPARQL)
- ❖ [exportierbar](#) in Standard Formate (JSON, RDF, XML)
- ❖ verlinkt zu anderen Open Data in der LOD Cloud

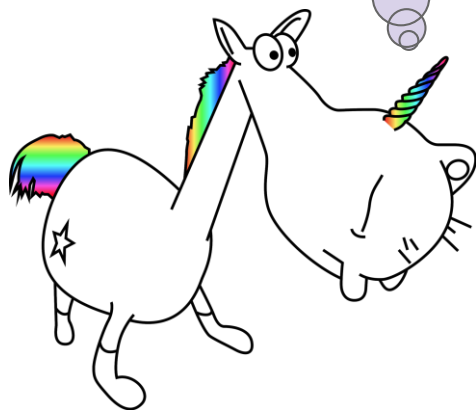


## Was ist Wikidata?





Wie kann ich  
Wissenschaftlern helfen,  
Wikidata Daten zu benutzen  
ohne dass sie Ahnung von  
SPARQL haben?



## Entwicklung des 'SPARQL unicorn'



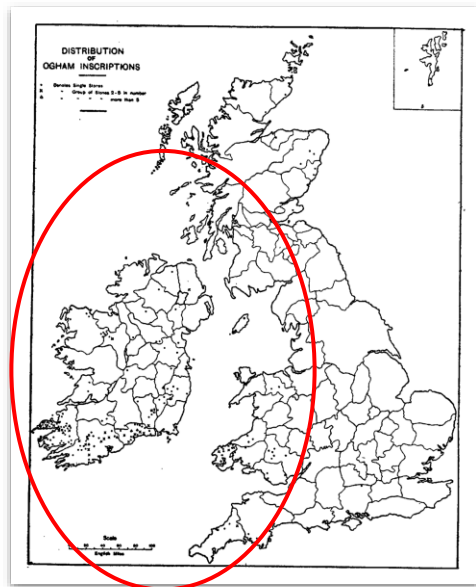
Ich  
könnte...



<https://plugins.qgis.org/plugins/sparqlunicorn/>



...das **SPARQLing  
Unicorn QGIS  
Plugin** nutzen!



## 4th-9th century AD

### Distribution:

Ireland

(+Wales, England, Isle of Man)

**Information** on people  
and their families /  
tribal affiliation



[R.A.S. Macalister, Corpus inscriptionum insularum Celticarum, vol. I \(1945\)](#) / p.502

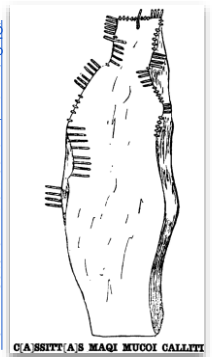
# Das Ogi Ogham Project - Ogham Inscriptions



Ich möchte alle Ogham Steine Irland untersuchen.  
Wo finde ich die?



R.A.S. Macalister, Corpus inscriptionum insularum Celticarum, vol. I (1904)



UCC Stone Corridor, Stone 4, CIIC 81 (Florian Thiery) CC BY 4.0



## Linked Ogham??

Online & Open:

3D Ogham Project:

<https://ogham.celt.dias.ie>

Heritage Management:

<http://webgis.archaeology.ie/historicenvironment/>

Online: CISP

<https://www.ucl.ac.uk/archaeology/cisp/database>

Offline:

CIIC by Macàlister  
div. Publikationen



link zu existierenden  
informationen: OSM  
data, CISP data set



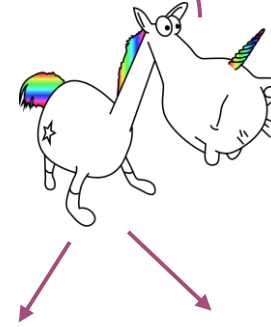
Einfügen in  
Wikidata, Link zu  
existierenden Daten  
in Wikidata

Extraktion der  
Geoinformation auf  
Ogham Steinen  
townland, barony, county



Macálistier 1945

Verlinkung von  
weiteren  
Datenbanken  
durch  
Geoinformation  
und textliche  
Informationen



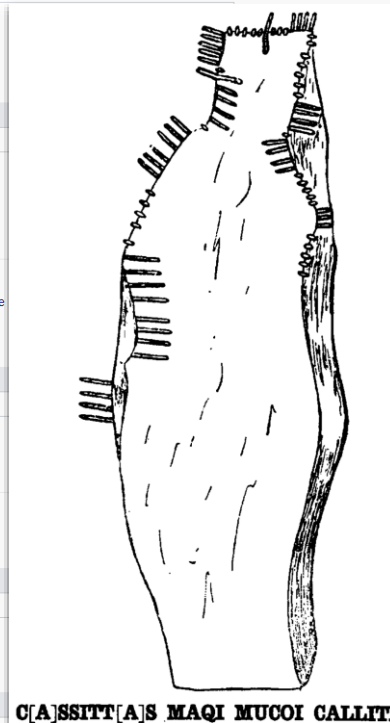
Extraktion  
angereicherter  
Daten mit Hilfe  
des **SPARQL  
unicorn**



weitergehende  
Analysen mit  
open source  
software



inscription	<code>&lt;span&gt;QID:&lt;/span&gt; C[A]SSITT[A]S MAQI MUCOI CALLITI (Irish)</code> <small>presumably</small> ▶ 1 reference
series ordinal	<code>&lt;span&gt;QID:&lt;/span&gt; 81</code> criterion used: Corpus Inscriptionum Insularum Celtaicarum Vol.1 ▶ 1 reference
	<code>&lt;span&gt;QID:&lt;/span&gt; 4</code> criterion used: Stone Corridor University College Cork ▶ 1 reference
inscription mentions	<code>&lt;span&gt;QID:&lt;/span&gt; MAQI</code> ▶ 1 reference
	<code>&lt;span&gt;QID:&lt;/span&gt; MUCOI</code> ▶ 1 reference
state of conservation	<code>&lt;span&gt;QID:&lt;/span&gt; preserved</code> ▶ 1 reference



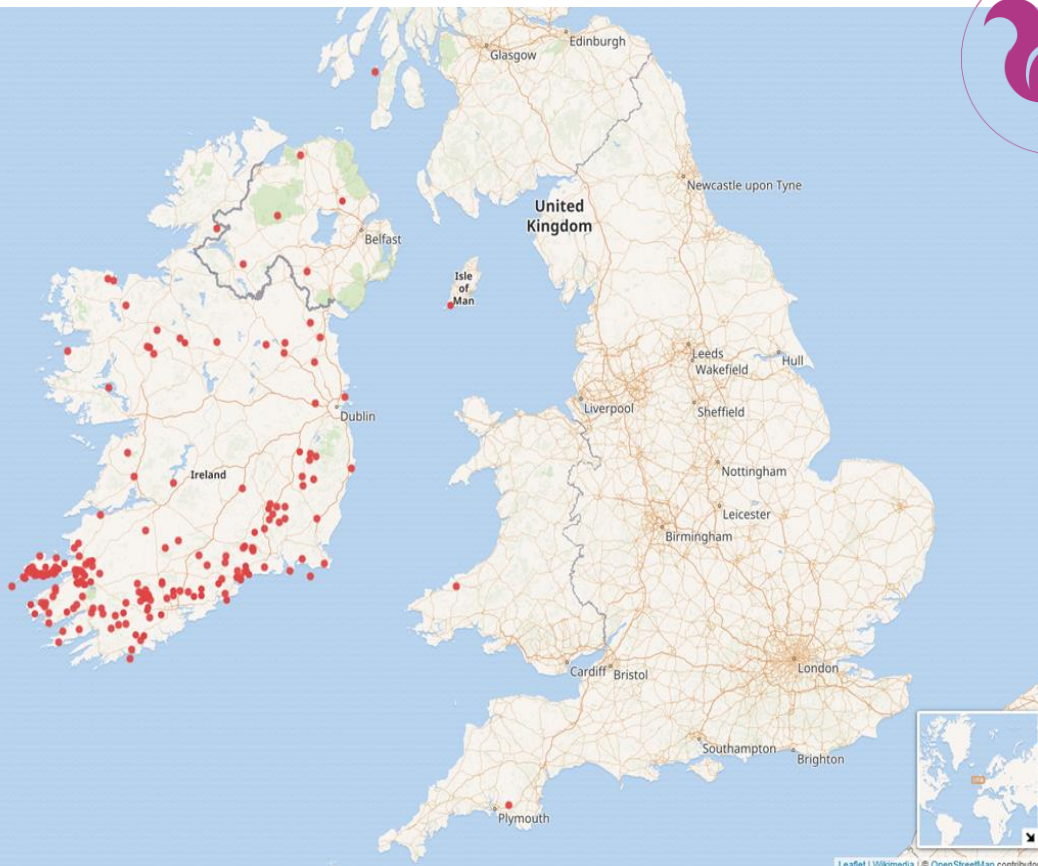
R.A.S. Macalister. Corpus inscriptionum insularum Celtaicarum, vol. I (1945)

## CIIC 81 @ Stone Corridor University College Cork, No. 4

<https://www.wikidata.org/wiki/Q69385424>



<http://ogham.link>



## Wikidata View

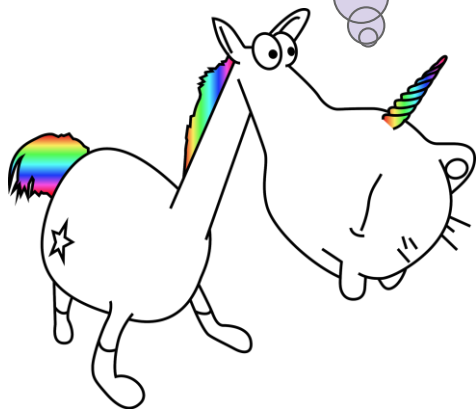
<https://w.wiki/HRe>

Wikidata Query Service

Leaflet | Wikimedia | © OpenStreetMap contributors




Which Ogham Stones  
können am University  
College Cork (UCC)  
angeschaut werden?



Wikidata Query Service

Examples Help More tools

1 (Input a SPARQL query or choose a query example)

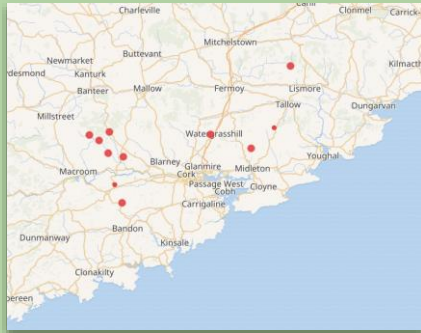
 **UCC** ?

University College Cork, Ireland  
Coláiste na hOllscoile Corcaigh  
[ucc.ie](http://ucc.ie)

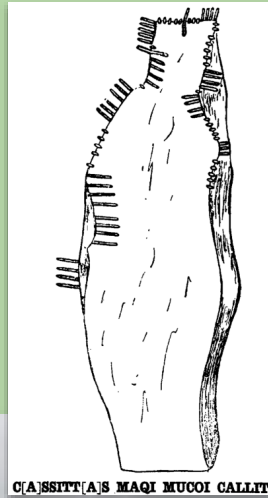
[w.wiki/HRT](http://w.wiki/HRT)

[query.wikidata.org](http://query.wikidata.org)





<https://w.wiki/HRT>



R.A.S. Macalister. *Corpus Inscriptionum Insularum Celticarum*. vol. 1 (1946)  
UCC Stone Corridor. Stone 4. CIIC.81 (Florian Thier). CC BY 4.0



(Florian Thier) CC BY 4.0



**SPARQL Unicorn Wikidata Plugin**

Query:  Interlink:  Enrich:

Select endpoint:  Wikidata -> ?geo required! Or:  Load From File layer name:  unicorn\_ogham\_ucc

Layer concept:  Query Templates:  Item+Label

Constraint By Area Type:  Area:  Constraint By BBOX:

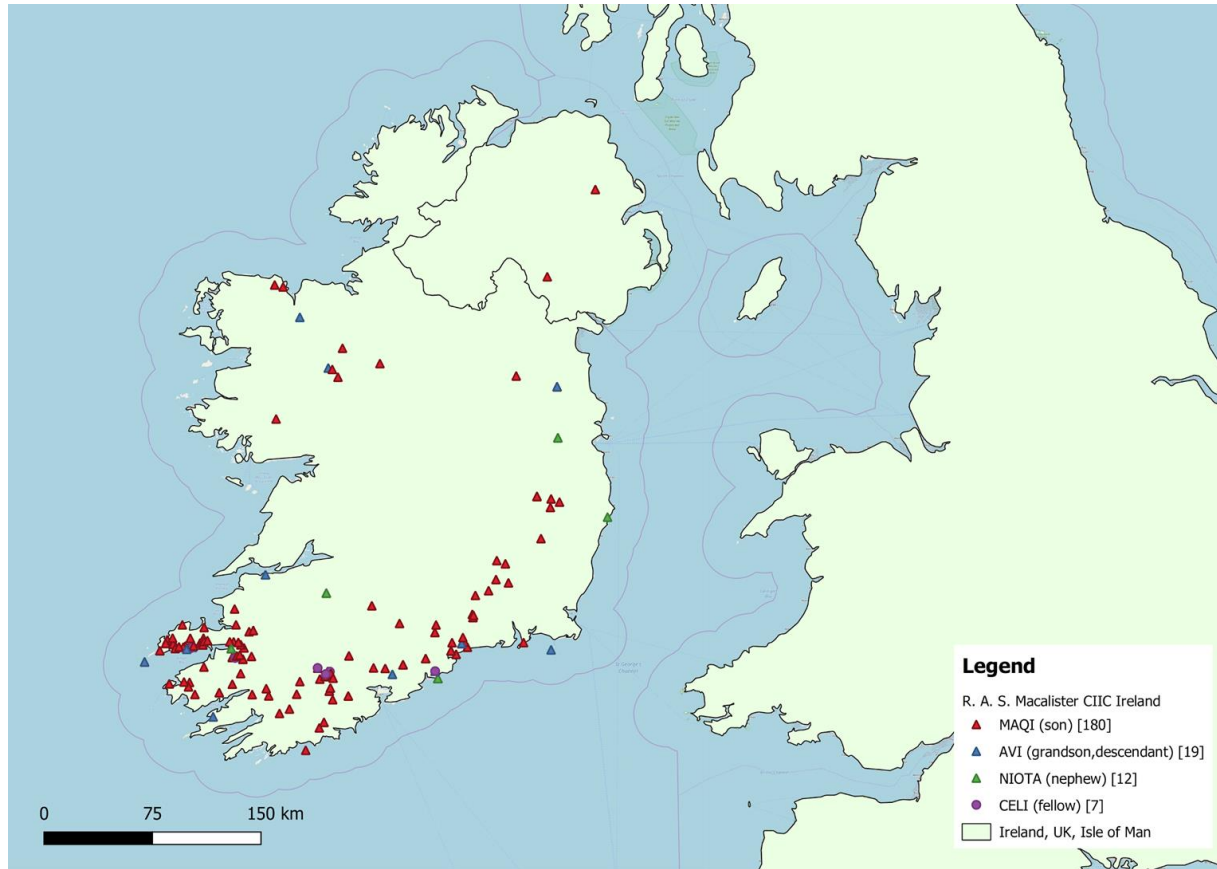
Valid Query

```
# Ogi Ogham Stones at UCC
SELECT ?label ?item ?geo ?country ?inscription WHERE {
  ?item wdt:P31 wd:Q2016147;
  wdt:P361 wd:Q70873595.
  OPTIONAL {
    ?item rdfs:label ?label.
    FILTER((LANG(?label)) = "en")
  }
  ?item wdt:P625 ?geo.
  OPTIONAL { ?item wdt:P17 ?countryWD. ?countryWD rdfs:label ?country.
  FILTER((LANG(?country)) = "en")}
  OPTIONAL { ?item wdt:P1694 ?inscription. }
  ?item wdt:P195 wd:Q69379477.
}
ORDER BY (?label)
```

add layer

load unicorn layers  unicorn\_ogham\_ucc  Export Loaded Layer as TTL  Schließen

Koordinate: -1115744,7013937 Maßstab: 1:1549023 Vergrößerung: 100% Drehung: 0,0 ° Zeichen EPSG:3857



# Thx!

## Any questions?

Mail

[rse@fthiery.de](mailto:rse@fthiery.de)

Web

<http://squirrel.link>

<http://ogham.link>





# Literatur

- **Macalister, Robert Alexander Stewart. 1996.** *Corpus Inscriptionum Insularum Celticarum*. Celtic Studies. Kill Lane, Blackrock, Co. Dublin, Ireland ; Portland, OR: Four Courts Press.
- **Adrian Bielefeldt, Julius Gonsior, Markus Krötzsch. 2018.** *Practical Linked Data Access via SPARQL: The Case of Wikidata*. In Tim Berners-Lee, Sarven Capadisli, Stefan Dietze, Aidan Hogan, Krzysztof Janowicz, Jens Lehmann, eds., *Proceedings of the WWW/2018 Workshop on Linked Data on the Web (LDOW-18)*, volume 2073 of CEUR Workshop Proceedings, 2018. CEUR-WS.org.
  - <https://icclinf.tu-dresden.de/w/images/8/85/Wikidata-SPARQL-queries-Bielefeldt-Gonsior-Kroetzsch-LDOW-2018.pdf>





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or [Research Squirrel Engineers](#) [CC BY 4.0]



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