INTERNATIONAL TRAINING ON TOPONYMY

MODULES

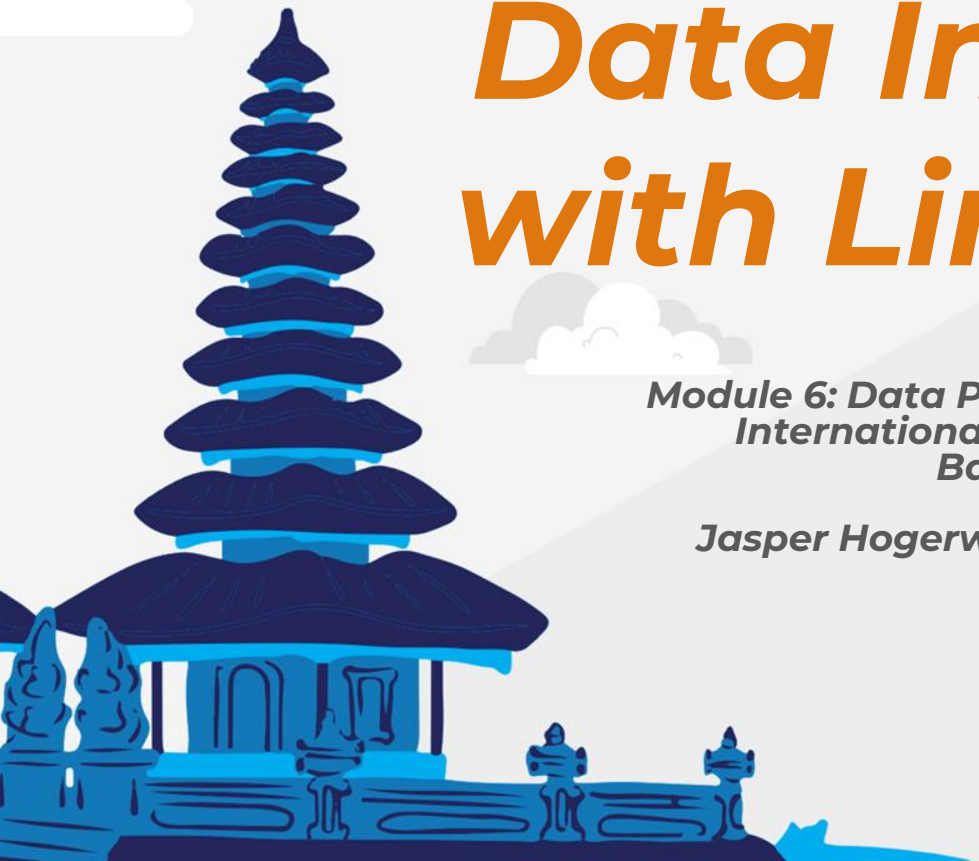
DAY 5

19 - 23 JUNE 2023

BALI, INDONESIA

United Nations
Group of Experts on
Geographical Names

BADAN INFORMASI
GEOSPASIAL



Data Integration with Linked Data

Module 6: Data Processing and Management
International Training on Toponymy
Bali – Indonesia

Jasper Hogerwerf & Alexandra Rowland

Road Map

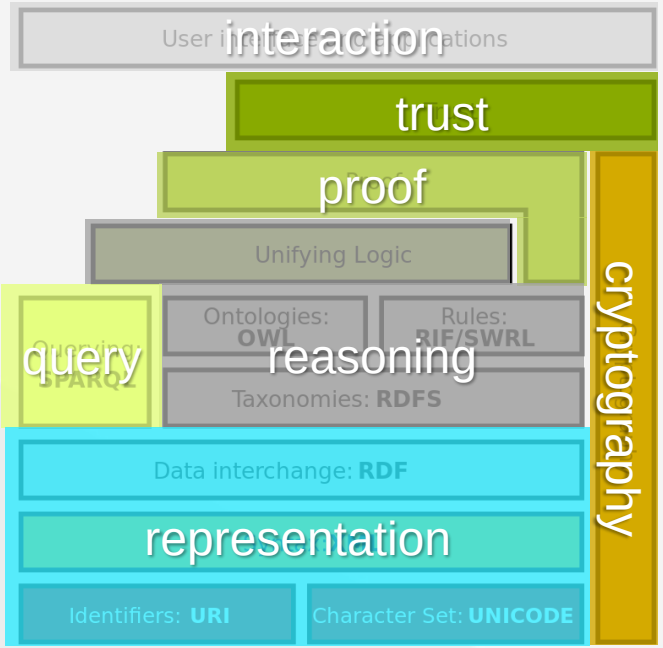
1. What is linked data?
2. Why and for what use cases do we use it at Kadaster?
3. Linked data and geographical names

What is Linked Data?

"Linked Data is a method of publishing structured data using standard Web technologies such as HTTP, RDF and URIs" – Sir Tim Berners-Lee, 2006

Linked Data Philosophy:

- A set of best practices for publishing and connecting structured data on the Web using standard formats and interfaces;
- Supports easy combination of multiple Linked Data sources, aims to go beyond data silo's;
- Facilitates data interoperability by providing self-documentation structure (terms' meaning can be described through resolving them on the Web);
- Supports usability and findability on the Web (also through Google search engine)



Five Star Model of Linked (Open) Data

Developing towards linked open data:

1 star: Map with names online

2 stars: Names database available online in Esri format (e.g. File Geodatabase)

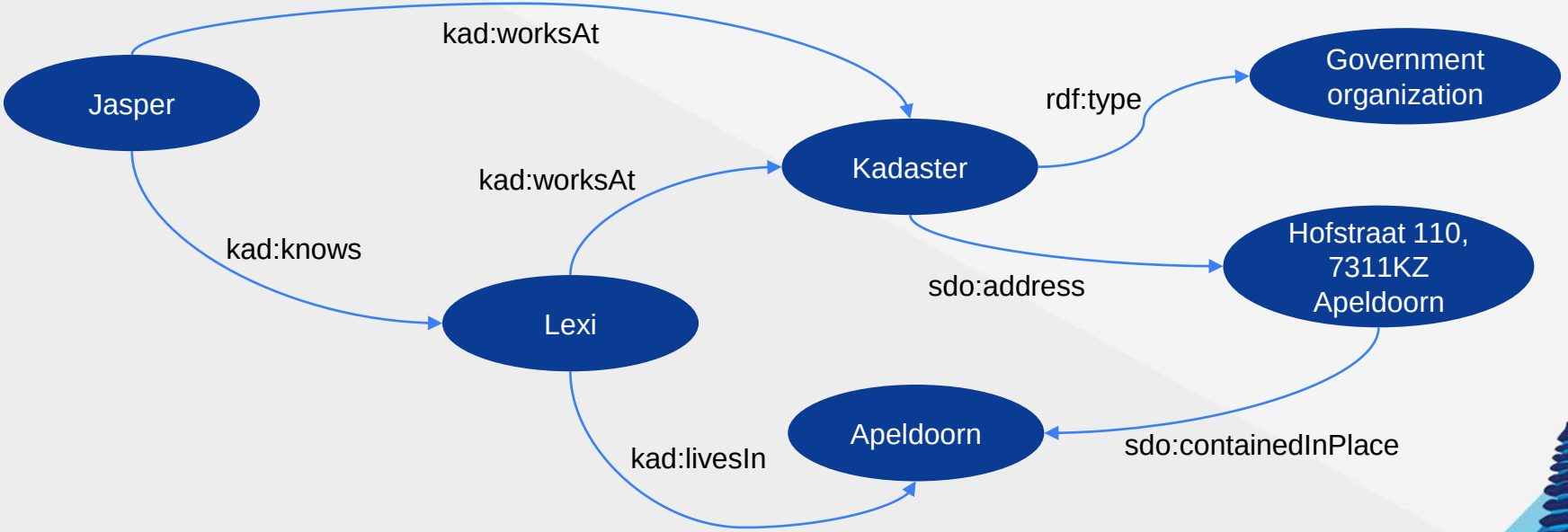
3 stars: Names database available online in open source format (e.g. Geopackage)

4 stars: Names, attributes and values available as URI (linkable web data)

5 stars: URIs of names database linked to other linked open data

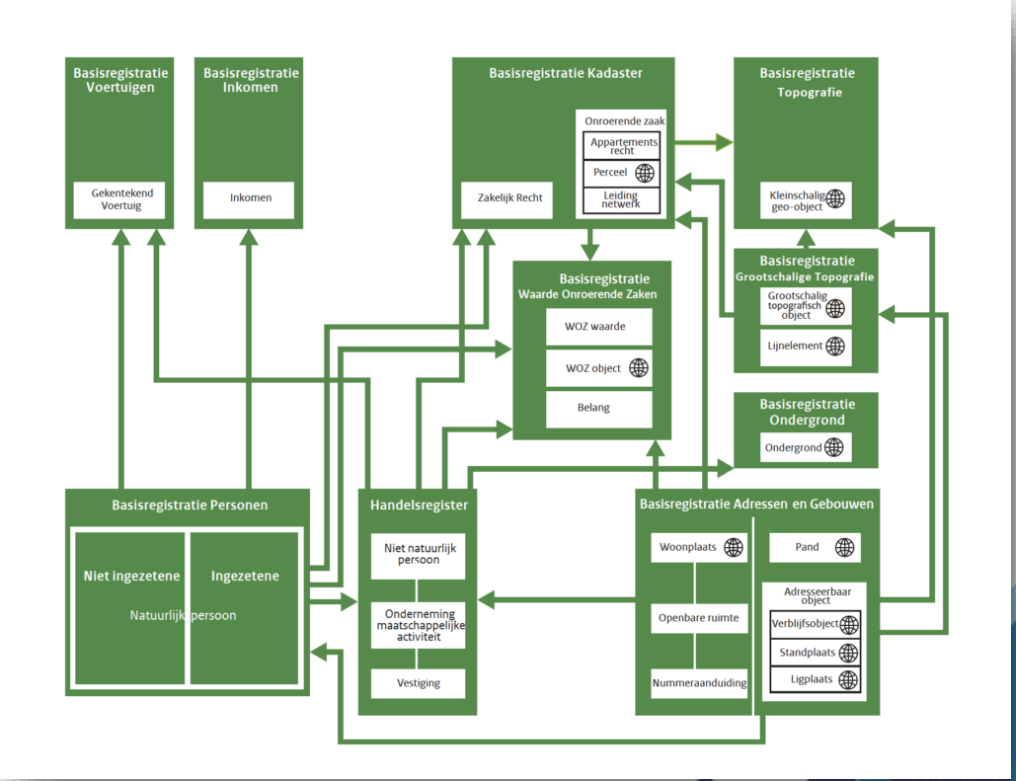
The essence of Linked Data

The essence of the practical application of linked data are triples



Kadaster: Dutch Cadastre, Land Registry and Mapping Agency

- **Role**: National agency tasked with the publication and maintenance of several key registers.
- SDI developments in the Netherlands are all strongly related to the key registers and e-government policy.
- Organization is based on an interrelated (although not automatically connected) system



Kadaster produces and maintains…

- BRK: Key Register Cadastre
- BRT: Key Register Topography
- BAG-LV: Key Register Addresses and Buildings
- RO-LV: Spatial Planning *
- WOZ-LV: Real Estate Valuation
- BGT-LV: Key Register Large-scale Topography
- WKPB-LV: Public Law Restrictions *
- LV-Energielabels: Energy Labels *
- KLIC: Cables and Pipes *

LV = National Database only
* = No formal key register

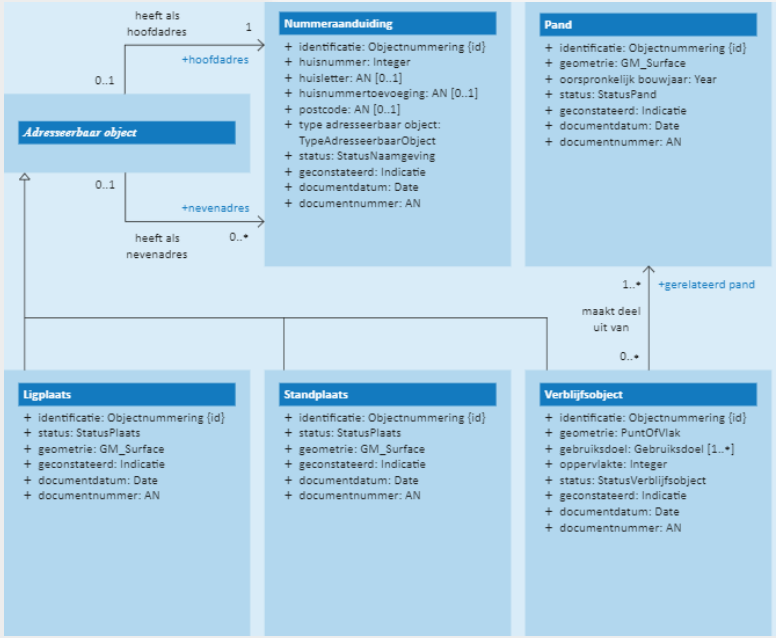
Why Linked Data?

- In order to achieve our ambitions, we need to:
  - Provide the semantics of our data so that there is a shared understanding of what our data means
  - Ensure that the provenance of our data is clear to users
  - Provide information about how our data should be used, where we have made calculations or combined data (provide metadata)

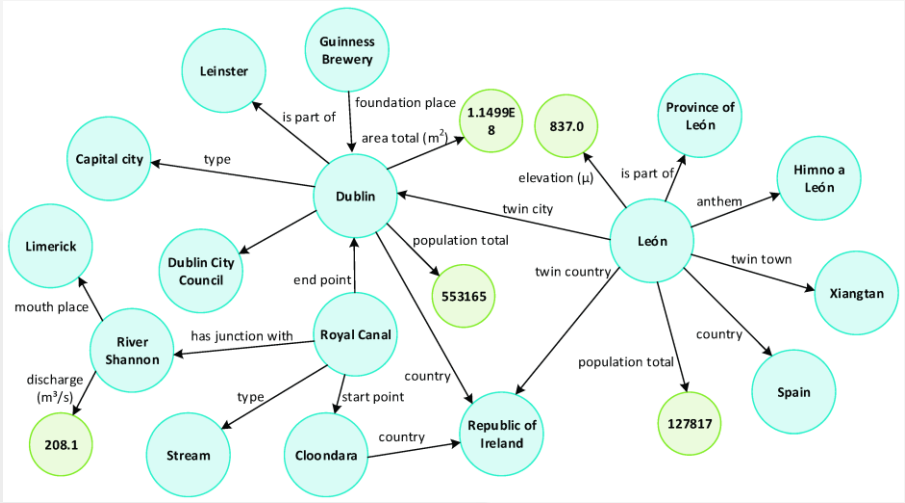
- Our data should, therefore, be:
  - Findable, accessible, interoperable and reusable (FAIR)
  - 5-star data

= Linked Data and the Semantic Web

Linked Data -> Knowledge Graph



Relational Model (UML)



Knowledge Graph (RDF)

What questions do we want to answer?

BRT (Topography)

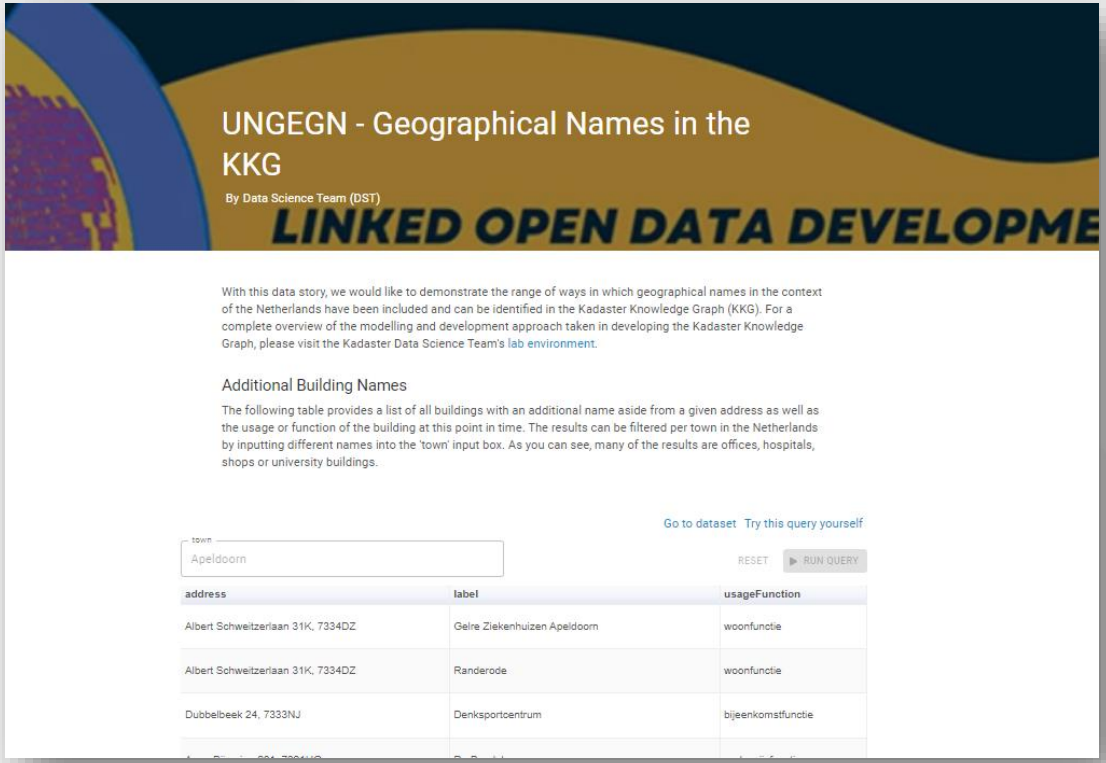
BAG (Addresses and Buildings)

I want to buy a palace with a surface area of >1500m2 which is a national monument and in the neighborhood of ‘Berg en Bos’ in Apeldoorn.

RCE (Cultural Heritage)

CBS (Statistics)

Geographical Names as Linked Data



https://data.labs.kadaster.nl/dst/-/stories/ungegn-kkg

Addresses and Building Names

Additional Building Names

The following table provides a list of all buildings with an additional name aside from a given address as well as the usage or function of the building at this point in time. The results can be filtered per town in the Netherlands by inputting different names into the 'town' input box. As you can see, many of the results are offices, hospitals, shops or university buildings.

Go to dataset Try this query yourself

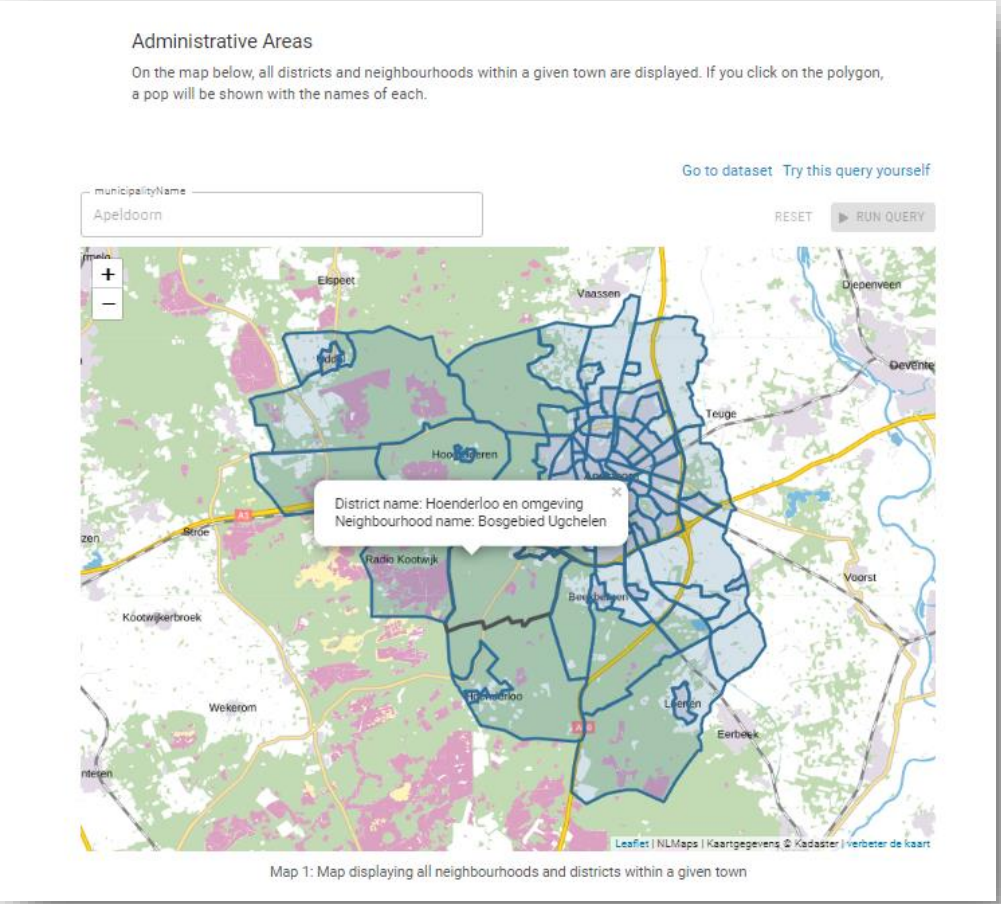
town: Apeldoorn RESET ▶ RUN QUERY

address	label	usageFunction
Albert Schweitzerlaan 31K, 7334DZ	Gelre Ziekenhuizen Apeldoorn	woonfunctie
Albert Schweitzerlaan 31K, 7334DZ	Randerode	woonfunctie
Dubbelbeek 24, 7333NJ	Denksportcentrum	bijeenkomstfunctie
Anna Bijnsring 201, 7321HG	De Bundel	onderwijsfunctie
Laan van de Leeuw 299, 7324BD	De Diamant	onderwijsfunctie
Dubbelbeek 56, 7333NJ	Aquacentrum Malkander	winkelfunctie
Alexanderlaan 1, 7316BP	Theologische Universiteit Apeldoorn	bijeenkomstfunctie
Alexanderlaan 1, 7316BP	Theologische Universiteit Apeldoorn	kantoorfunctie
Anklaarseweg 71, 7316MB	Obadjaschool	onderwijsfunctie
Anklaarseweg 71, 7316MB	Jacobus Fruytier	onderwijsfunctie

◀ ▶ 1 2 10 90 94

Table 1: Addresses, building names and functions for buildings within a given administrative area

Administrative Areas



Map 1: Map displaying all neighbourhoods and districts within a given town

Integration with Wikidata

Religious Buildings - KKG and Wikidata

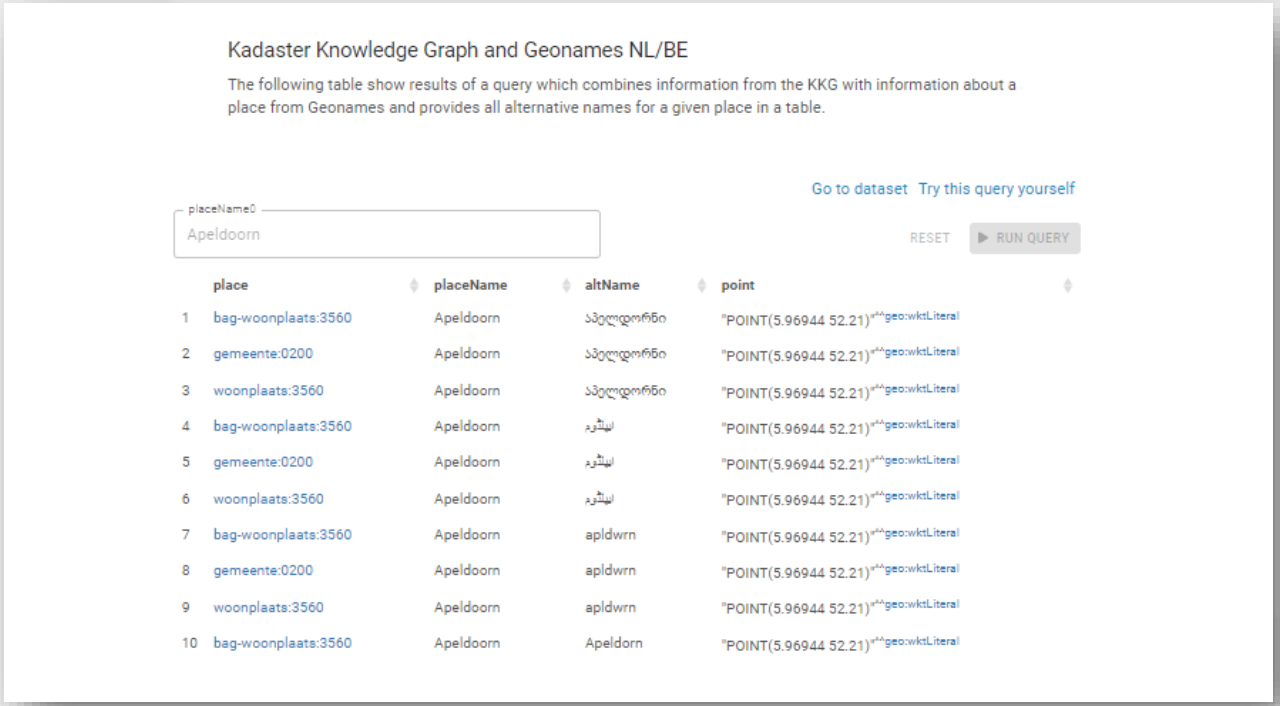
The following provides a list of religious buildings in the Netherlands, their building years and a picture of the building from Wikidata.

Go to dataset Try this query yourself

Kerk	Kruiskerk (Amstelveen)
BAG bouwjaar	1950
BAG ID	0362100001054286
Wikidata ID	Q18813235

Kerk	Clematisstraat 25
BAG bouwjaar	1935
BAG ID	0363100012096290
Wikidata ID	Q29001735

Integration with GeoNames



Kadaster Knowledge Graph and Geonames NL/BE

The following table show results of a query which combines information from the KKG with information about a place from Geonames and provides all alternative names for a given place in a table.

Go to dataset Try this query yourself

placeName0: Apeldoorn

RESET ▶ RUN QUERY

	place	placeName	altName	point
1	bag-woonplaats:3560	Apeldoorn	აპელდორნი	"POINT(5.96944 52.21)"^^geo:wktLiteral
2	gemeente:0200	Apeldoorn	აპელდორნი	"POINT(5.96944 52.21)"^^geo:wktLiteral
3	woonplaats:3560	Apeldoorn	აპელდორნი	"POINT(5.96944 52.21)"^^geo:wktLiteral
4	bag-woonplaats:3560	Apeldoorn	اپلڈورہ	"POINT(5.96944 52.21)"^^geo:wktLiteral
5	gemeente:0200	Apeldoorn	اپلڈورہ	"POINT(5.96944 52.21)"^^geo:wktLiteral
6	woonplaats:3560	Apeldoorn	اپلڈورہ	"POINT(5.96944 52.21)"^^geo:wktLiteral
7	bag-woonplaats:3560	Apeldoorn	apldwrn	"POINT(5.96944 52.21)"^^geo:wktLiteral
8	gemeente:0200	Apeldoorn	apldwrn	"POINT(5.96944 52.21)"^^geo:wktLiteral
9	woonplaats:3560	Apeldoorn	apldwrn	"POINT(5.96944 52.21)"^^geo:wktLiteral
10	bag-woonplaats:3560	Apeldoorn	Apeldorn	"POINT(5.96944 52.21)"^^geo:wktLiteral

Thank you for your attention!