



# Network of Terms

*Bringing links to your data!*

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PLDN - Metadata Matters - September 2023



dutch digital  
heritage  
network



# Introduction to the NDE programme

# The Dutch Digital Heritage Network (NDE)

The Dutch Digital Heritage Network (NDE) aims at **increasing the social value of the cultural heritage information** maintained by libraries, archives, museums and other cultural institutions.

The NDE strategy starts from the **end user perspective** and encourages institutions to provide digital heritage information that is more **visible, usable and sustainable**.

The NDE program is about building strong **cross sector networks** on the level of **expertise and information**. **Linked Data** is regarded as one of the enabling technologies.



# Networks of cultural institutions



Archieven



Bibliotheken



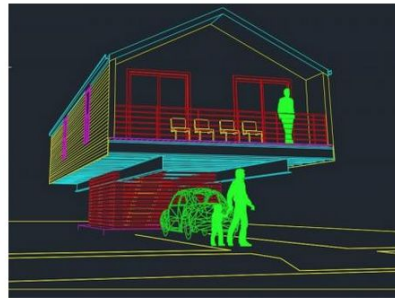
Musea



Media en AV



Digital humanities



Design en digitale cultuur



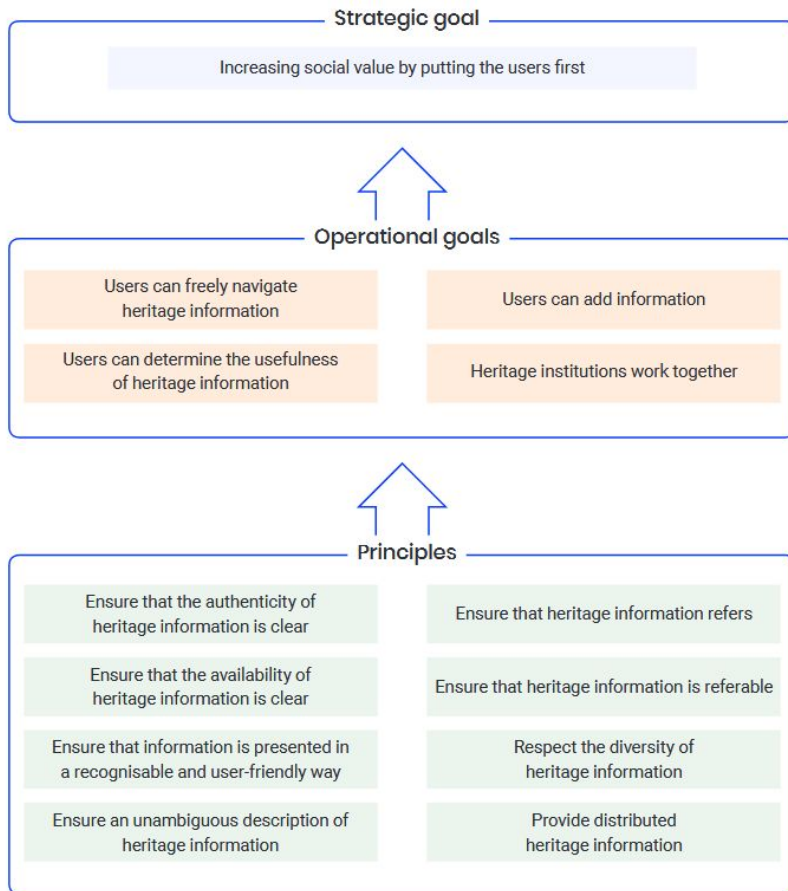
Podiumkunst.net



Netwerk Archieven Design en Digitale Cultuur



# Cross domain reference architecture (DERA)



# Overview of the NDE program

## Visible

Service providers



Usage profiles



Campaign & channel



Rights & Usage

## Usable

Infrastructure providers



Data & Terminologie Sources (LÖD)



Registries



Aggregators



Knowledge Graph

## Sustainable

Source providers



PID



Preservation Policy & Certification



Cost model Preservation



Index Preservation Services

## OVERALL



Supporting Network



Training & Education



Body of Knowledge



Services Toolbox



Service implementation & management



The background is a solid blue color. It features several white geometric patterns consisting of radiating lines. In the top-left corner, there is a circular pattern with a horizontal line through its center. In the top-right corner, there is a large, dense fan-shaped pattern. In the middle-left, there is a smaller fan-shaped pattern. In the bottom-left, there is another fan-shaped pattern. At the bottom center, there is a small fan-shaped pattern. In the bottom-right, there is a small circular pattern with a horizontal line through its center. All these patterns are connected to the center by thin white lines.

# Infrastructure for digital heritage

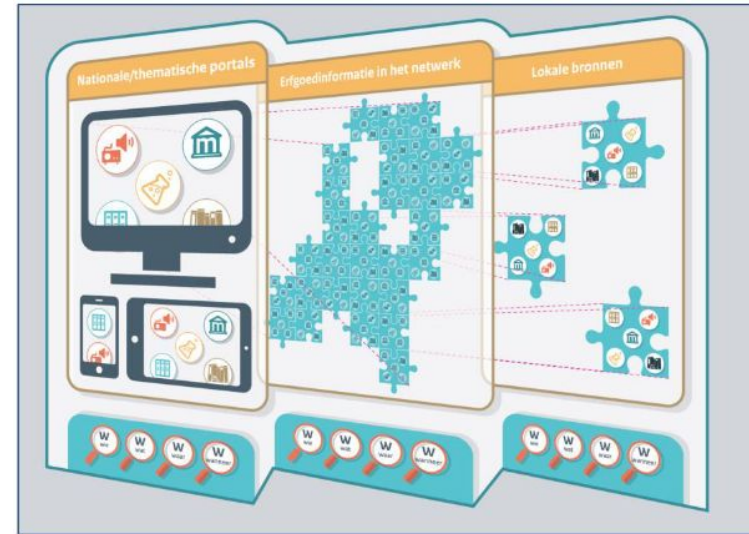
# Infrastructure for digital heritage information

Rethink the architecture:

- maximize the usability of data at the source
- refer to data instead of copying
- build portals as dynamic views based on a common, interconnected data layer
- minimize the intermediate layers
- improve visibility on the web in general

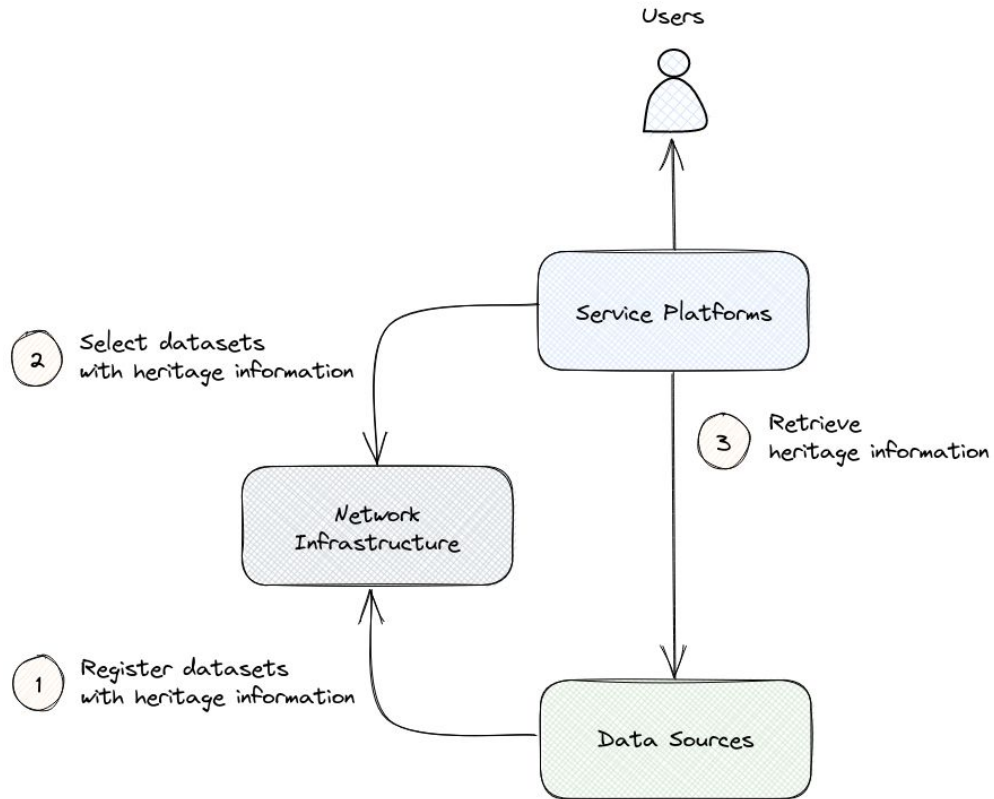
Apply:

- Linked Data / FAIR principles
- 'web-centric' technologies (HTTP, RDF, Web APIs)
- decentralized technologies where possible





# Service platforms – generic and dynamic services



# BAROK 1600



**Mars en Venus betrapt door Vulcanus**  
Wtewael, Joachim, 1601



**De val van Phaëthon**  
Rottenhammer, Hans (I), 1604



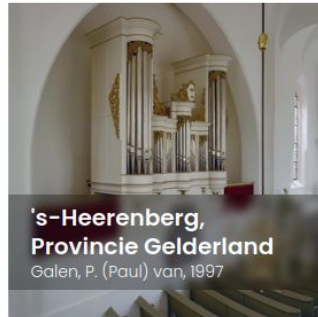
**Boslandschap met jagers en waarzegster**  
Govaerts, Abraham, 1612



**Portret van een officier**  
Ravesteyn, Jan van, 1612



# PROVINCIE GELDERLAND



# Roadmap National Infrastructure for Digital Heritage

Services

$n = 2000+$

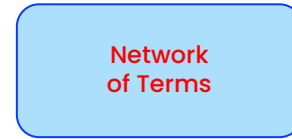
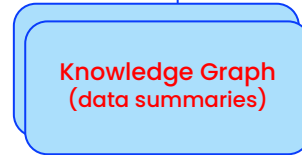


*"smarter, more dynamic services"*

Infrastructure

$n = 50+$

*"discover relevant datasets"*

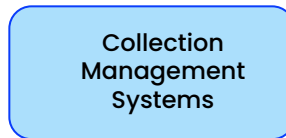


Data Sources

$n = 1500+$

*"advertise your data"*

*"improve the visibility on the web"*



*"use things, not strings"*



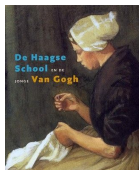
# Using Linked Data in a network...



[A Pair of Leather Clogs](#)  
(Van Gogh Museum)



[Garden at Arles](#)  
(Kunstmuseum)



[National Library](#)

Dataset Registry

schema:creator

rico:isCreatorOf

schema:creator

rico:isCreatorOf

schema:about

schema:subjectOf

Knowledge Graph



**Vincent van Gogh**  
<https://data.rkd.nl/artists/32439>  
(RKD Artists)

Network of Terms





# Network of Terms

# Available for linking through the Network of Terms

## National Institutes

- Cultural Heritage Agency (thesauri)
- National Library (thesauri, persons/org.)
- Sound & Vision Institute (thesauri, persons/org.)
- Music library of The Netherlands (thesauri, persons/org.)
- Performing Arts Network (thesauri, persons/org. )
- Netherlands Institute for Art History (persons)
- Nationaal Museum of World Cultures (thesauri)
- Indonesia Remembrance Centre (thesauri)
- LGBTI Heritage Organisation (thesauri)
- Second World War Documentation (thesauri, persons)

## In numbers:

- Organisations: 18
- Individual terminology sources: 25
- Search queries: 40

## International Institutes

- Getty Research Institute (AAT)
- Geonames (NL, BE, DE)
- Wikidata (entities, persons, places, streets)
- European Union (EuroVoc)
- Henri van de Waal Foundation (Iconclass)

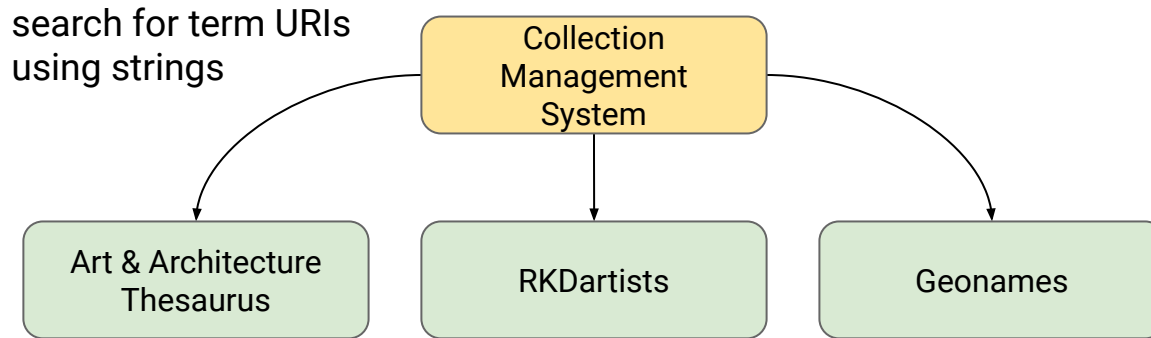
## Regional Institutes

- Erfgoed Brabant (buildings)
- Gouda Time Machine (streets)
- Cultural Institutions Amsterdam (streets)

# Default approach

## Challenges:

- harvest sources or query live apis?
- support for multiple protocols
- support for multiple data models
- complexity and maintenance issues



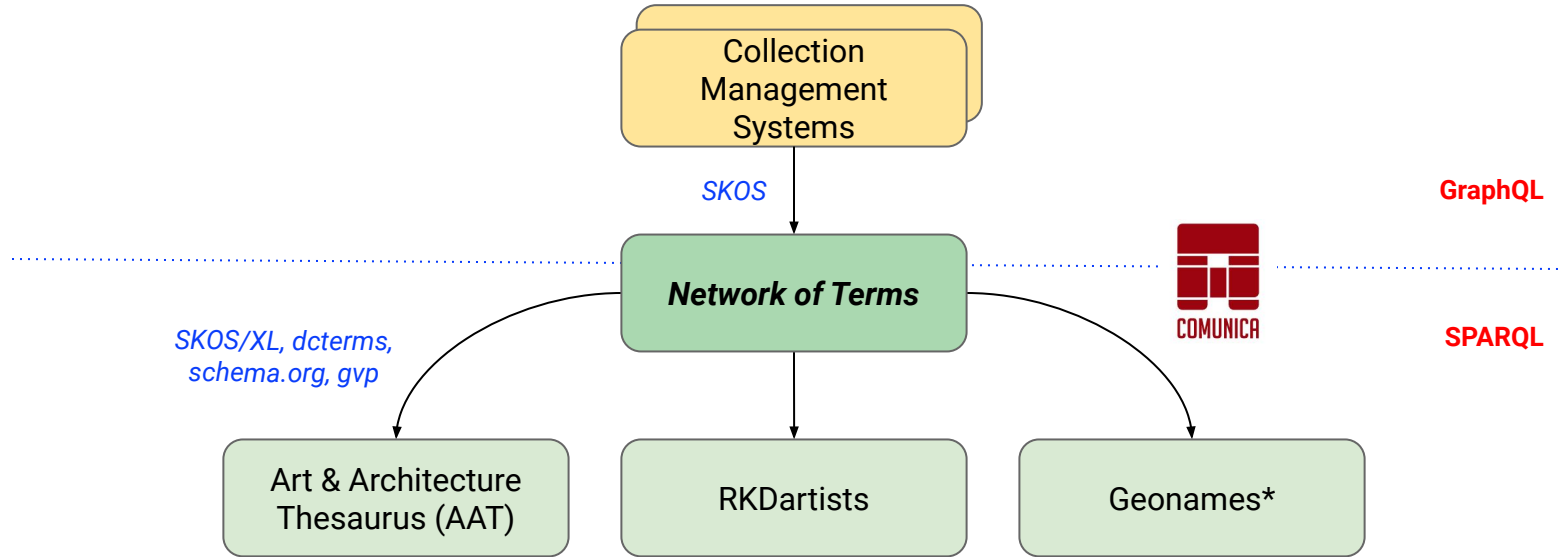
'From string to thing': "Van Gogh" → <https://data.rkd.nl/artists/32439>





# Network of Terms approach

Harmonisation of data models and protocols





# Termennetwerk

Zoeken in gemeenschappelijke thesauri, classificatiesystemen en referentielijsten

Zoeken met woorden Zoeken met URI

Zoekwoorden

Terminologiebronnen

EuroVoc - thesaurus van de Europese Unie

Zoeken

EuroVoc - thesaurus van de Europese Unie

12 termen gevonden

aardolie

Kopieer URI

Bekijk bij bron

#### Bredere term

koolwaterstof

#### Nauwere termen

aardolie uit zee

ruwe aardolie

#### Gerelateerde termen

bitumineus materiaal

fossiele brandstof

kunststof

minerale reserves

waterstofproductie

Live demo...



GraphQL



Prettify

Merge

Copy

History

← Docs

```

1 terms {
2   sources: ["https://data.netwerkdigitaalergoed.nl/rkd/rkdartists/sparql",
3             "http://data.bibliotheken.nl/thes/sparql"]
4   query: "Vincent van Gogh"
5   queryMode: OPTIMIZED
6 }
7 {
8   source {
9     name
10  }
11  result {
12    __typename
13    ... on Terms {
14      terms {
15        uri
16        prefLabel
17        altLabel
18        hiddenLabel
19        scopeNote
20      }
21    }
22    ... on Error {
23      message
24    }
25  }
26 }
27
28

```

```

{
  "data": {
    "terms": [
      {
        "source": {
          "name": "RKDArtists"
        },
        "result": {
          "__typename": "Terms",
          "terms": [
            {
              "uri": "https://data.rkd.nl/artists/32439",
              "prefLabel": [
                "Gogh, Vincent van"
              ],
              "altLabel": [
                "Van Gogh, Vincent",
                "Gogh, Vincent Willem van (1853-1890)"
              ],
              "hiddenLabel": [],
              "scopeNote": [
                "remark family relation: older brother of art dealer and collector Theo van Gogh; nephew of Anton Mauve; nephew of Vincent van Gogh (1866-1911)",
                "See also: Gauguin, Paul; Hermans, Antonius Petrus; Verlaan, Klaas; Gogh, Willemina van; remark: collaboration"
              ]
            },
            {
              "uri": "http://data.bibliotheken.nl/id/thes/p375306390",
              "prefLabel": [
                "Gogh, V. van (1789-1874)"
              ],
              "altLabel": [
                "Gogh, Vincent Ferdinand Jacob van",
                "V. van Gogh"
              ],
              "hiddenLabel": [],
              "scopeNote": [
                "Den Haag, 11 februari 1789 - Breda, 7 mei 1874. Nederlandse predikant, medeoprichter van de Maatschappij tot bevordering van welstand. Hij is de grootvader van de kunstschilder Vincent van Gogh."
              ]
            }
          ]
        }
      }
    ]
  }
}

```



## Example of a SPARQL CONSTRUCT query used for transformation to SKOS

```
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
```

```
PREFIX void: <http://rdfs.org/ns/void#>
```

```
CONSTRUCT {
```

```
  ?uri a skos:Concept ;  
    skos:prefLabel ?rdfs_label ;  
    skos:altLabel ?schema_name ;  
    skos:altLabel ?schema_alternateName ;  
    skos:scopeNote ?schema_description .
```



*Map all types to skos:Concept for easy access*

```
}
```

```
WHERE {
```

```
  ?uri foaf:isPrimaryTopicOf/void:inDataset <http://data.bibliotheken.nl/id/dataset/stcn> ;  
    schema:additionalType <http://www.productontology.org/id/Printer_%28publishing%29> ; # Select printers.  
    rdfs:label ?rdfs_label .
```

```
  ?uri ?predicate ?label .
```

```
VALUES ?predicate { rdfs:label schema:name schema:alternateName }
```

```
?label <bif:contains> ?virtuosoQuery .
```



*some "magic" for full text search depending on SPARQL-endpoint type*

```
OPTIONAL { ?uri schema:name ?schema_name }
```

```
OPTIONAL { ?uri schema:alternateName ?schema_alternateName }
```

```
OPTIONAL { ?uri schema:description ?schema_description }
```

```
}
```

```
LIMIT 1000
```



# Reconciliation Service API



## TABLE OF CONTENTS

### Abstract

### Status of This Document

#### 1. Introduction

- 1.1 Data Matching on the Web
- 1.2 History of the Reconciliation API
- 1.3 External Resources
- 1.4 Versions
  - 1.4.1 0.1
  - 1.4.2 0.2 (This Version)
- 1.5 Conformance

#### 2. Core Concepts

- 2.1 Entities
- 2.2 Types
- 2.3 Properties
- 2.4 Property Values
- 2.5 Identifier and Schema Spaces

#### 3. Service Definition

- 3.1 Service Manifest
- 3.2 HTTP(S) Access

## Reconciliation Service API v0.2

A protocol for data matching on the Web

Final Community Group Report 10 April 2023

### This version:

<https://www.w3.org/community/reports/reconciliation/CG-FINAL-specs-0.2-20230410/>

### Latest published version:

<https://www.w3.org/community/reports/reconciliation/CG-FINAL-specs-0.2-20230410/>

### Latest editor's draft:

<https://reconciliation-api.github.io/specs/draft/>

### Editors:

[Antonin Delpuch](#)  (University of Oxford)  
[Adrian Pohl](#)  (Hochschulbibliothekszentrum NRW)  
[Fabian Steeg](#)  (Hochschulbibliothekszentrum NRW)  
[Thad Guidry Sr.](#)   
[Osma Suominen](#)  (National Library of Finland)

### Feedback:

[GitHub reconciliation-api/specs](#) (pull requests, new issue, open issues)  
[public-reconciliation@w3.org](mailto:public-reconciliation@w3.org) with subject line [specs-0.2] ~ message topic ~ (archives)

Copyright © 2023 the Contributors to the Reconciliation Service API v0.2 Specification, published by the [Entity Reconciliation Community Group](#) under the [W3C Community Final Specification Agreement \(FSA\)](#). A human-readable [summary](#) is available.

## Abstract

This document describes the reconciliation service API, a protocol edited by the [W3C Entity Reconciliation Community Group](#). It is intended as a comprehensive and definitive specification of



# Add links to existing data using OpenRefine:

10000 rows

Show as: rows records Show: 5 10 25 50 rows

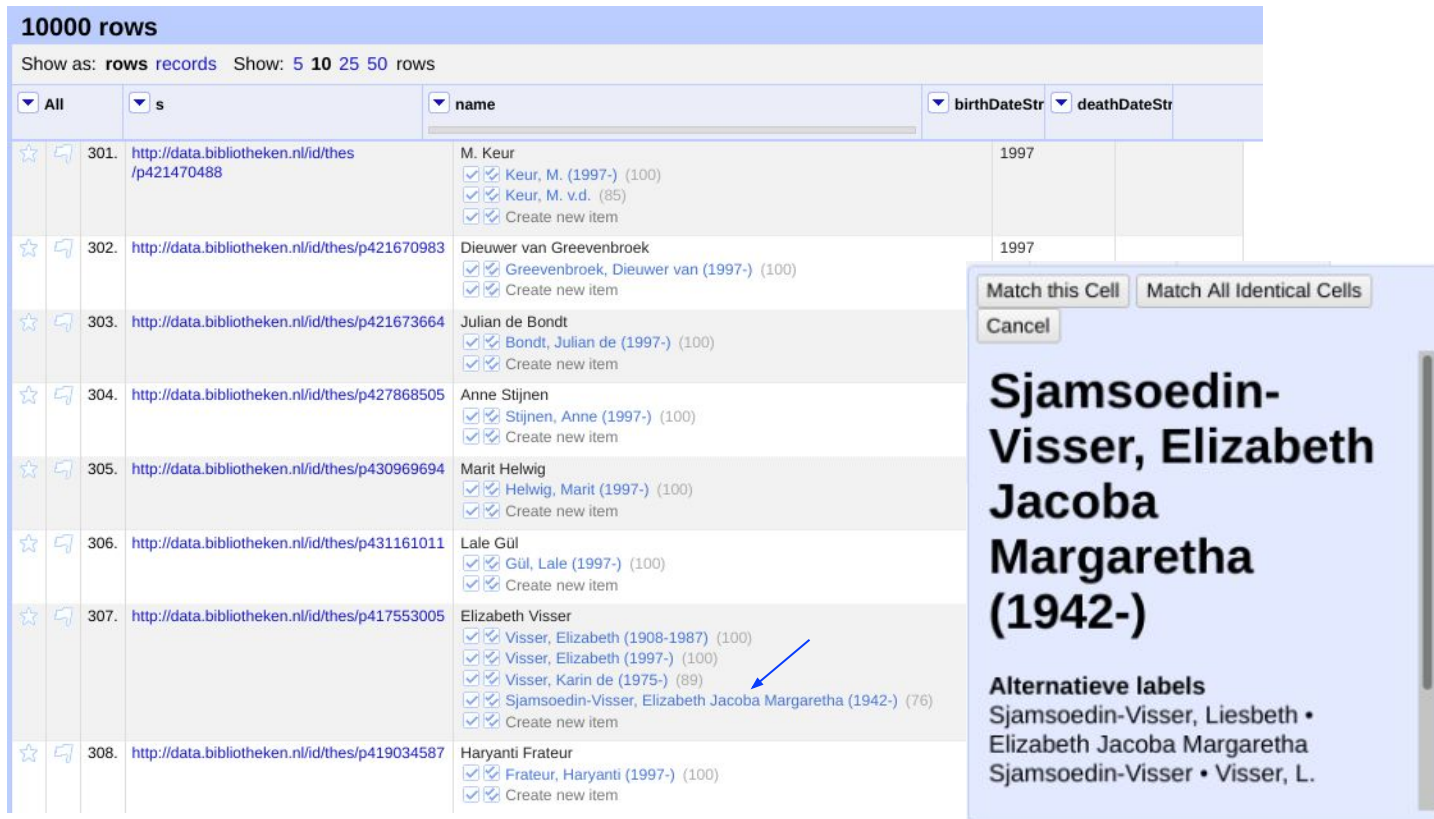
All	s	name	birthDateStr	deathDateStr
☆		301. <a href="http://data.bibliotheken.nl/id/thes/p421470488">http://data.bibliotheken.nl/id/thes/p421470488</a> M. Keur <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Keur, M. (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Keur, M. v.d. (85) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item	1997	
☆		302. <a href="http://data.bibliotheken.nl/id/thes/p421670983">http://data.bibliotheken.nl/id/thes/p421670983</a> Dieuwer van Greevenbroek <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Greevenbroek, Dieuwer van (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item	1997	
☆		303. <a href="http://data.bibliotheken.nl/id/thes/p421673664">http://data.bibliotheken.nl/id/thes/p421673664</a> Julian de Bondt <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Bondt, Julian de (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item		
☆		304. <a href="http://data.bibliotheken.nl/id/thes/p427868505">http://data.bibliotheken.nl/id/thes/p427868505</a> Anne Stijnen <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Stijnen, Anne (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item		
☆		305. <a href="http://data.bibliotheken.nl/id/thes/p430969694">http://data.bibliotheken.nl/id/thes/p430969694</a> Marit Helwig <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Helwig, Marit (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item		
☆		306. <a href="http://data.bibliotheken.nl/id/thes/p431161011">http://data.bibliotheken.nl/id/thes/p431161011</a> Lale Gül <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Gül, Lale (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item		
☆		307. <a href="http://data.bibliotheken.nl/id/thes/p417553005">http://data.bibliotheken.nl/id/thes/p417553005</a> Elizabeth Visser <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Visser, Elizabeth (1908-1987) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Visser, Elizabeth (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Visser, Karin de (1975-) (89) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Sjamsoedin-Visser, Elizabeth Jacoba Margaretha (1942-) (76) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item		
☆		308. <a href="http://data.bibliotheken.nl/id/thes/p419034587">http://data.bibliotheken.nl/id/thes/p419034587</a> Haryanti Frateur <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Frateur, Haryanti (1997-) (100) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Create new item		

Match this Cell Match All Identical Cells

Cancel

**Sjamsoedin-Visser, Elizabeth Jacoba Margaretha (1942-)**

**Alternatieve labels**  
Sjamsoedin-Visser, Liesbeth • Elizabeth Jacoba Margaretha Sjamsoedin-Visser • Visser, L.



# DIY – Network of Terms Tutorial

network-digitaal-erfgoed / network-of-terms-tutorial

Q Type to search

<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

## Configuring the catalog

Enno Meijers edited this page 3 weeks ago · 9 revisions

Edit New page

### Introduction to the Catalog

The Catalog is the core component of the Network of Terms. Adding new terminology sources to the Network of Terms is only a matter of making changes to the Catalog configuration. **No changes of the code itself are necessary.** The Catalog only exists of files containing JSON-LD objects or SPARQL queries.

To make changes to the Catalog it is important to understand the structure and data model behind it.

The Catalog is part of the [network-of-terms repository](#) and is a separate package located in `packages/network-of-terms-catalog`. The Catalog has the following file structure:

```
* catalog/
* publishers.jsonld # definition of organizations that publish data sources
* datasets/
* <ds_name_n>.jsonld # dataset definition for each data source
* queries/
* search/
* <qname_n>.rq # SPARQL queries for searching
* lookup/
* <qname_n>.rq # SPARQL queries for lookups
```

### Data Model

Pages 19

- Home
- Goal and purpose
- Current system integrations
- Main components
  - GraphQL API
  - Demonstrator
  - Reconciliation Service API
- Run your own Network of Terms instance
  - Running the GraphQL API
  - Running the Demonstrator
  - Running the Reconciliation Service API
- Catalog configuration
  - Making changes to the queries
  - Adding a new data source
  - Setup your own catalog

<https://github.com/network-digitaal-erfgoed/network-of-terms-tutorial/wiki>





# Implementation



## Integrations of Network of Terms API in other systems:

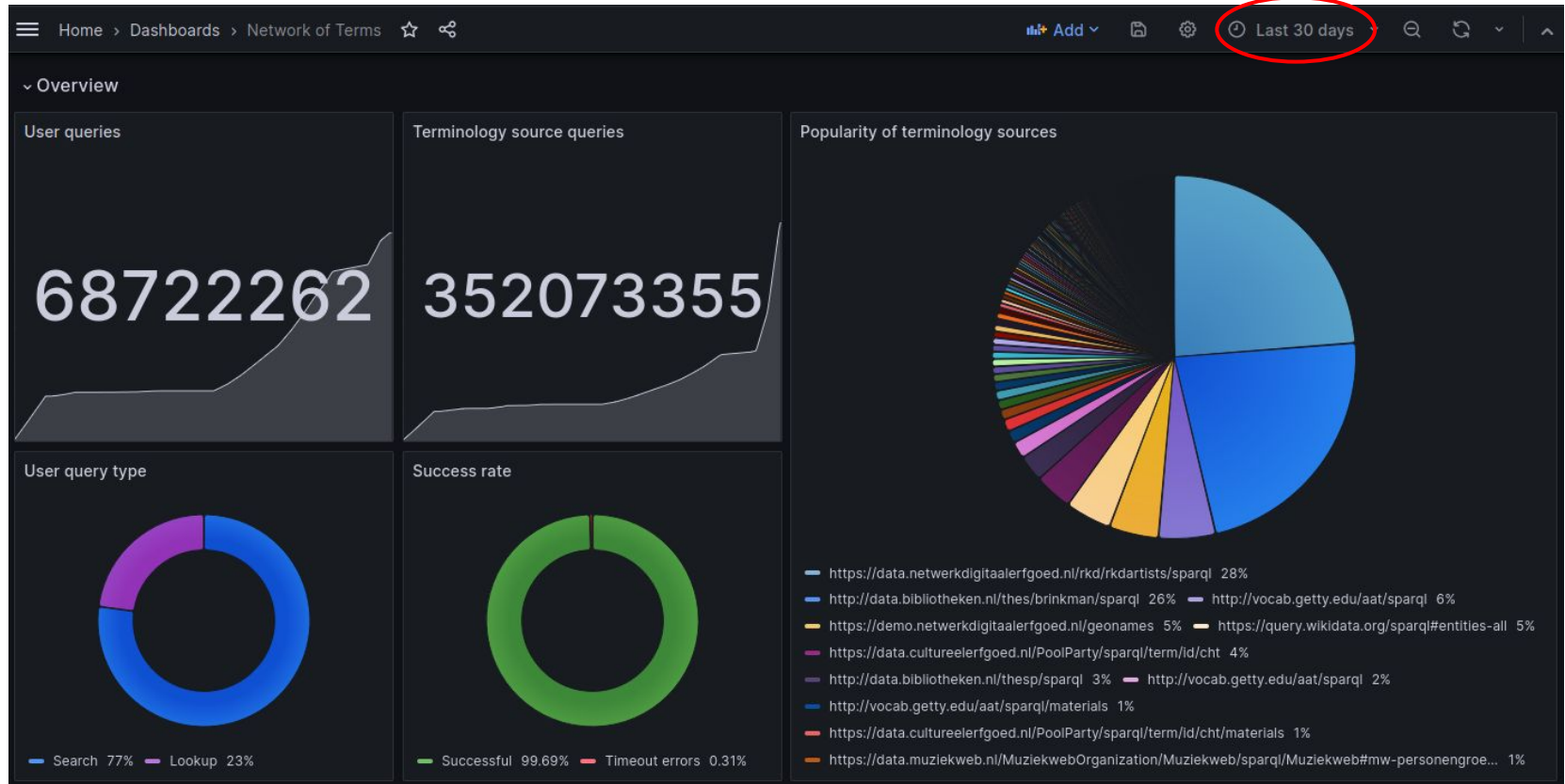
- Atlantis (DEVENTit)
- Memorix (Picturae)
- Axiell Collections (Axiell)
- Kleksi (Sofco)
- MuseumPlus (ZetCom - under discussion)
- Omeka-S (open source)
- Solid-CRS (open source - experimental)
- LDWizard - Heritage (open source - limited)
- Mark Lindeman - VSCode Termennetwerk Extension (open source)

Source code (with EUPL-license) available at

<https://github.com/netwerk-digitaal-erfgoed/network-of-terms>



# Usage over August '23



## Takeaways:

- Federated querying of linked data works (for this use case)
  - Comunica is a powerful framework for federated querying over Linked Data
  - Standardisation of full text search for SPARQL is needed
  - Network-of-Terms is a generic tool, it could fit your use case too
- => give it a try and share your ideas with us!





# Thank you!

[Enno.meijers at kb.nl](mailto:Enno.meijers@kb.nl) | <https://mastodon.social/@ennomeijers>

Learn more at:

<https://github.com/netwerk-digitaal-erfgoed/network-of-terms-tutorial/wiki>



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dutch digital  
heritage  
network