



FIP Visualization

- Kristina Hettne

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Why visualize?

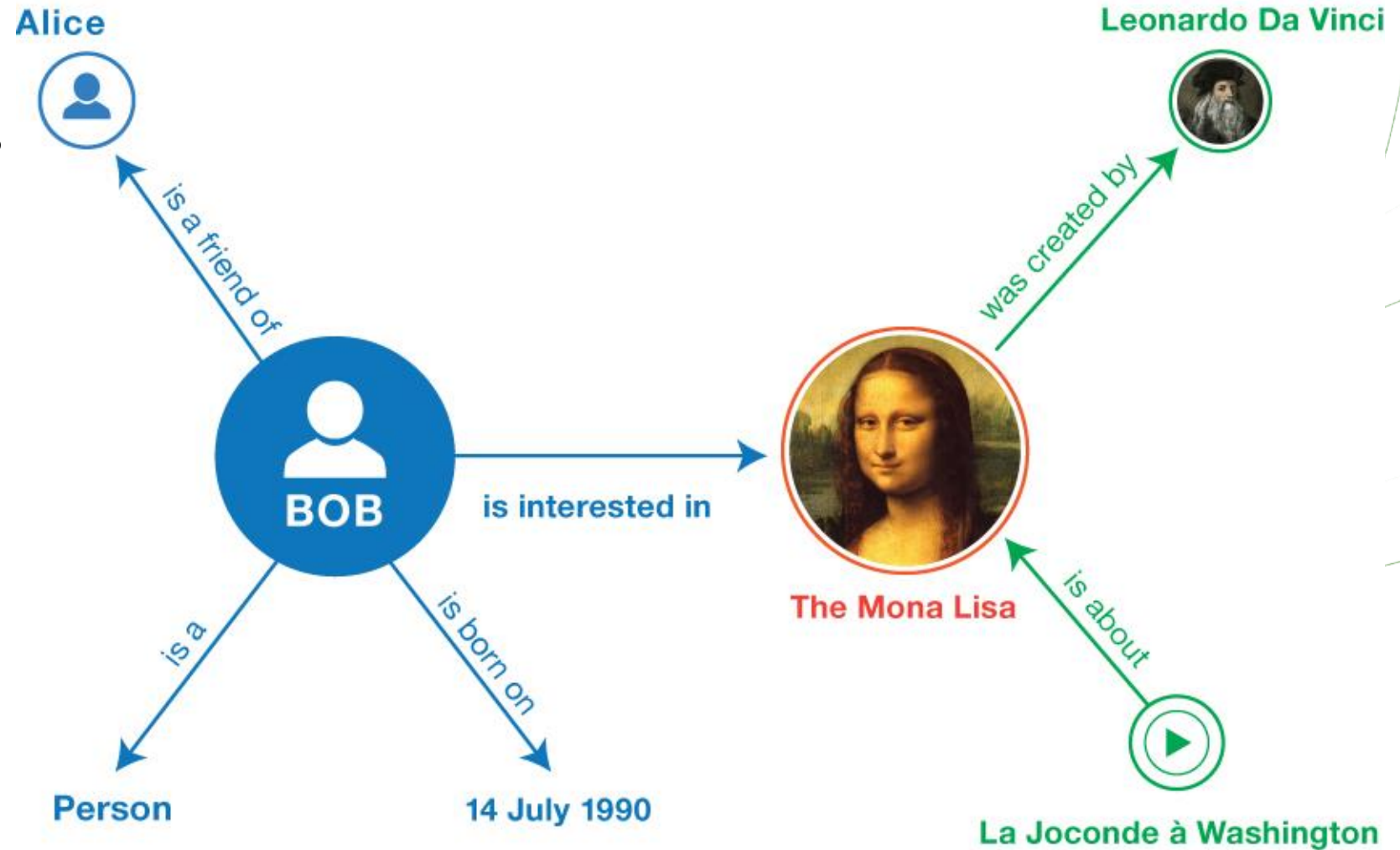
- 🌐 Visualizations help humans find commonalities and gaps
 - Highlight aspects of interest
- 🌐 Can function as a conversation starter around FAIRness and implementation of the FAIR principles

What to visualize?

- 🌐 Connectivity and overlap of FICs, FERs, the FAIR Principles
- 🌐 Important: think about what you want to know and formulate your questions before starting the visualization process

How to visualize?

- 🌐 RDF graphs contain nodes and relationships between those nodes
- 🌐 Any network analysis tool can work but one designed for semantic relationships is recommended



<https://www.w3.org/TR/rdf11-primer/>

Examples

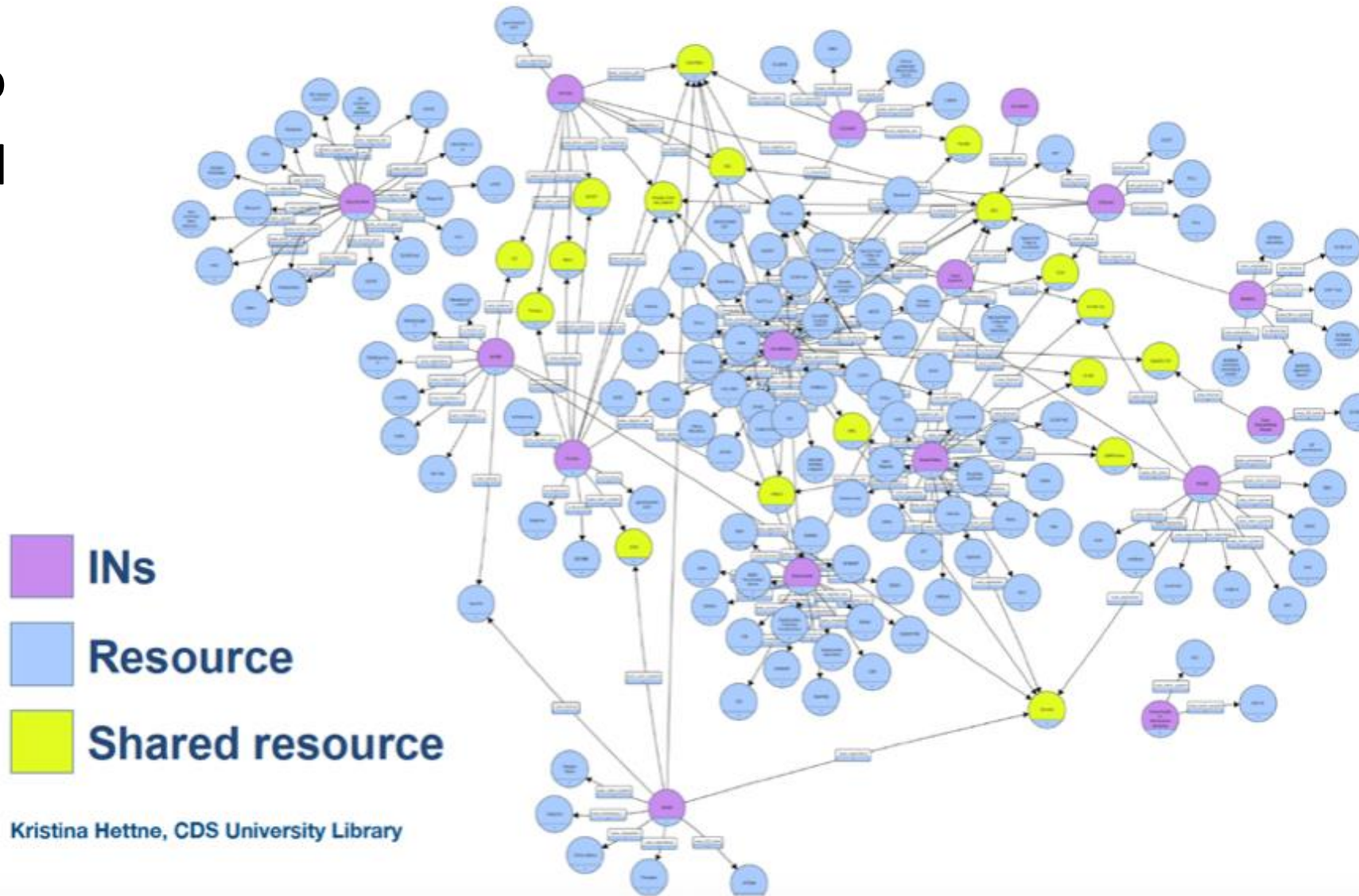


<https://www.w3.org/TR/rdf11-primer/>

GO FAIR Implementation networks (INs) FER overlap

 In Grafo

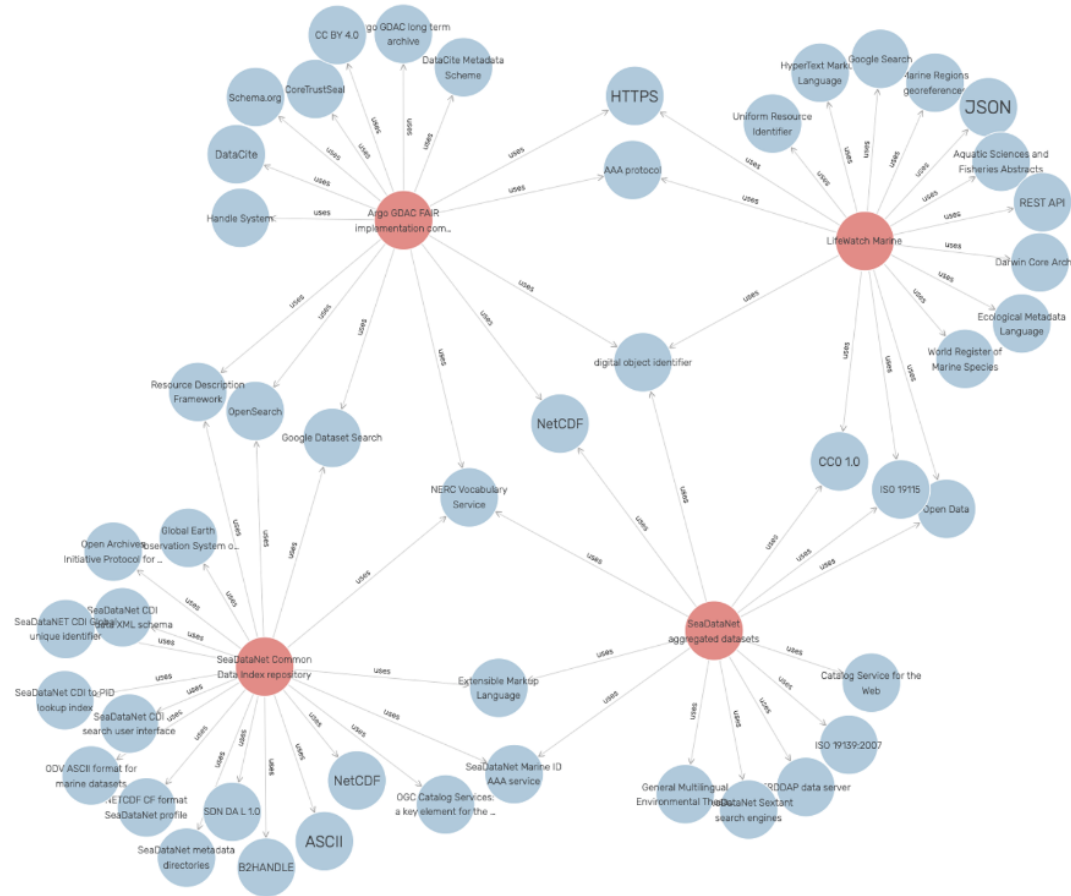
 By hand



Marine sciences FER overlap

In GraphDB

Automatic



Marine sciences

Top 3 shared resources:

1. Digital Object identifier (3)
2. NERC vocabulary service (3)
3. NetCDF (2)

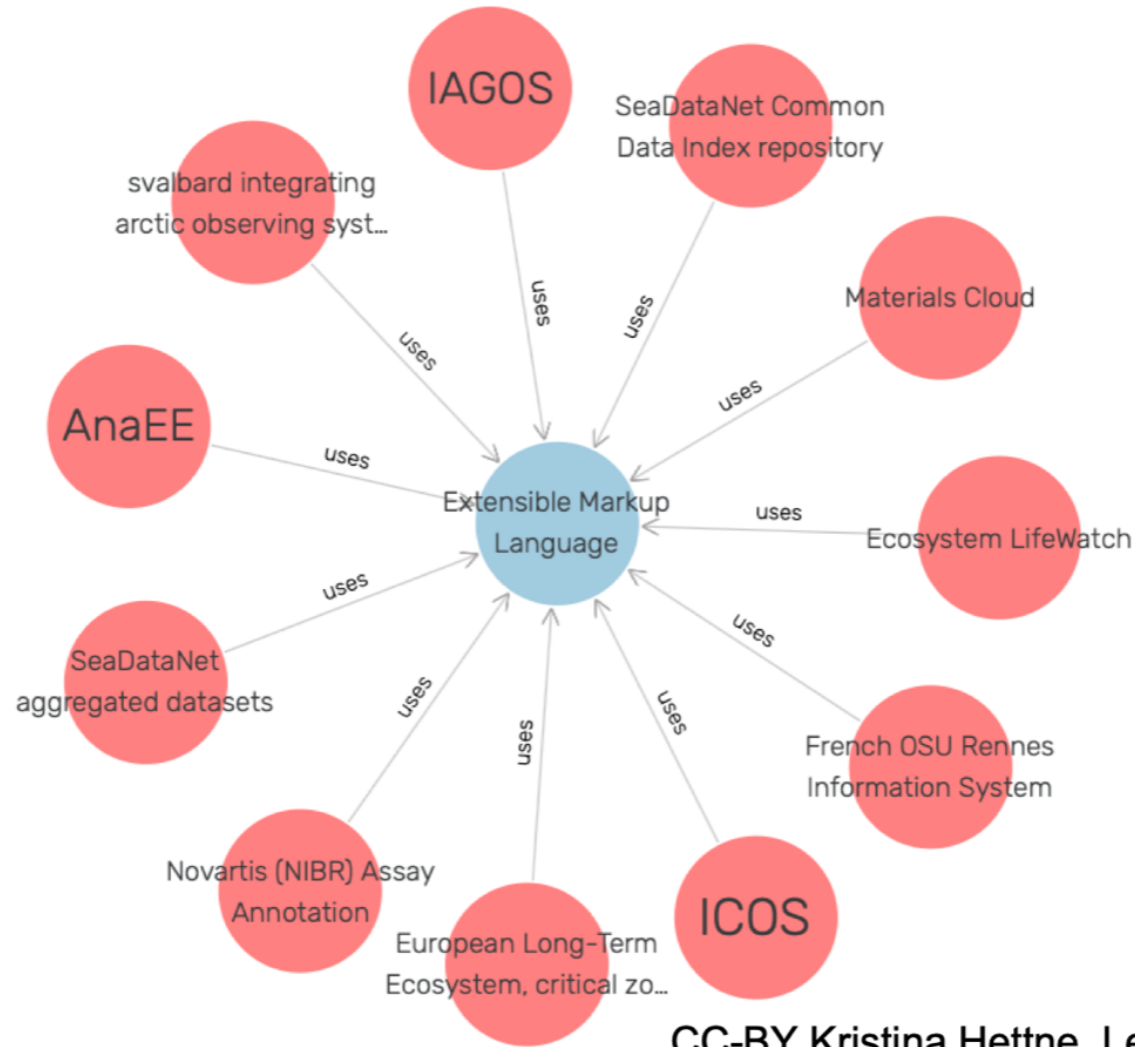


Generic and domain-specific resources

Red: communities
Blue: resources

CC-BY Kristina Hettne, Leiden University Libraries
Created with GraphDB

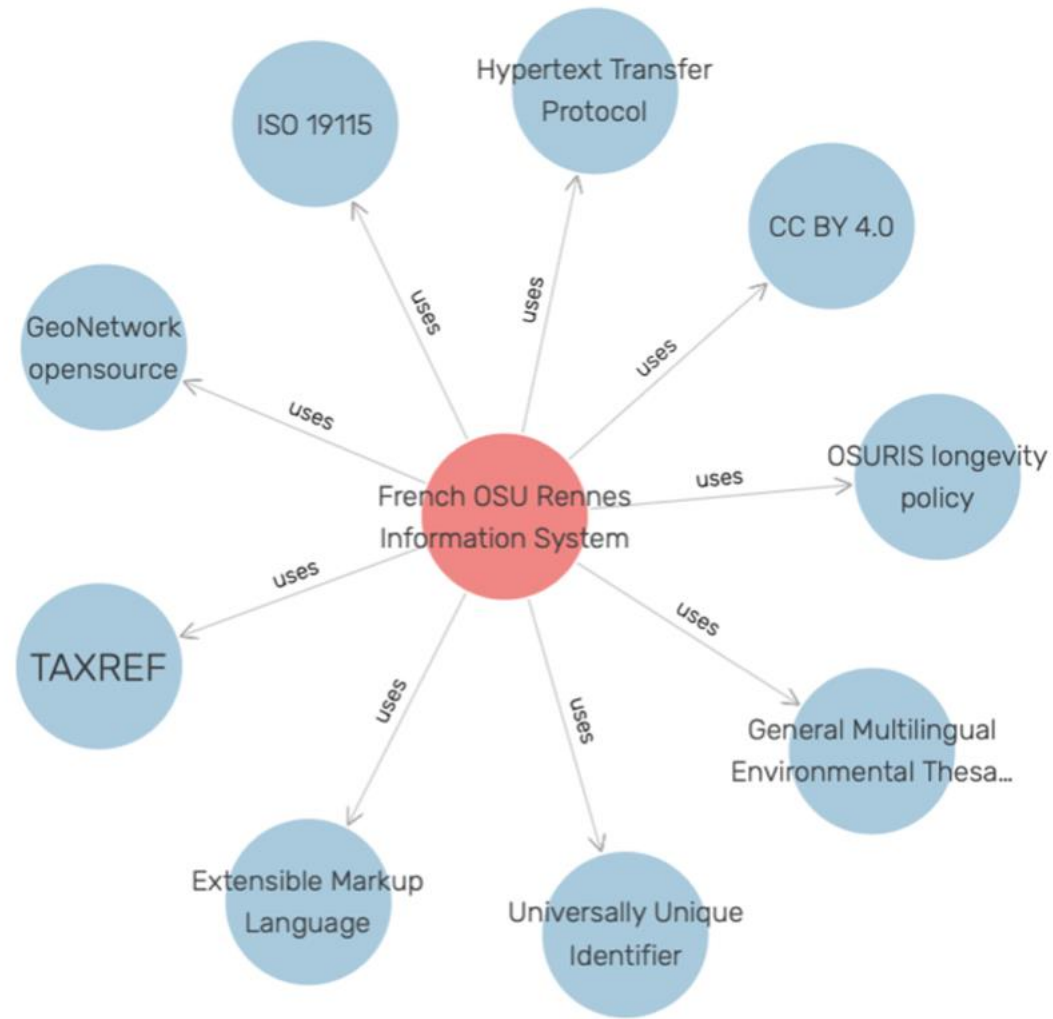
FER centric



Red: communities
Blue: resources

CC-BY Kristina Hettne, Leiden University Libraries
Created with GraphDB

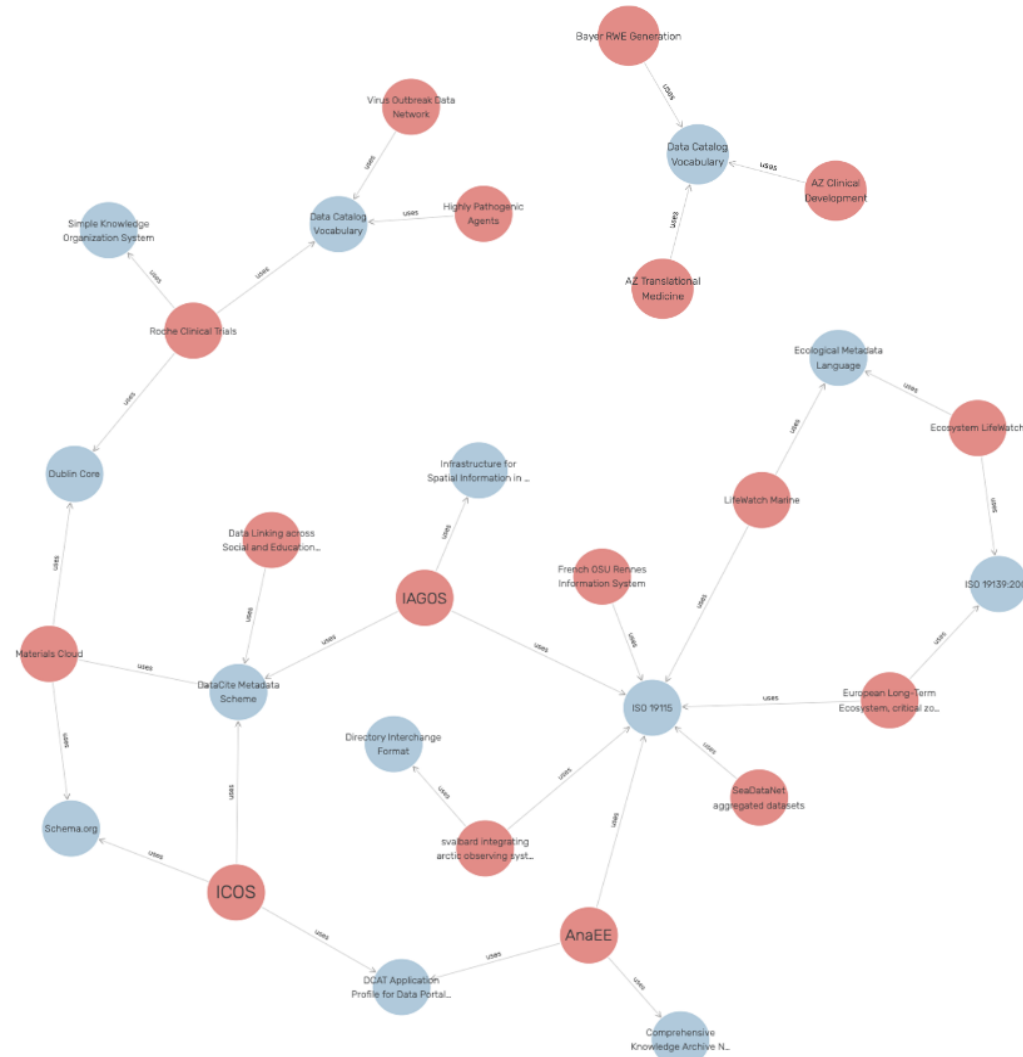
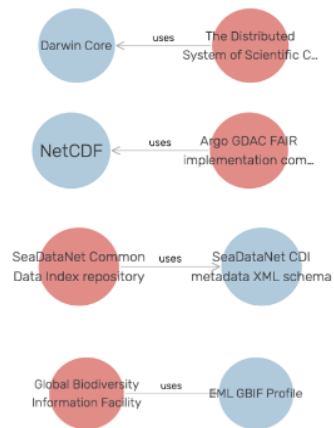
FIC centric



CC-BY Kristina Hettne, Leiden University Libraries
Created with GraphDB

FAIR Principle centric

F2: Which metadata schemas do you use for findability?



Red: communities
Blue: resources

CC-BY Kristina Hettne, Leiden University Libraries
Created with GraphDB

Creating graphs in GraphDB

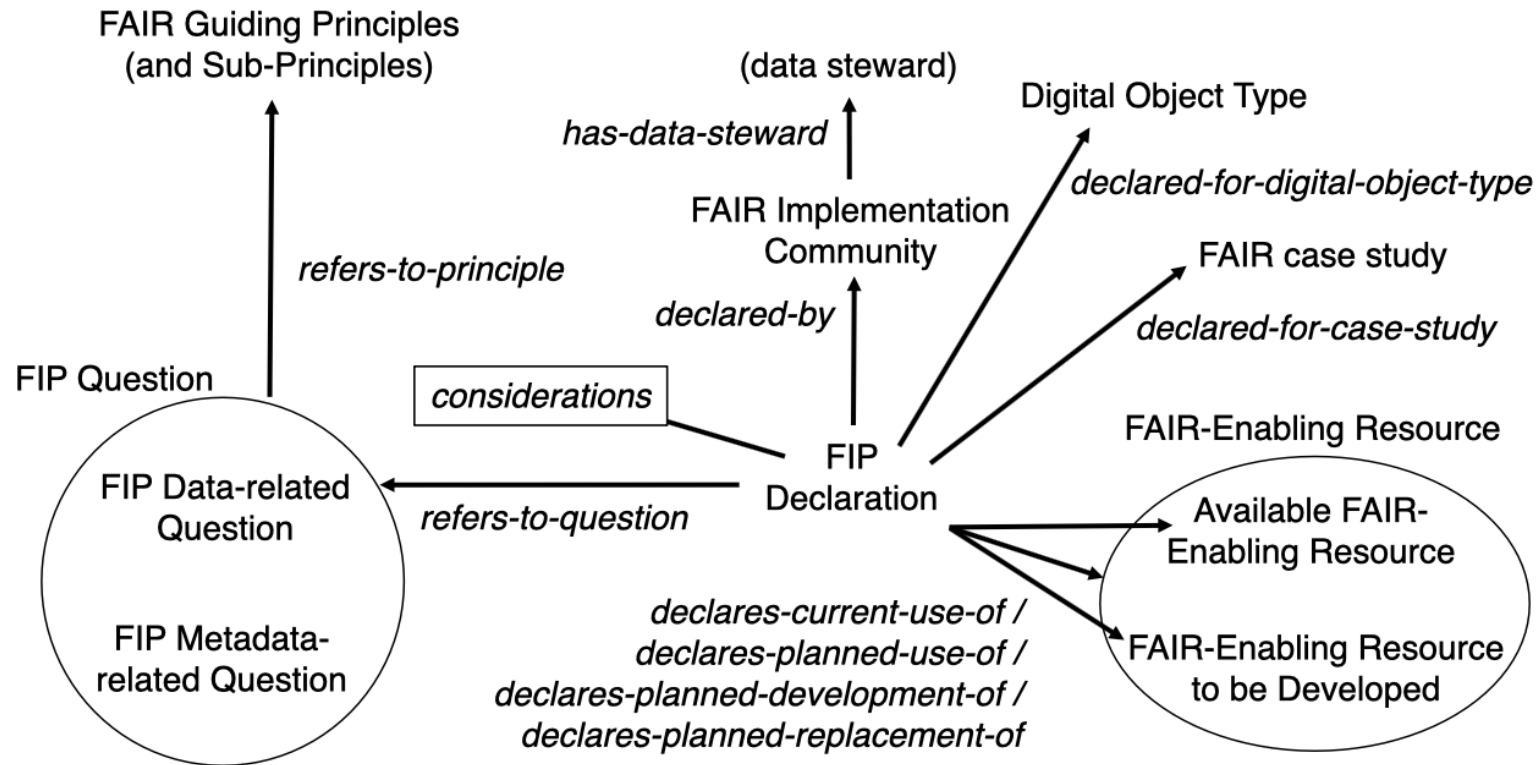


<https://www.w3.org/TR/rdf11-primer/>

Background knowledge: the FIP Ontology

🌐 Need to understand the ontology to generate useful graphs

FAIR Implementation Profile (FIP)



<https://peta-pico.github.io/FAIR-nanopubs/fip/index-en.html>

Example data

 FIPs in .trig format:

 Digital Repository of Ireland

- WorldFAIR WP13. (2024). WorldFAIR WP13: repository-level FIP for Digital Repository of Ireland. Zenodo. <https://doi.org/10.5281/zenodo.11386616>

 Leiden University Digital Collections

- Hettne, K., de Vos, M., van Wijk-Zielstra, L., Gambardella, A., & Verhaar, P. (2024). FAIR Implementation Profile for Leiden University Libraries Digital Collections. Zenodo. <https://doi.org/10.5281/zenodo.14416614>

GraphDB desktop application

GraphDB free:

- Free to use
- Download from: <https://graphdb.ontotext.com>



GraphDB by  ontotext

GraphDB is an enterprise ready Semantic Graph Database, compliant with W3C Standards. Semantic graph databases (also called RDF triplestores) provide the core infrastructure for solutions where modelling agility, data integration, relationship exploration and cross-enterprise data publishing and consumption are important.

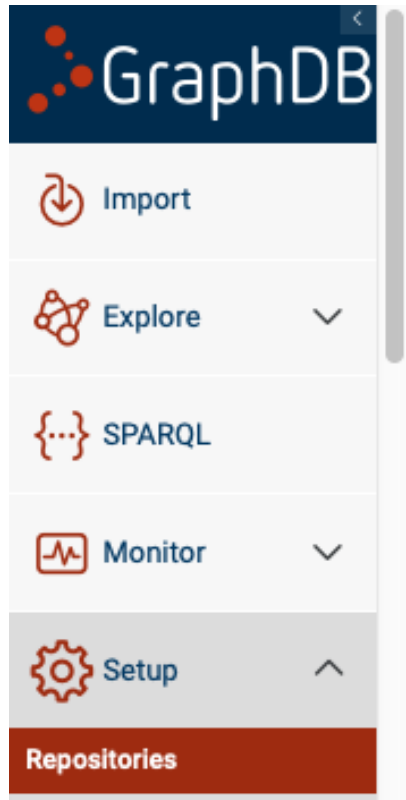


Setup instructions

- 🌐 Register at <https://graphdb.ontotext.com>
- 🌐 Download GraphDB free
- 🌐 Install the download on your computer

Setting up a GraphDB database (or »repository«) (1)

















Create a new repository



- GraphDB
- Import
- Explore
- SPARQL
- Monitor
- Setup
- Repositories**

Repositories ⓘ

Repositories from: Local

	 Cultural_heritage_FIPs · RUNNING · A repository for FAI...	     
	 FIP_visualization_UBL-DC · RUNNING · A repository to v...	     

 Create new repository



 Attach remote location

GraphDB 10.8.2 · RDF4J 4.3.15 · Connectors 16.2.13 · Workbench 2.8.2 · © 2002–2025 Ontotext AD. All rights reserved.

Setting up a GraphDB database (or »repository») (2)

New GraphDB Repository

1)

The screenshot shows the GraphDB main interface. The left sidebar has a 'Setup' menu with 'Repositories' highlighted. The main content area shows three repository options: GraphDB Repository, Ontop Virtual SPARQL, and FedX Virtual SPARQL. The footer contains version information: GraphDB 10.8.2 • RDF4J 4.3.15 • Connectors 16.2.13 • Workbench 2.8.2 • © 2002–2025 Ontotext AD. All rights reserved.

2)

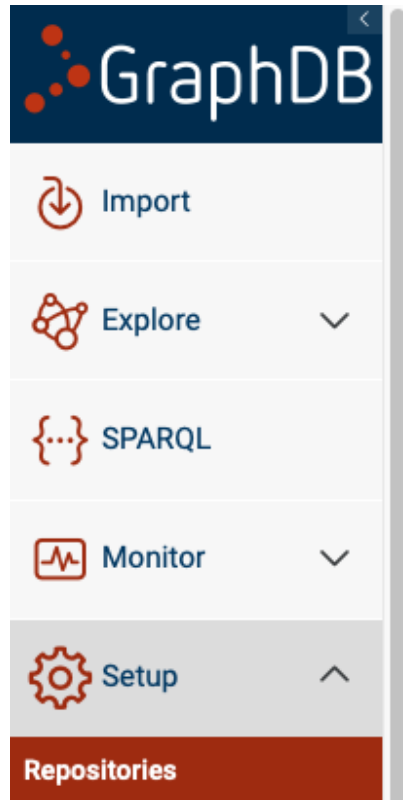
The screenshot shows the 'Create GraphDB repository' configuration page. The left sidebar is the same as in step 1. The main content area has the following fields and options:

- Repository ID*:
- Repository description:
- Read-only
- Inference and Validation:
 - Ruleset: **RDFS-Plus (Optimized)** (dropdown), [Custom ruleset...](#) (button)
 - Disable owl:sameAs
 - Enable consistency checks
 - Enable SHACL validation > SHACL options
- Indexing:
 - Entity ID size: 32-bit 40-bit
 - Enable context index
 - Enable predicate list index
 - Enable full-text search (FTS) index
 - FTS indexes to build (comma delimited):
 - FTS index for xsd:string literals:
 - FTS index for full-text indexing of IRIs:
- Queries and Updates:
 - Query timeout (seconds): Throw exception on query timeout
 - Limit query results:

Cancel **Create**


Setting up a GraphDB database (or »repository«) (3)















 New repository shows up in list as «inactive»



- GraphDB
- Import
- Explore
- SPARQL
- Monitor
- Setup
- Repositories**

Repositories

Repositories from: Local  

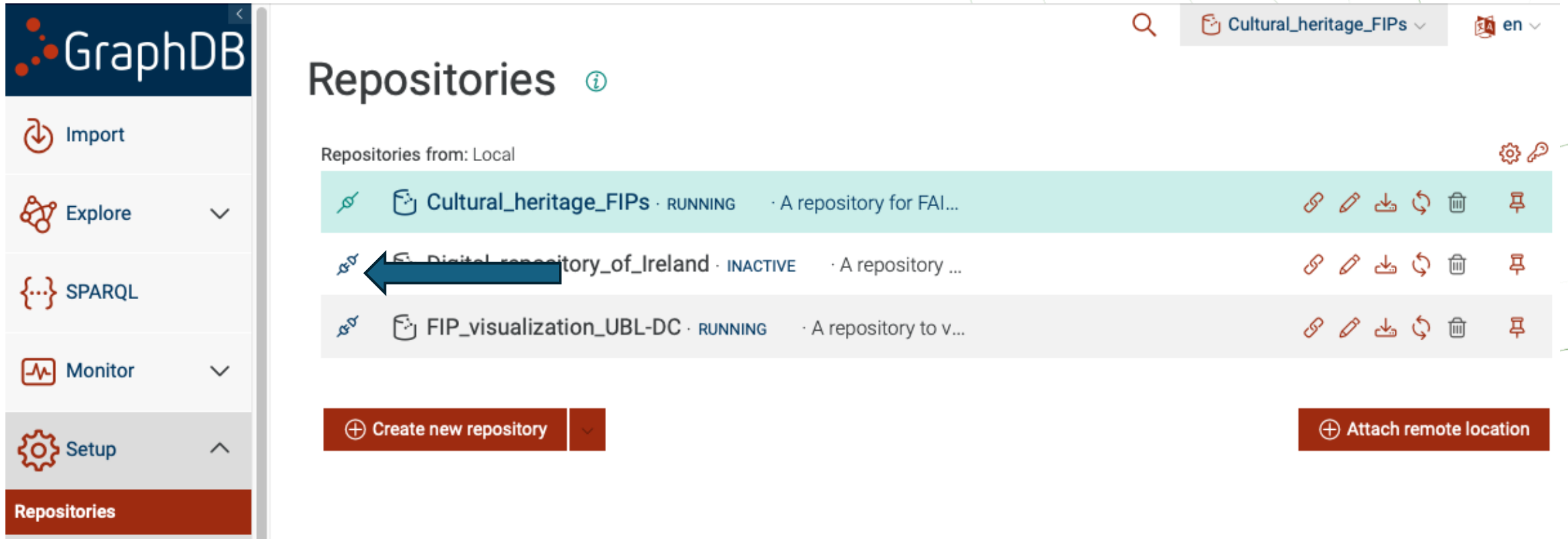
	 Cultural_heritage_FIPs · RUNNING · A repository for FAI...	     
	 Digital_repository_of_Ireland · INACTIVE · A repository ...	     
	 FIP_visualization_UBL-DC · RUNNING · A repository to v...	     

 Create new repository

 Attach remote location

Setting up a GraphDB database (or »repository») (4)

Click on connect repository icon



GraphDB

Import

Explore

SPARQL

Monitor

Setup

Repositories

Repositories

Repositories from: Local

Cultural_heritage_FIPs · RUNNING · A repository for FAI...

Digital_repository_of_Ireland · INACTIVE · A repository ...

FIP_visualization_UBL-DC · RUNNING · A repository to v...

+ Create new repository

+ Attach remote location

Setting up a GraphDB database (or »repository») (5)

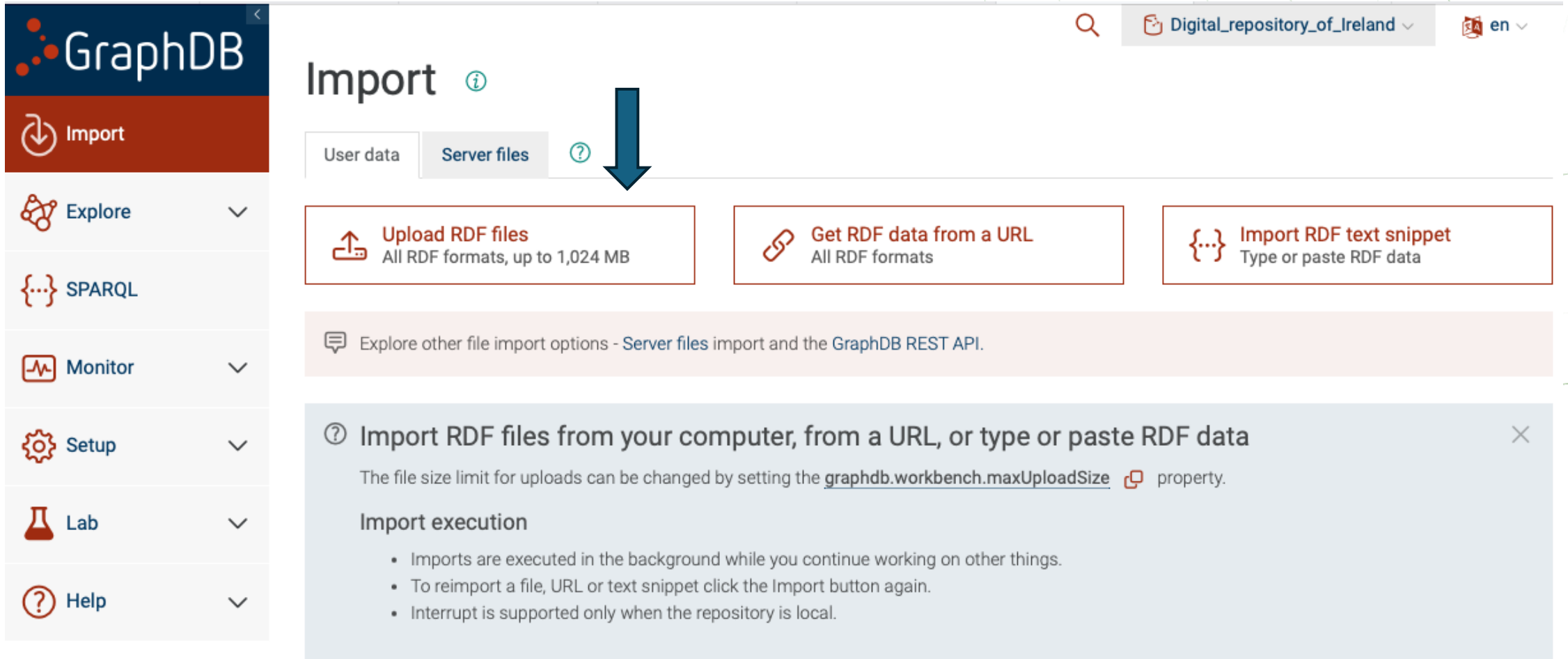
Repository is connected



The screenshot shows the GraphDB web interface. On the left is a sidebar with navigation options: Import, Explore, SPARQL, Monitor, and Setup. The main area is titled 'Repositories' and shows a list of local repositories. The repository 'Digital_repository_of_Ireland' is highlighted in light blue, and a blue arrow points to its name. Below the list are two buttons: 'Create new repository' and 'Attach remote location'. The top right of the interface shows a search bar and a dropdown menu for the current repository, which is set to 'Digital_repository_of_Ireland'.

Setting up a GraphDB database (or »repository») (6)

Go to Import



The screenshot shows the GraphDB web interface. The left sidebar contains navigation options: Import, Explore, SPARQL, Monitor, Setup, Lab, and Help. The main content area is titled 'Import' and has two tabs: 'User data' and 'Server files'. A blue arrow points to the 'Server files' tab. Below the tabs are three import options:

- Upload RDF files**: All RDF formats, up to 1,024 MB
- Get RDF data from a URL**: All RDF formats
- Import RDF text snippet**: Type or paste RDF data

Below these options is a message: "Explore other file import options - Server files import and the GraphDB REST API."

A help message is displayed at the bottom:

Import RDF files from your computer, from a URL, or type or paste RDF data

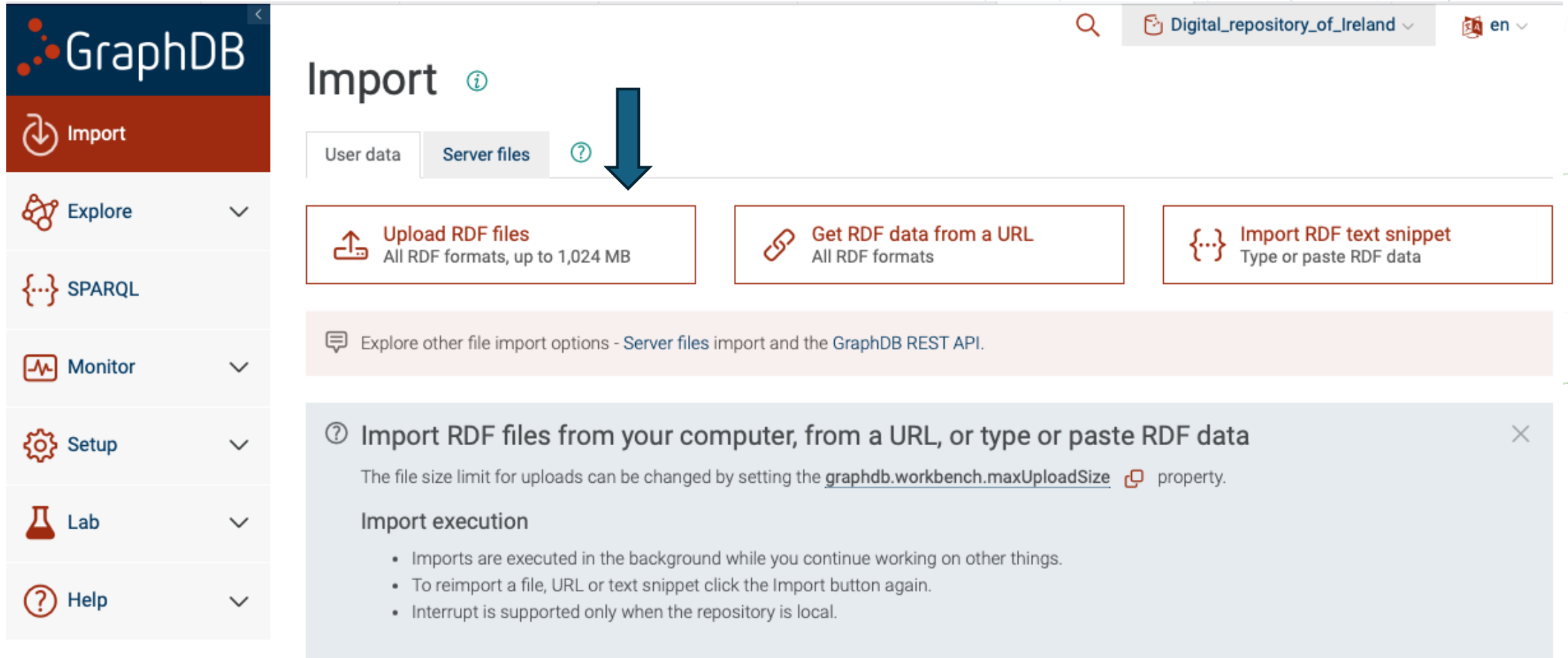
The file size limit for uploads can be changed by setting the `graphdb.workbench.maxUploadSize` property.

Import execution

- Imports are executed in the background while you continue working on other things.
- To reimport a file, URL or text snippet click the Import button again.
- Interrupt is supported only when the repository is local.

Setting up a GraphDB database (or »repository«) (7)

Select »Upload RDF files«



The screenshot shows the GraphDB web interface. On the left is a navigation sidebar with the following items: Import (highlighted), Explore, SPARQL, Monitor, Setup, Lab, and Help. The main content area is titled 'Import' and has two tabs: 'User data' and 'Server files' (selected). A blue arrow points to the 'Server files' tab. Below the tabs are three import options, each in a red-bordered box:

- Upload RDF files**: All RDF formats, up to 1,024 MB
- Get RDF data from a URL**: All RDF formats
- Import RDF text snippet**: Type or paste RDF data

Below these options is a light orange box with a speech bubble icon and the text: 'Explore other file import options - Server files import and the GraphDB REST API.'

At the bottom, a light blue tooltip box is open, containing the following text:

Import RDF files from your computer, from a URL, or type or paste RDF data

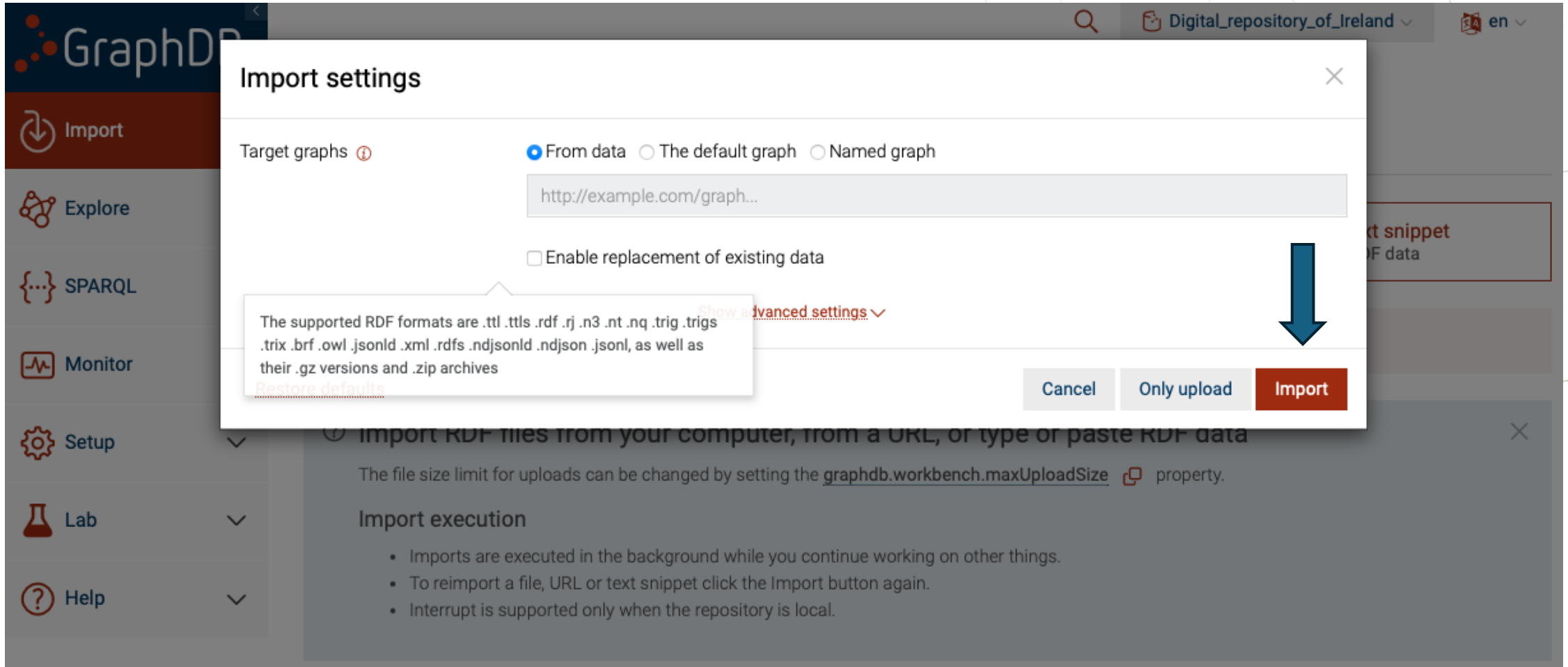
The file size limit for uploads can be changed by setting the `graphdb.workbench.maxUploadSize` property.

Import execution

- Imports are executed in the background while you continue working on other things.
- To reimport a file, URL or text snippet click the Import button again.
- Interrupt is supported only when the repository is local.

Setting up a GraphDB database (or »repository«) (8)

Use default settings



Import settings

Target graphs ⓘ From data The default graph Named graph

Enable replacement of existing data

[Show advanced settings](#) ▼

The supported RDF formats are .ttl .tts .rdf .rj .n3 .nt .nq .trig .trigs .trix .brf .owl .jsonld .xml .rdfs .ndjsonld .ndjson .jsonl, as well as their .gz versions and .zip archives

[Restore defaults](#)

Cancel Only upload **Import**

Setting up a GraphDB database (or »repository«) (9)

Imported file shows up

The screenshot shows the GraphDB web interface. On the left is a navigation sidebar with options: Import, Explore, SPARQL, Monitor, Setup, Lab, and Help. The main area is titled 'Import' and has two tabs: 'User data' and 'Server files'. Under 'Server files', there are three import options: 'Upload RDF files', 'Get RDF data from a URL', and 'Import RDF text snippet'. Below these is a message: 'Explore other file import options - Server files import and the GraphDB REST API.' At the bottom, a table lists imported files. A blue arrow points to the file name 'WorldFAIR WP13 CULTURAL HERITAGE FIP01.trig'. Below the table, a message states: 'Imported successfully in less than a second. Added 977 statements'.

Name	Size	Uploaded	Imported	Context
<input type="checkbox"/> WorldFAIR WP13 CULTURAL HERITAGE FIP01.trig	121.30 kb	2025-01-30, 09:15	2025-01-30, 09:15	

Exploring a GraphDB repository

Start exploring!



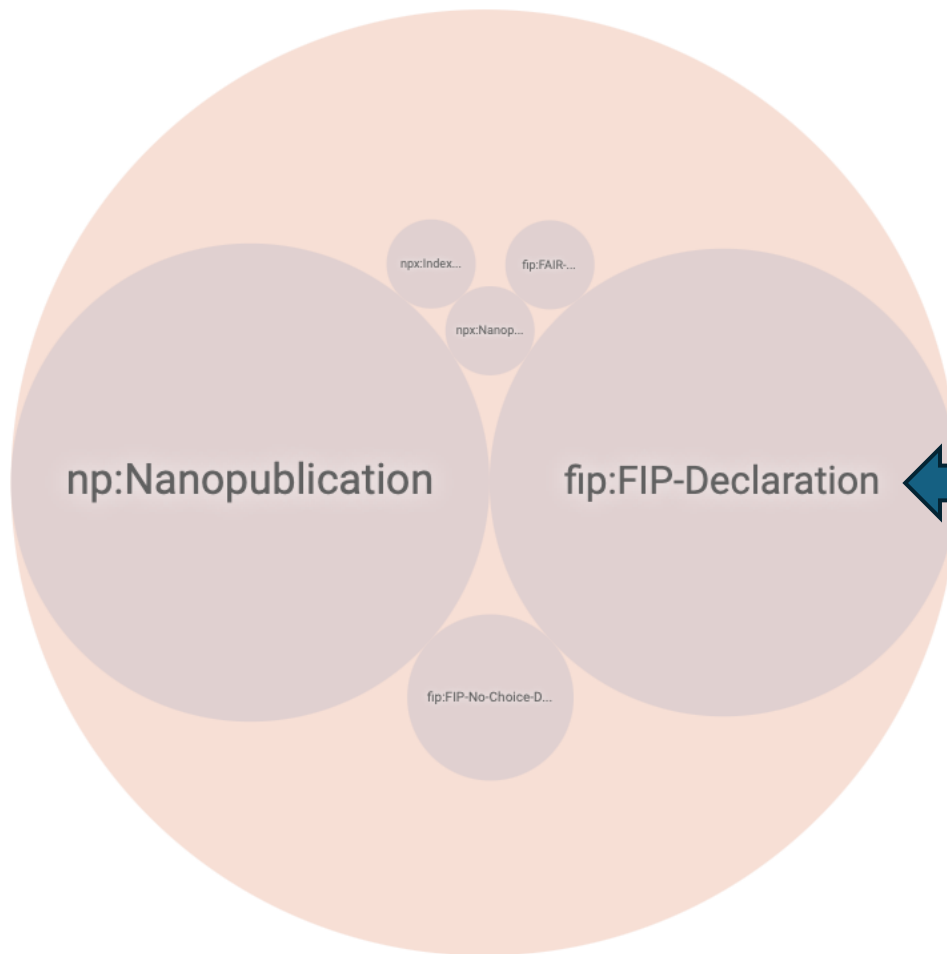
GraphDB

- Import
- Explore
- Graphs overview
- Class hierarchy**
- Class relationships
- Visual graph
- Similarity
- SPARQL
- Monitor
- Setup
- Lab
- Help

Class hierarchy

Class Count

6



1

Exploring a GraphDB repository

Copy IRI

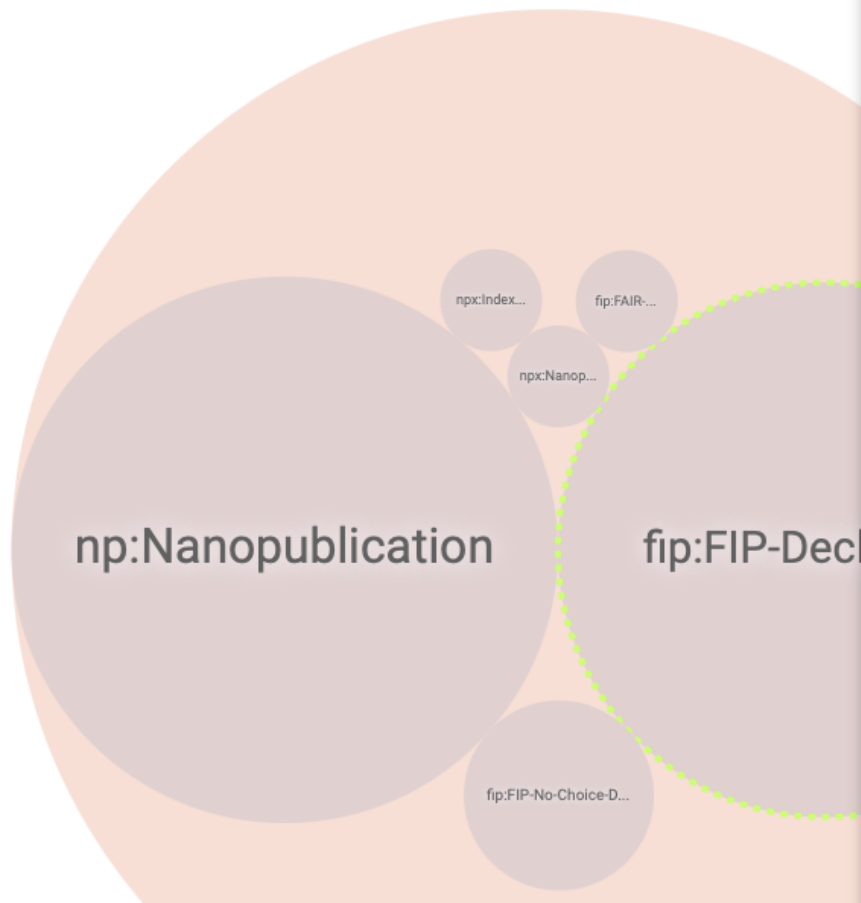
GraphDB

- Import
- Explore
- Graphs overview
- Class hierarchy**
- Class relationships
- Visual graph
- Similarity
- SPARQL
- Monitor
- Setup
- Lab
- Help

Class hierarchy

Class Count 6

6



All graphs

Digital_repository_of_Ireland en

fip:FIP-Declaration

Domain-Range graph

[View all 53 instances in SPARQL](#)

Search class instances

<http://purl.org/nanopub/temp/fip-declaration-np/58277f74-4708-4d6a-ade6-d47081b9490a/15dc836c-31b1-447c-9043-90d1c1703ec1/15c9eaac-bac9-430b-804d-d92cc574df24#declaration>

<http://purl.org/nanopub/temp/fip-declaration-np/58277f74-4708-4d6a-ade6-d47081b9490a/15dc836c-31b1-447c-9043-90d1c1703ec1/1834197d-4860-49c1-b7f5-506b65f61968#declaration>


<http://purl.org/nanopub/temp/fip-declaration-np/58277f74-4708-4d6a-ade6-d47081b9490a/15dc836c-31b1-447c-9043-90d1c1703ec1/1ac7bc8d-3999-4db6-a9bbe7479db42b3#declaration>

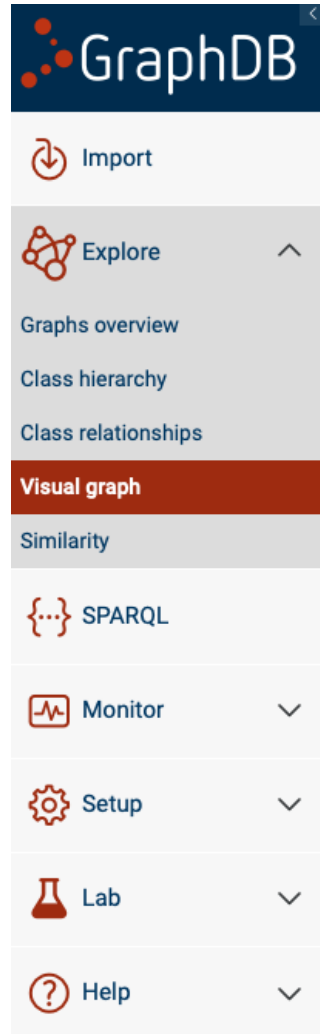
<http://purl.org/nanopub/temp/fip-declaration-np/58277f74-4708-4d6a-ade6-d47081b9490a/15dc836c-31b1-447c-9043-90d1c1703ec1/15c9eaac-bac9-430b-804d-d92cc574df24#declaration>



Create a visual graph

 Paste IRI

 Click «Show»



GraphDB

- Import
- Explore
- Graphs overview
- Class hierarchy
- Class relationships
- Visual graph**
- Similarity
- SPARQL
- Monitor
- Setup
- Lab
- Help

Visual graph

Easy graph

Search for an IRI to view it and configure the visualisation through the UI without using SPARQL

Show 

Hint: 'abc*' matches "abc*", "ab c*" and "ab-c*"

Advanced graph configurations

[+ Create graph config](#)

Define how the visualisation works by writing your own SPARQL queries

No graph configs

Saved graphs

FI1-D_declaration_UBL-DC_vs_wp13-cultural-heritage

Easy graph



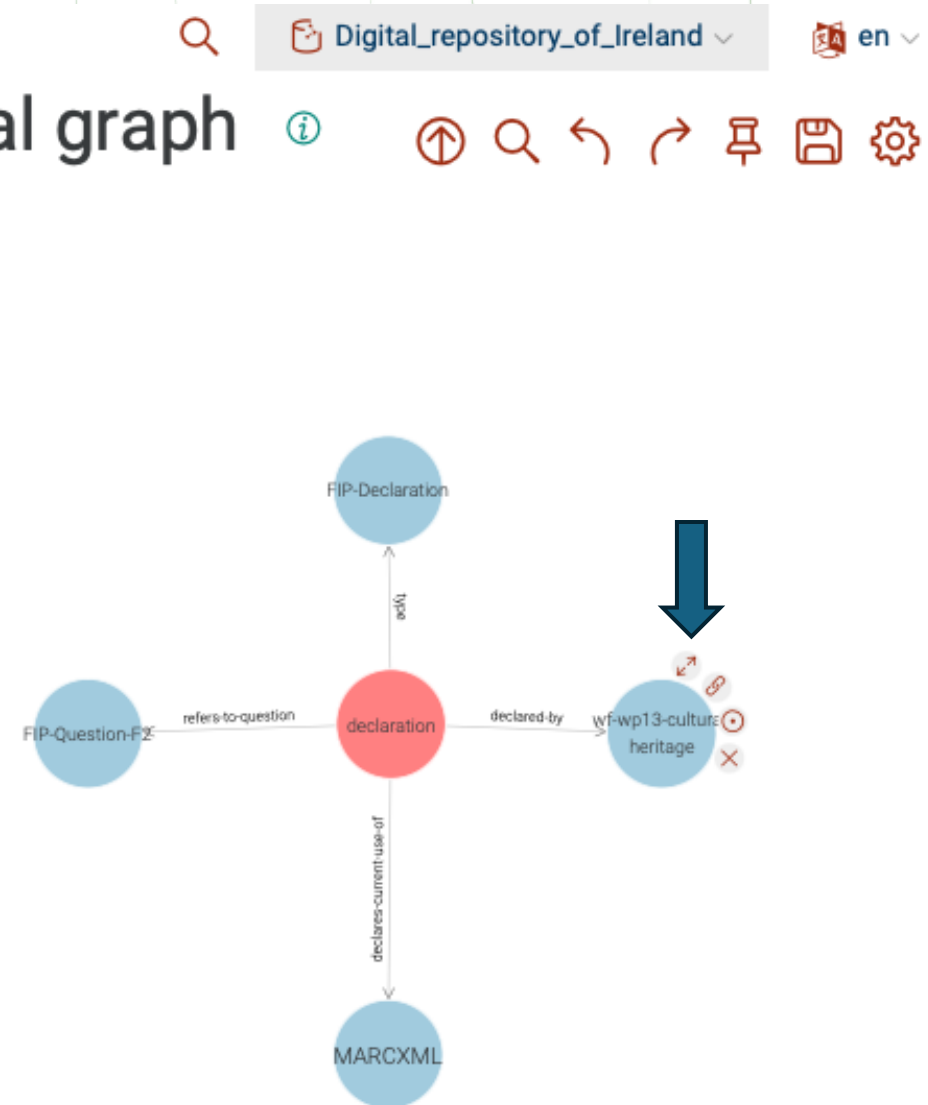
View and expand your start graph

View declaration

Click expand icon

The screenshot shows the GraphDB sidebar menu with the following items: Import, Explore (with an expand icon), Graphs overview, Class hierarchy, Class relationships, Visual graph (highlighted in red), Similarity, SPARQL, Monitor, and Setup.

Visual graph

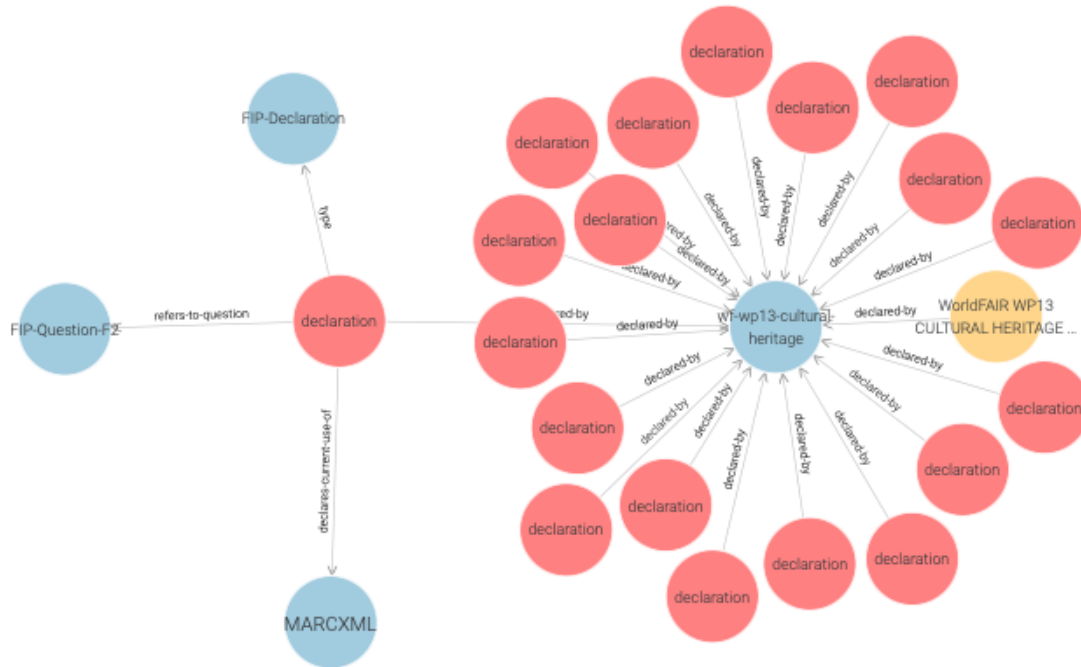


View and expand your start graph

Explore declarations further

- GraphDB
- Import
- Explore
- Graphs overview
- Class hierarchy
- Class relationships
- Visual graph**
- Similarity
- SPARQL
- Monitor
- Setup

Visual graph



Search bar: Digital_repository_of_Ireland

Language: en

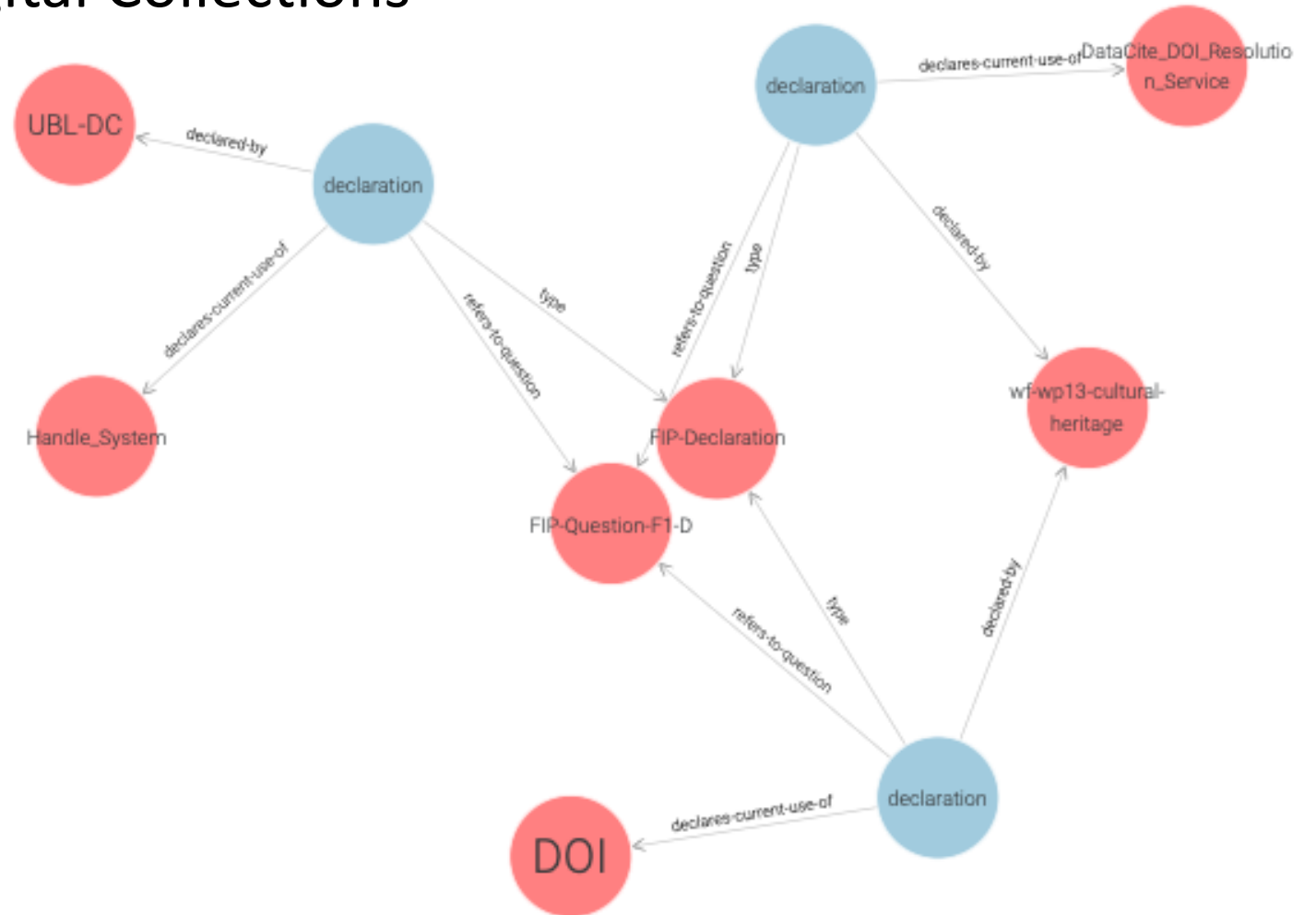
Navigation icons: Home, Search, Back, Forward, Pin, Save, Settings

Inspiration: use two FIPs and compare declarations

 Leiden University Libraries Digital Collections

 Digital Repository of Ireland

 FIP question F1-D (data)



Live demo (if enough time)

 Keep your questions in mind



Recap

- 🌐 We visualize FIPs to help humans find commonalities and gaps
- 🌐 FIPs are Nanopublications and can be visualized as RDF graphs
- 🌐 GraphDB is a useful tool for visualizing RDF as graphs
- 🌐 You need a dataset in RDF and GraphDB installed on your computer
- 🌐 First create a repository in GraphDB, then fill with data and explore



THANKS!

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
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