TIB LEIBNIZ-INFORMATIONSZENTRUM TECHNIK UND NATURWISSENSCHAFTEN UNIVERSITÄTSBIBLIOTHEK

European Infrastructure Integration and Research Knowledge Graphs

CRIS 2026, 20 May 2026
Session 2.2: VIVO in the Evolving CRIS Ecosystem: Community, Institution, Europe, Nation, and Technology

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Agenda

- Research Knowledge Graphs
  - Personal
  - Institutional
  - OpenAIRE - quantitative overview from the RIS perspective
  - Persistent Identifiers, and other services

- VIVO as an institutional knowledge graph
  - From OpenAlex to VIVO
  - From Cordis to VIVO
  - From VIVO to ORCID
  - From VIVO to OpenAIRE

- Perspective
  - Understanding and leveraging personal research knowledge graphs?
  - Interoperability challenges

What is a research knowledge graph?

1. A knowledge graph is *“a graph of data intended to accumulate and convey knowledge of the real world, whose nodes represent entities of interest and whose edges represent potentially different relations between these entities.” (Hogan et al., 2021)*

2. *Explicit Knowledge is “formal and systematic” knowledge, which “can be easily communicated and shared” (Nonaka 2009)*

3. *Research information is metadata about research activities, actors and results. This includes, for example, descriptions of projects, researchers, organisations, publications, software or conferences.*
   https://blog.tib.eu/2024/05/08/research-data-or-research-information-whats-the-difference/

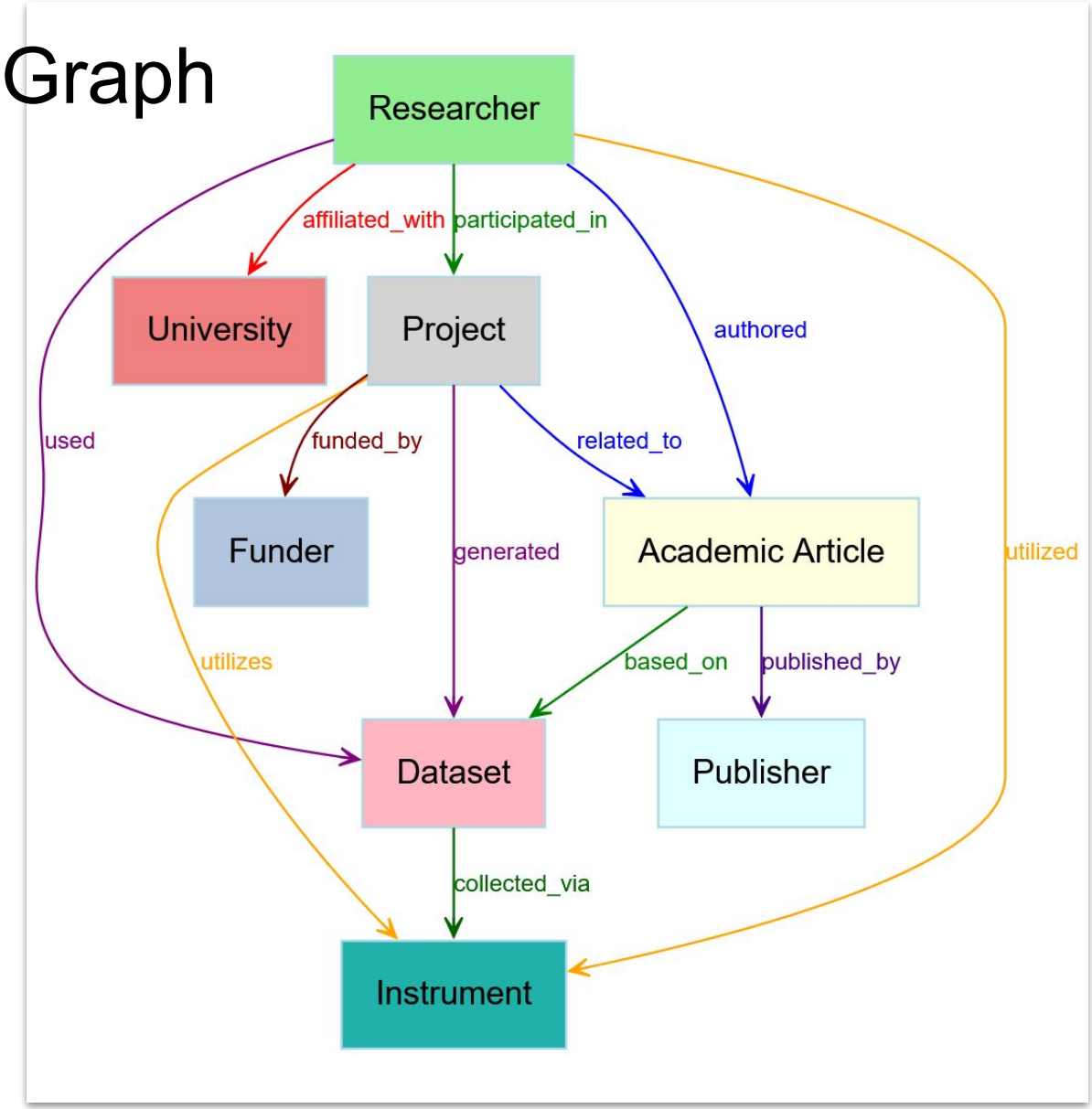
4. *A Research Knowledge Graph is a knowledge graph which represents explicit knowledge about research.*

Personal Research Knowledge Graph

"A PRKG belonging to a researcher contains information in the form of entities and their relationships that are of importance to the researcher."

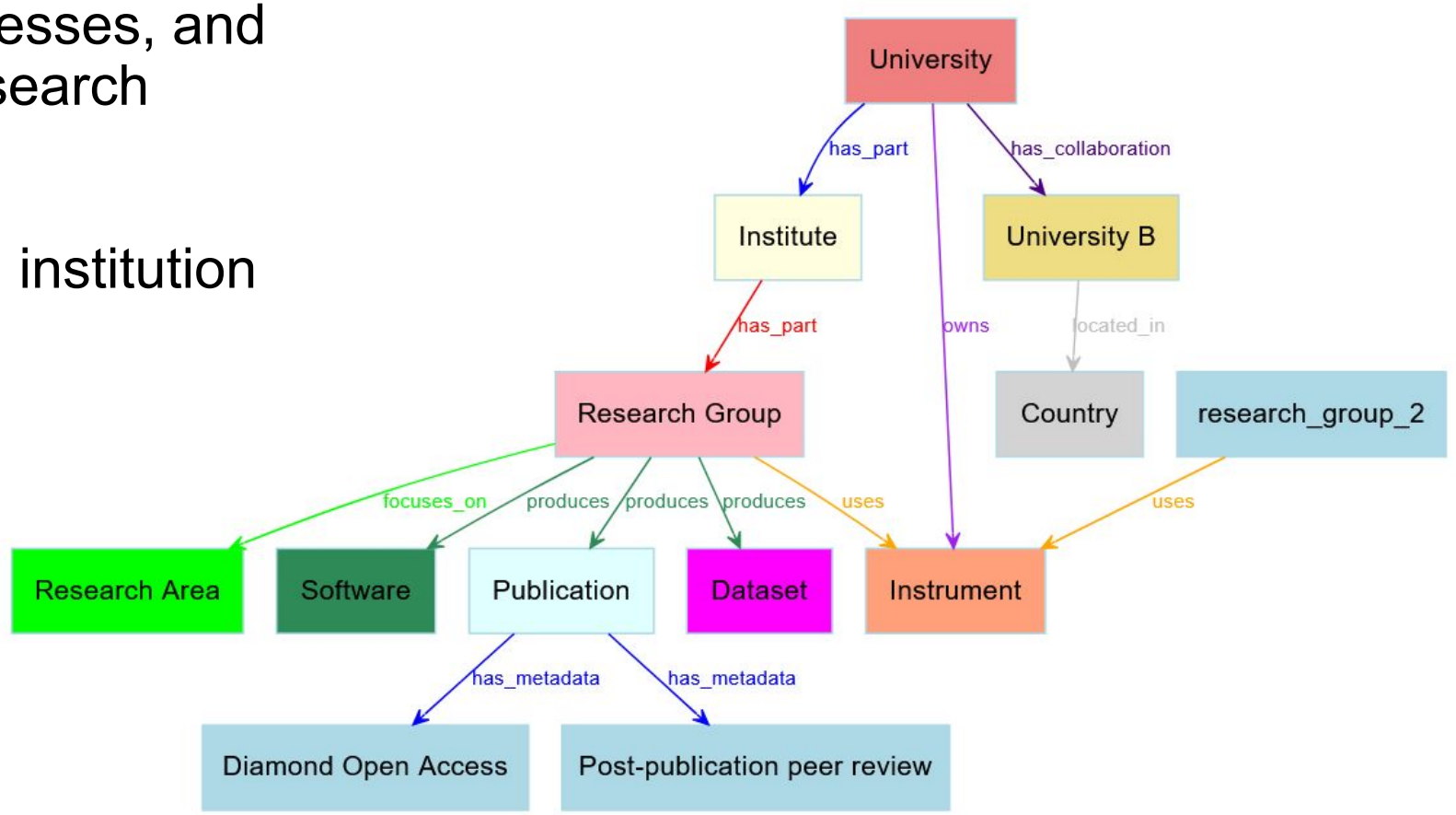
Chakraborty et al. (2022). Personal Research Knowledge Graphs. ACM. WWW '22. https://doi.org/10.1145/3487553.3524654

- contains the knowledge a researcher has about their own activities and environment.
- can be more fine-grained including methods etc. too.



Institutional Research Knowledge Graph

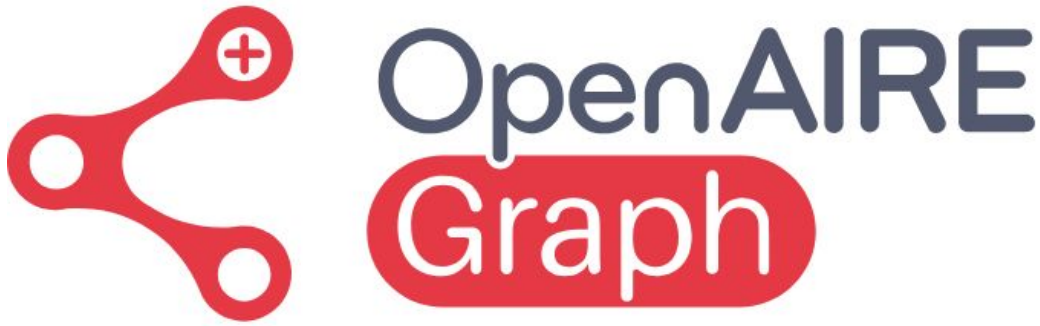
- An institutional knowledge graph represents the actors, processes, and output of an institution's research activities.
- RIS as a knowledge graph
- Contains the knowledge an institution has about itself.



European Research Knowledge Graph

OpenAIRE is a European Research Knowledge Graph:

“EXPLORE is built on the OpenAIRE Graph, one of the largest open scholarly record collections worldwide. Conceived as a public and transparent good, populated out of data sources trusted by scientists, the OpenAIRE Graph brings discovery, monitoring, and assessment of science back in the hands of the scientific community.“



OpenAIRE could be a true research information commons om the sense of “**information and knowledge resources** that are **collectively created and owned or shared** between or among a **community** and that tend to be **non-exclusivedible**, that is, be (generally freely) available to third parties. Thus, they are **oriented to favor use and reuse**, rather than to exchange as a commodity. Additionally, the **community of people** building them can intervene in the **governing of their interaction processes** and of their **shared resources**.”

Fuster Morell, M. (2010). Governance of online creation communities: Provision of infrastructure for the building of digital commons., p. 5

Persistent Identifiers, and other services

IGSN

ORCID

PID

Metadata from Crossref

ORKG

DataCite

TIB ConfIDent

OpenAIRE Graph

OpenAlex

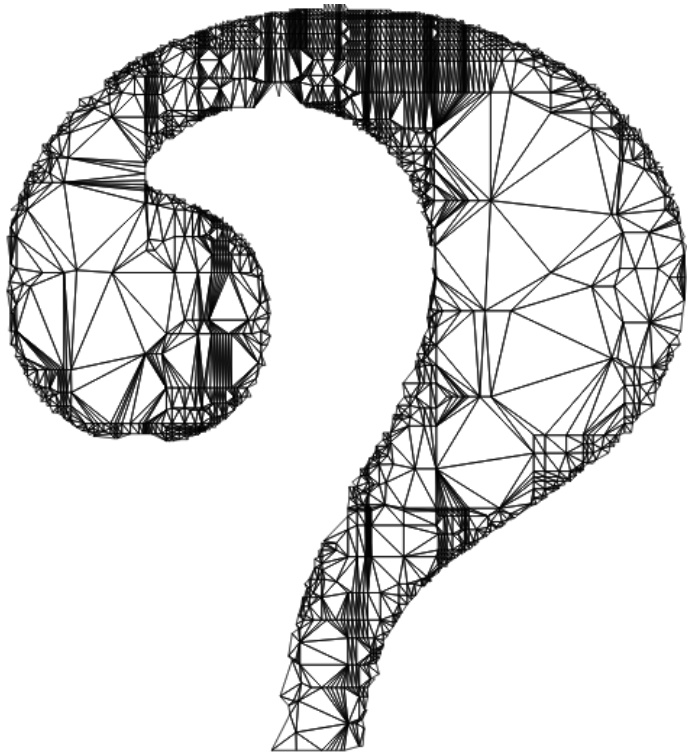
CORDIS

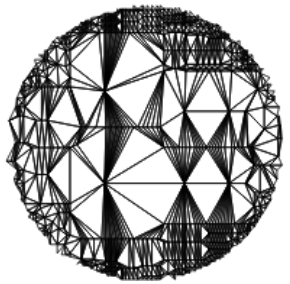
But….

- *are (European) research institutions sharing their research information?*

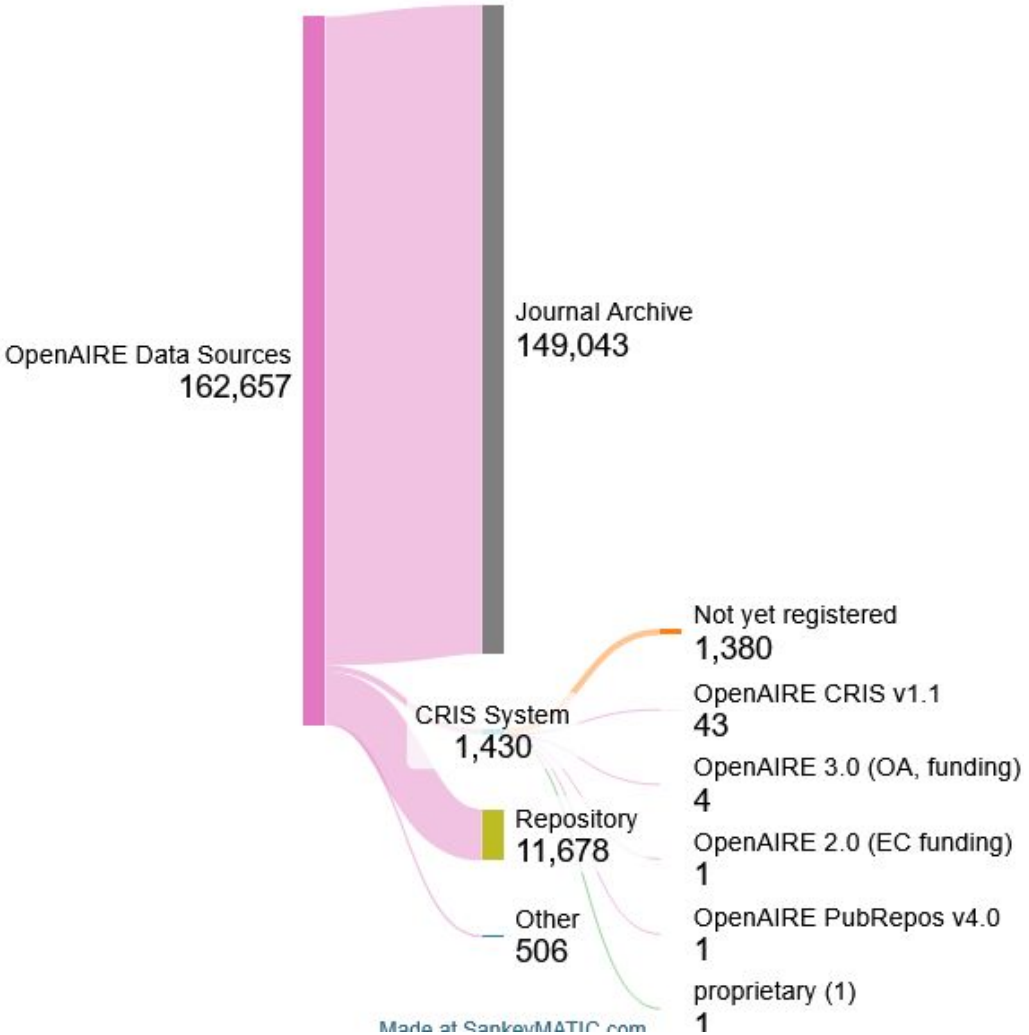
- *are they favoring use and reuse?*

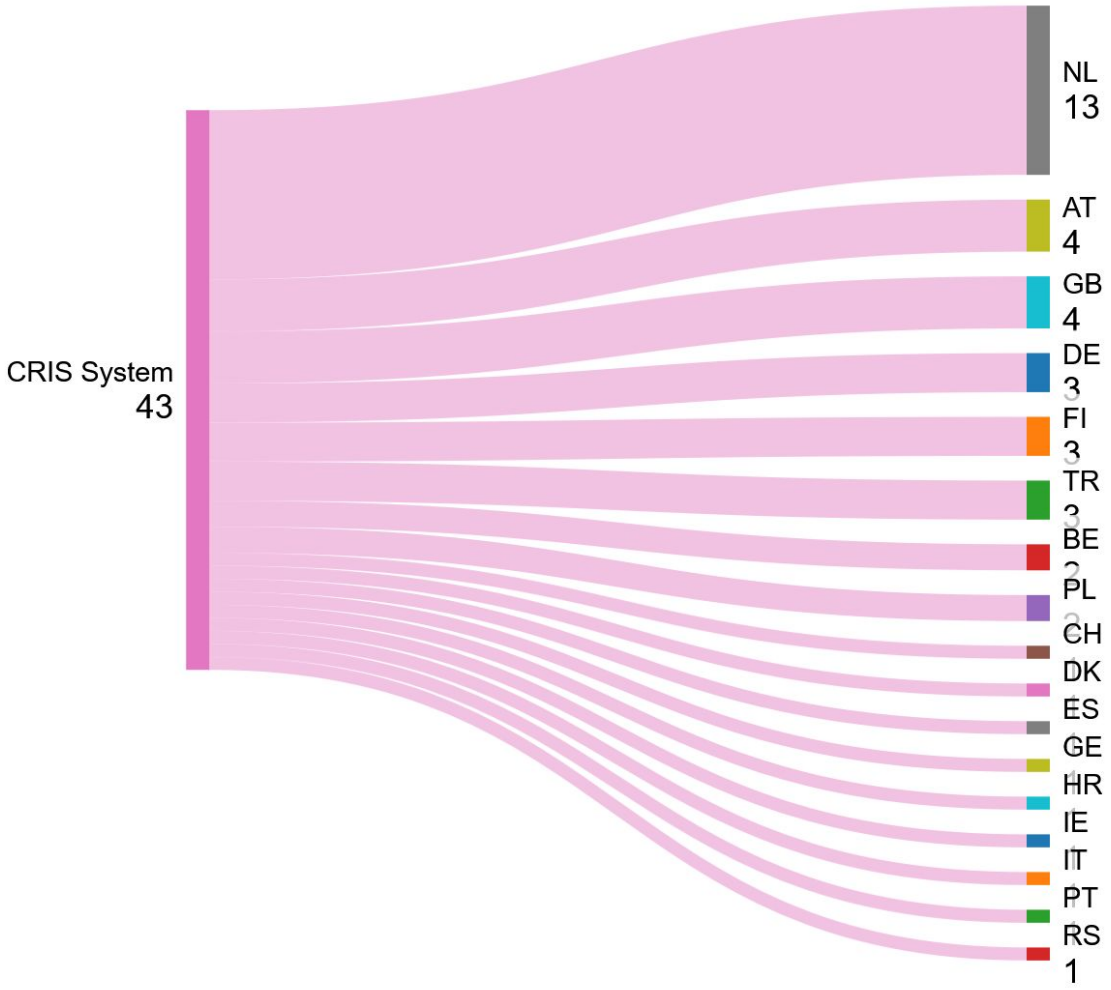
Let's have a look….





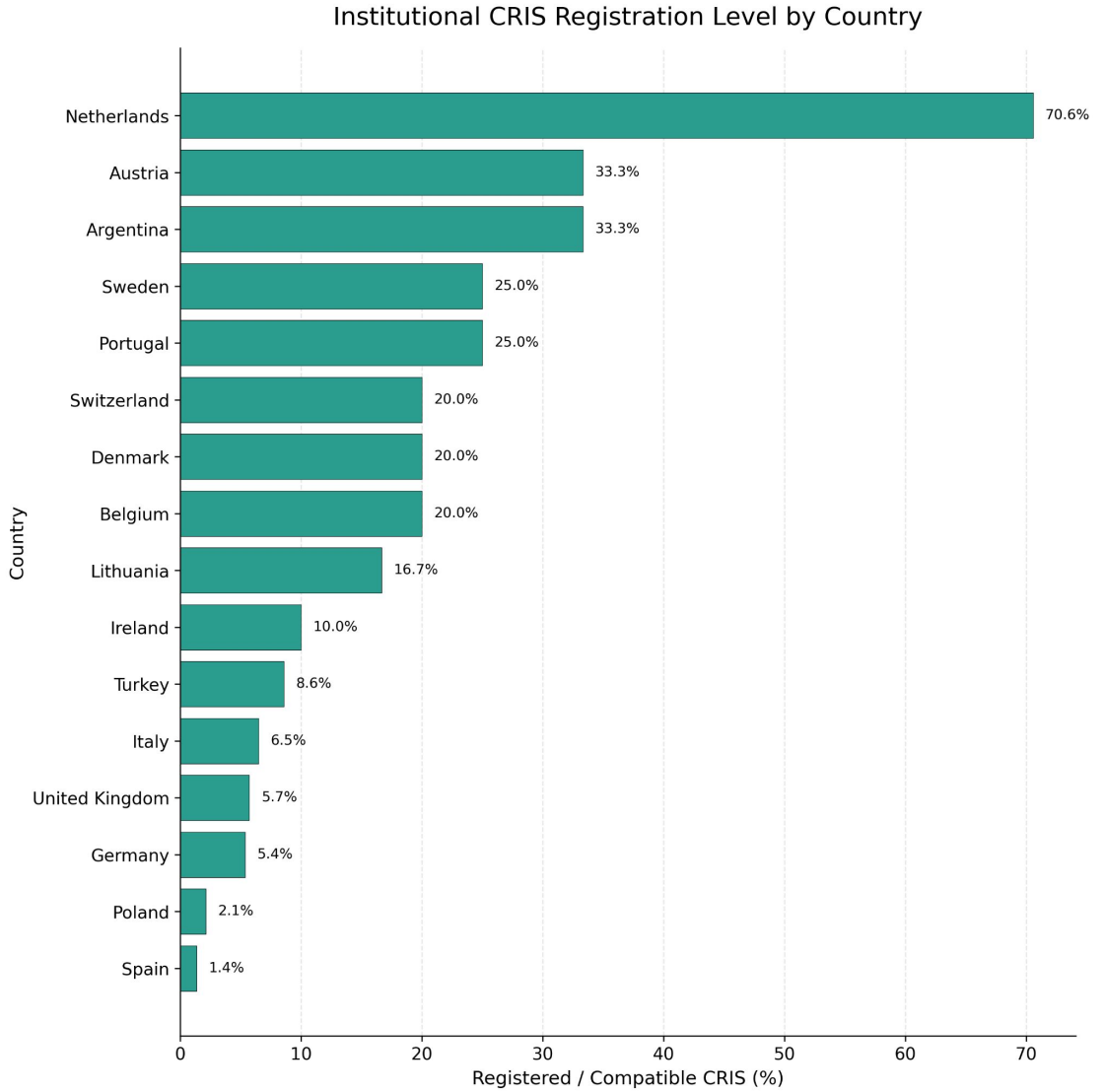
How many RIS are (not) registered and OpenAIRE compliant?





NL is leading by example

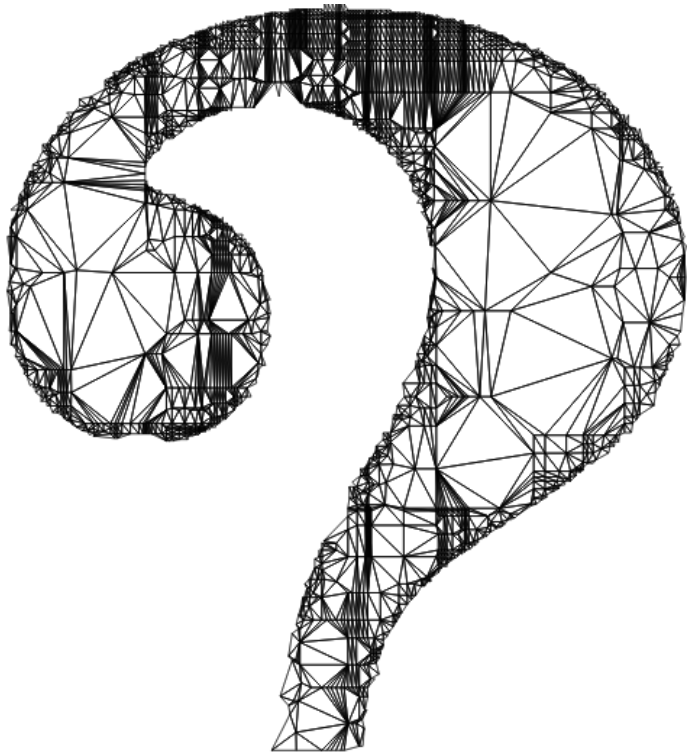
Country	RIS	Products
Netherlands	13	1583726
Italy	2	437203
United Kingdom	4	295883
Germany	2	288461
Austria	4	272132
Denmark	2	210277
Poland	1	104290
Portugal	1	36693
Belgium	1	34637
Argentina	1	18948
Turkey	1	9253
Ireland	1	8643
Switzerland	1	7198
Lithuania	1	5394
Sweden	1	2476

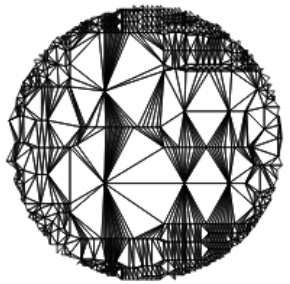


Source: https://orion-dbs.community/collections/sos/, updated Feb 16, 2026

But what does this all…

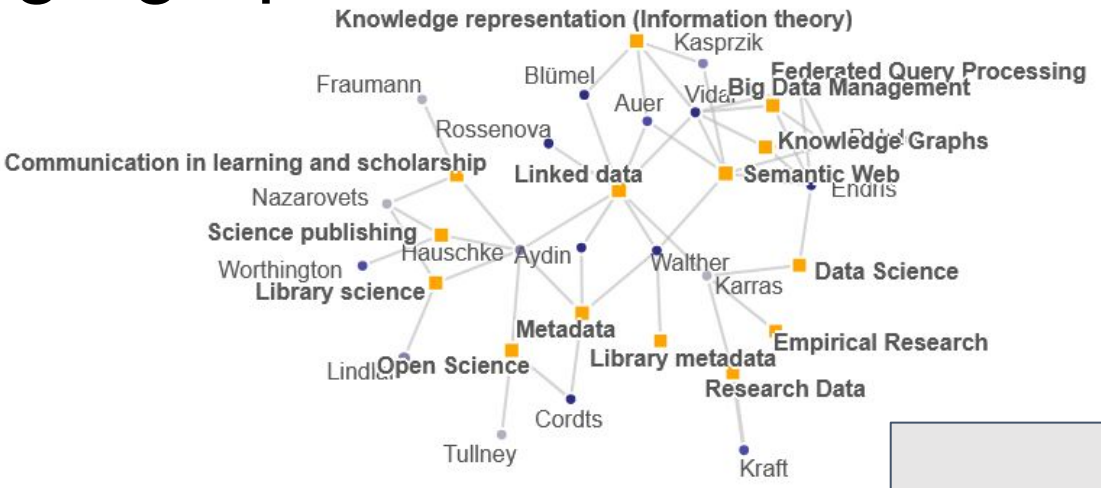
… have to do with VIVO?

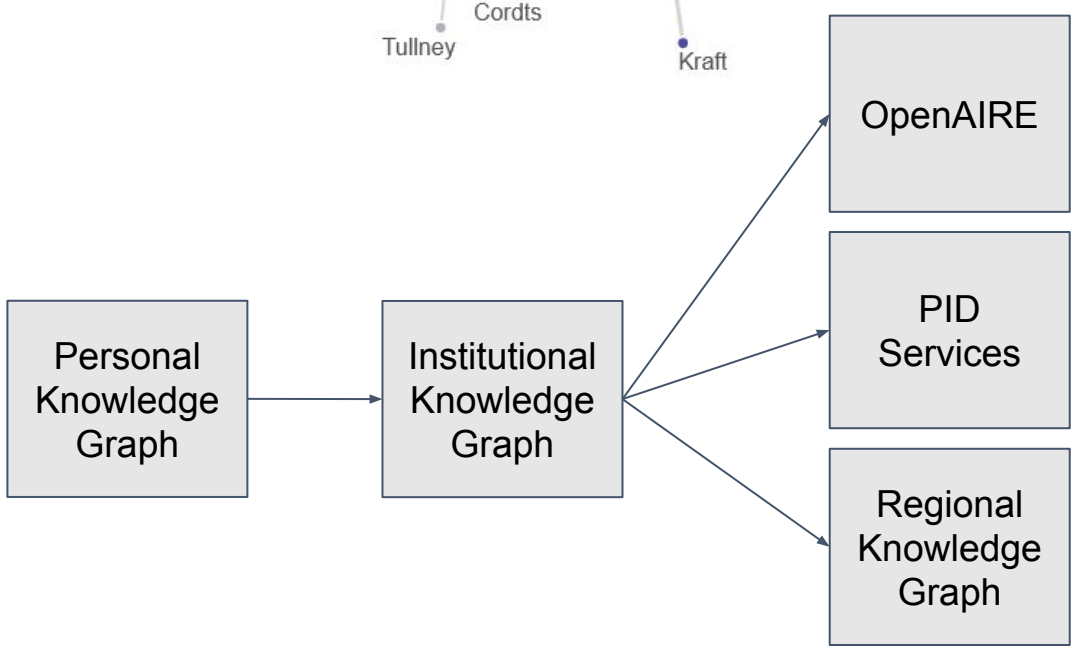




VIVO as an institutional knowledge graph

- Represents institutional research ecosystems as a knowledge graph
- Integrates data about: Researchers, Organisations, Publications, Projects, Grants, Datasets, Academic Events, Instruments, etc.
- Based on Linked Open Data and RDF technologies
- Supports interoperability through shared ontologies and identifiers
- Can aggregate data from multiple institutional sources (HR systems, repositories, grant management…)
- Acts as a bridge from
  - Personal knowledge graphs
  - Institutional systems
- To
  - Regional / national knowledge graphs
  - larger research knowledge graph ecosystems (OpenAIRE, PID Services, etc.)





From CORDIS to VIVO: LORIS Projects

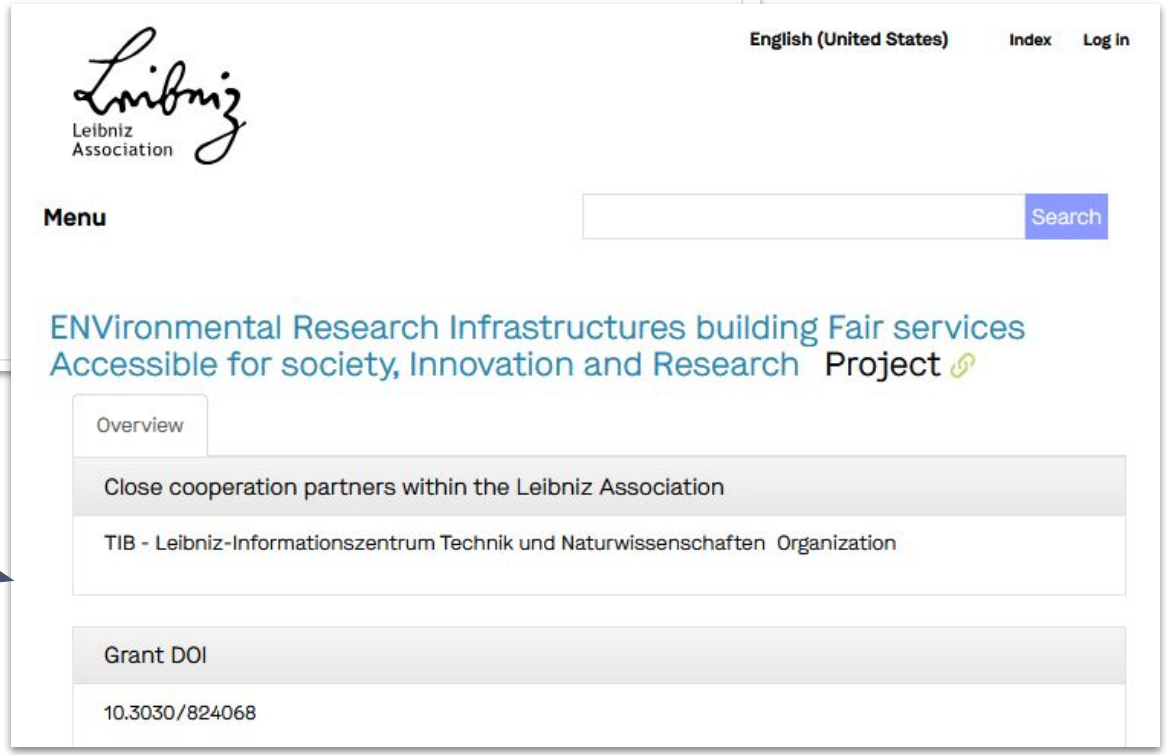
```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX eurio: <http://data.europa.eu/s66#>
PREFIX skos-xl: <http://www.w3.org/2008/05/skos-xl#>
SELECT  ?id ?project ?project_title ?acr_v ?ps ?project_start_date ?project_end_date ?doi ?grant ?grant_id ?tc ?tcv ?tccr  ?fln ?organisation ?orgid ?
organisation_name ?organisation_role ?role_label ?euroSciVoc ?euroSciVoc_label ?fs ?fsname ?fs_id
WHERE {
  ?project a eurio:Project .
  ?project eurio:title ?project_title .
  ?project eurio:identifier ?id .
  OPTIONAL {
   ?project eurio:doi ?doi . }
  OPTIONAL {
  ?project eurio:isFundedBy ?grant ;
         eurio:identifier ?grant_id .


   OPTIONAL {
 ?grant eurio:hasFundingSchemeTopic ?fs .

```

via SPARQL / VIVO Harvester

1080 results in 2.658 seconds



From OpenAlex to VIVO: GROBI


```
id:                  "https://openalex.org/W2007498313"
doi:                 "https://doi.org/10.4018/jkss.2010100105"
title:               "Knowledge Crash and Knowledge Management"
display_name:        "Knowledge Crash and Knowledge Management"
publication_year:    2010
publication_date:    "2010-10-01"
ids:
  openalex:          "https://openalex.org/W2007498313"
  doi:               "https://doi.org/10.4018/jkss.2010100105"
  mag:               "2007498313"
language:            "en"
primary_location:
  id:                "doi:10.4018/jkss.2010100105"
  is_oa:             false
  landing_page_url:  "https://doi.org/10.4018/jkss.2010100105"
  pdf_url:           null
  source:
    id:              "https://openalex.org/S200968236"
    display_name:    "International Journal of Knowledge and Systems Science"
    issn_l:          "1947-8208"
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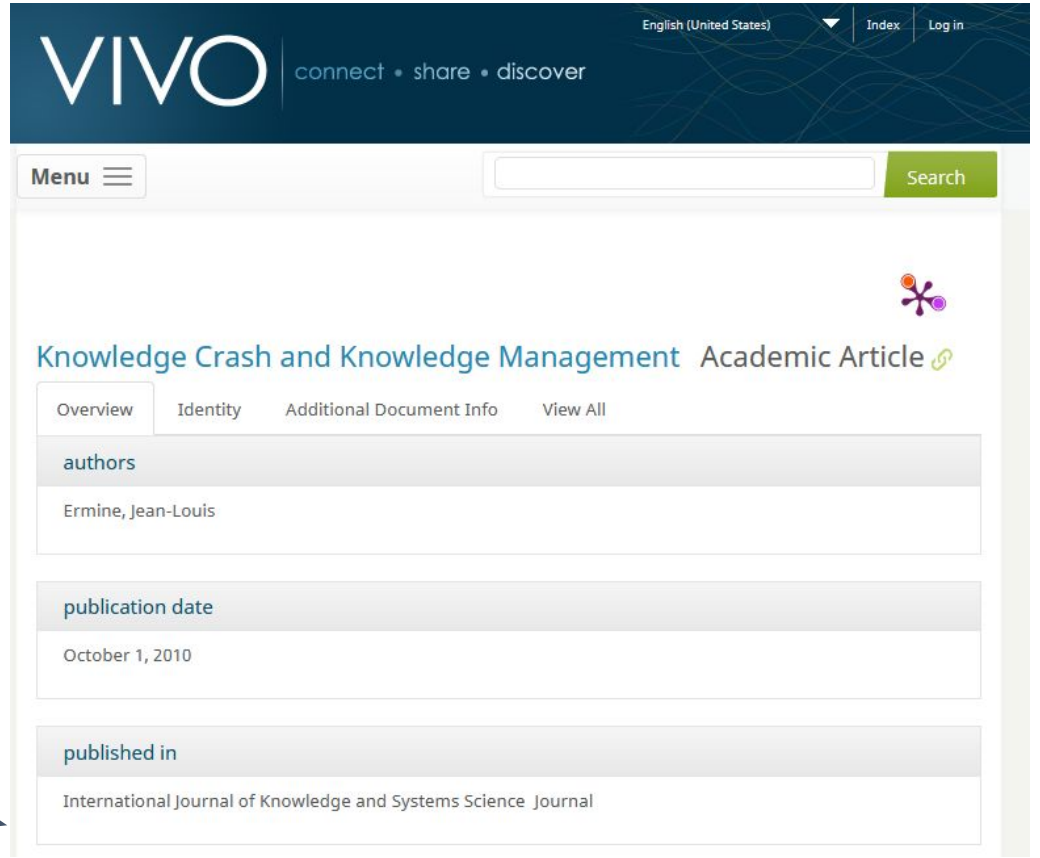
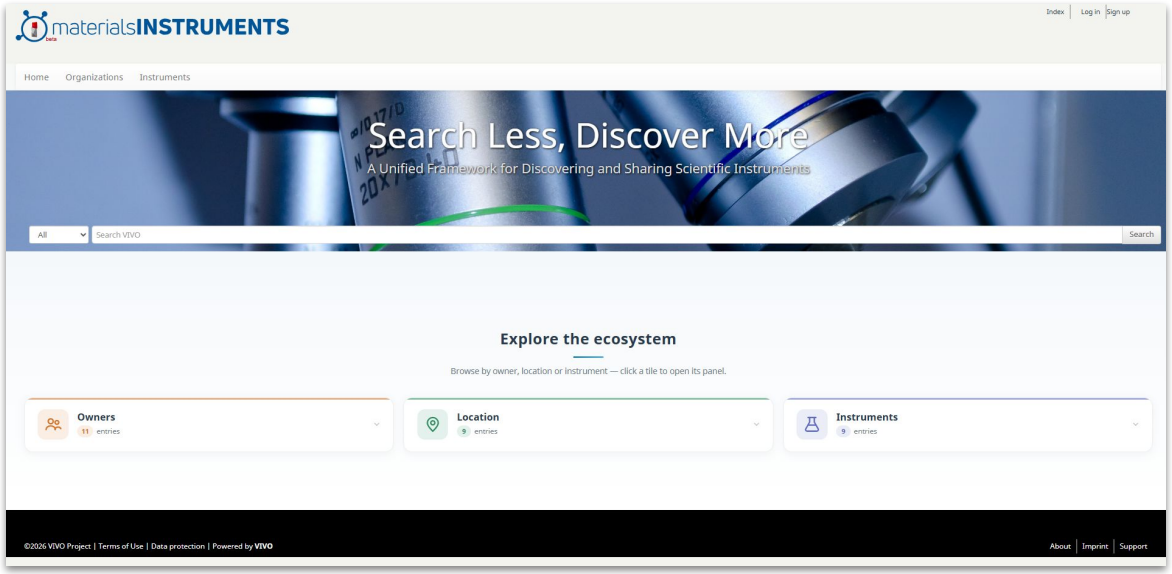
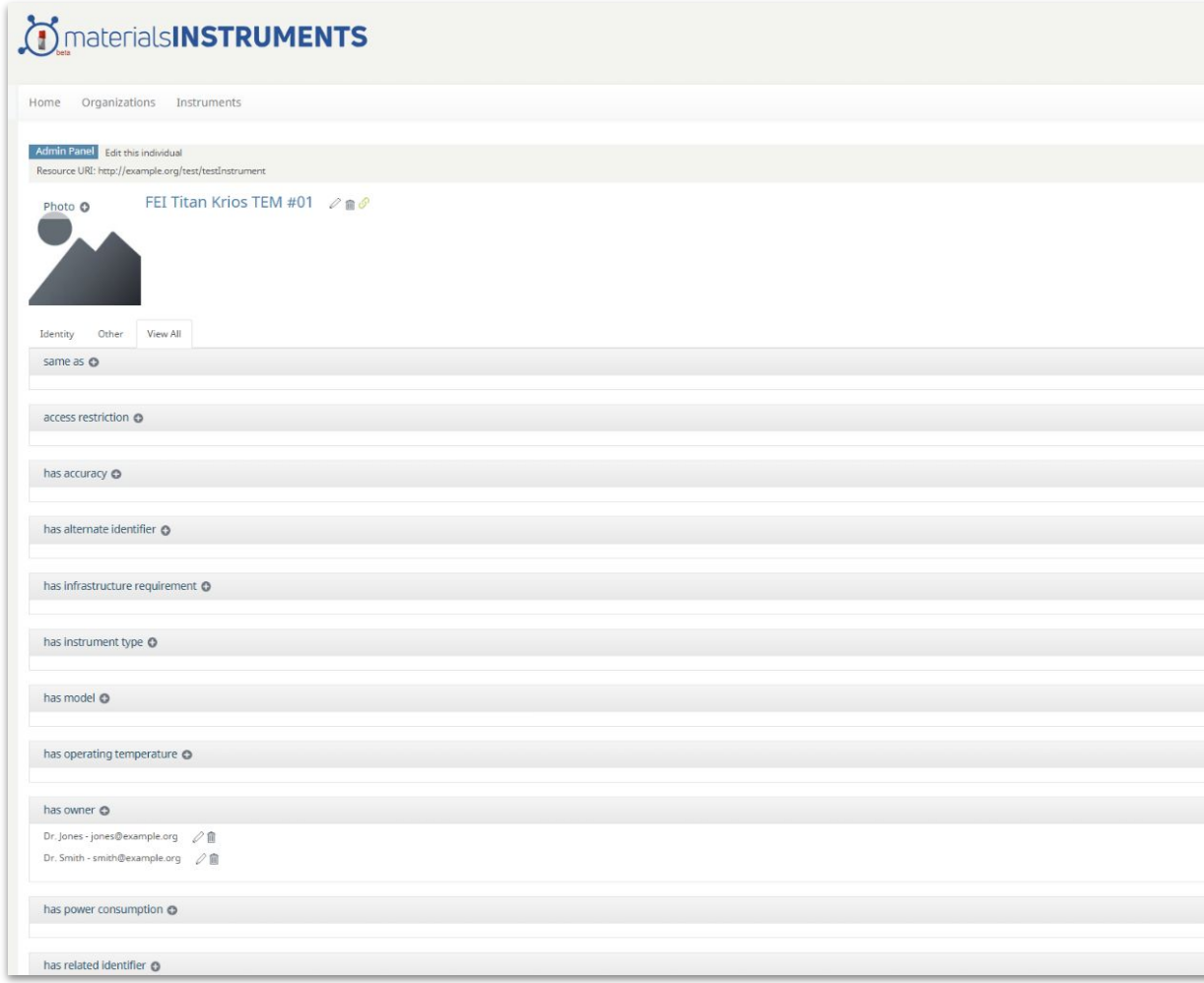
via SPARQL / VIVO Harvester



Materials Instruments

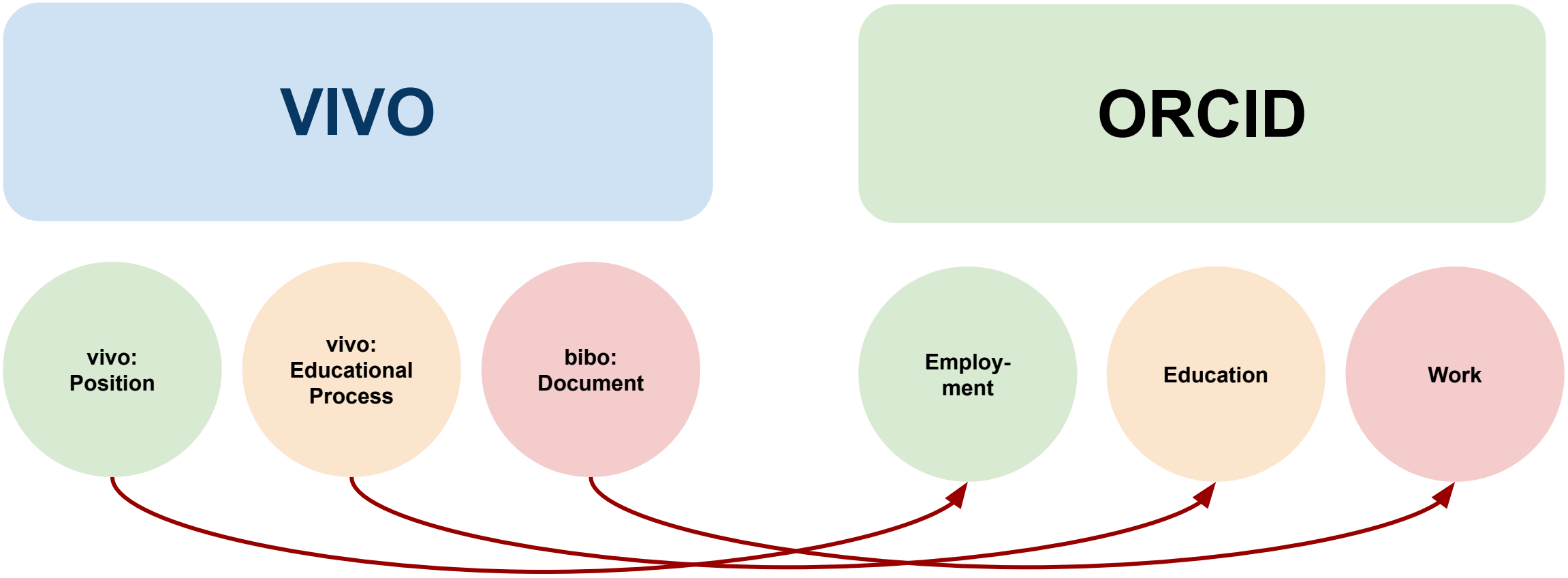
- Build a **central registry** of materials science instruments
- Make information about instruments **easy to find and access**
- Support **sharing and collaboration** across labs
- Increase **visibility and efficient use** of instruments





Literature: Richardson et al. (2025), Stocker et al. (2020), Teixeira da Silva (2025)

PID Graph integration: Push to ORCID



Perspective

Need for research

- Research is needed for a deeper understanding of the individual information ecosystems of researchers
- A lot of tools exist, but no(t a lot of) standardization
  - Obsidian could be a good playground for testing
- Which other knowledge graphs could feed into each other?
  - Entity-specific (Conferences, Instruments, Samples etc.)
- Quality assessment
  - Incomplete or biased metadata
  - Unclear provenance

Technical and other challenges

- Uptake of CERIF 2.0
- Emerging PIDs such as…
  - IGSN
  - PIDINST
  - RAID
- Fragmented PID systems
  - ARK vs. DOI
- Threats to openness
  - Restrictive copyright and licensing models
  - AI sellout by publishers
  - National policies limiting the sharing of research information
- Threats for infrastructure
  - Sustainability for open infrastructures

Literature

Chakraborty et al. (2022). Personal Research Knowledge Graphs. ACM. WWW ’22. https://doi.org/10.1145/3487553.3524654

Fuster Morell, M. (2010). Governance of online creation communities: Provision of infrastructure for the building of digital commons.,

Hogan, A., Blomqvist, E., Cochez, M., D’amato, C., Melo, G. D., Gutierrez, C., Kirrane, S., Gayo, J. E. L., Navigli, R., Neumaier, S., Ngomo, A.-C. N., Polleres, A., Rashid, S. M., Rula, A., Schmelzeisen, L., Sequeda, J., Staab, S., & Zimmermann, A. (2021). Knowledge Graphs. ACM Computing Surveys, 54(4), 1–37. https://doi.org/10.1145/3447772

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Teixeira da Silva, J. A. (2025). Incomplete and mismatching descriptors of scanning electron microscopy (SEM) and SEM microscopes: a case study. EXCLI Journal; 24:Doc1019. https://doi.org/10.17179/EXCLI2025-8605

Richardson, R. A. K., Moon, J., Hong, S. S., & Amaral, L. A. N. (2025). Widespread misidentification of scanning electron microscope instruments in the peer-reviewed materials science and engineering literature. PLOS One, 20(7), e0326754. https://doi.org/10.1371/journal.pone.0326754

Stocker, M., Darroch, L., Krahl, R., Habermann, T., Devaraju, A., Schwardmann, U., D’Onofrio, C., & Häggström, I. (2020). Persistent Identification of Instruments. Data Science Journal, 19. https://doi.org/10.5334/dsj-2020-018

Questions? Feedback?

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