



Consiglio Nazionale
delle Ricerche



ISTITUTO DI SCIENZA E TECNOLOGIE
DELL'INFORMAZIONE "A. FAEDO"



Science. Set free.

OpenAIRE Graph

An open resource for Open Science

Claudio Atzori, PhD
CNR-ISTI



Research evaluation and Open Science a transition in the making



CITATION INDEX

Cited Item

Sample Display

	VOL	PG	YR
ANSANELLI V 87 AM J SURG BOLLER M	148	117	
ANSARA I 91 SEMIN CHIM ETAT SOL WAGNER C	127	277	97
ANSARI A 88 AM J GASTROENTEROL ANDRESCO A	50	456	
REDDI K K 88 S MED J WAYNE KS	42	173	97
ANSARI AH 89 AM J OBSTET GYN PENTILA M	103	511	8
STRUYE FA 90 FERTILITY STERILITY YOUNG JH	21	873	
ANSERIN F 83 OR HEBDOMAD SE ACAD PEZAT M	258	2618	
BLANCHARD P 85 T AM NUCL SOC T AM NUCL S	20		23
			151
			97
			M

Citing Item

citing author
journal abbreviation
volume, page & year

Consult the Source Index section of the SCI for bibliographic information on all citing items in the Citation Index. (See sample below)

Codes Indicate Type of Source Item:

- Blank articles, reports, technical papers, etc.
- B book reviews (from The Scientist, Science or Nature)
- C corrections, errata, etc.
- E editorial material
- I items about individuals (tributes, obituaries, etc.)
- L letters, communications, etc.
- M abstracts from meetings
- NI news items
- R reviews
- REP reprints
- W computer reviews (hardware reviews, software reviews, database reviews)

A complete description of each source item code appears in the SCI Codes & Conventions: Citation Index, section of the instructional material.

SOURCE INDEX ENTRY

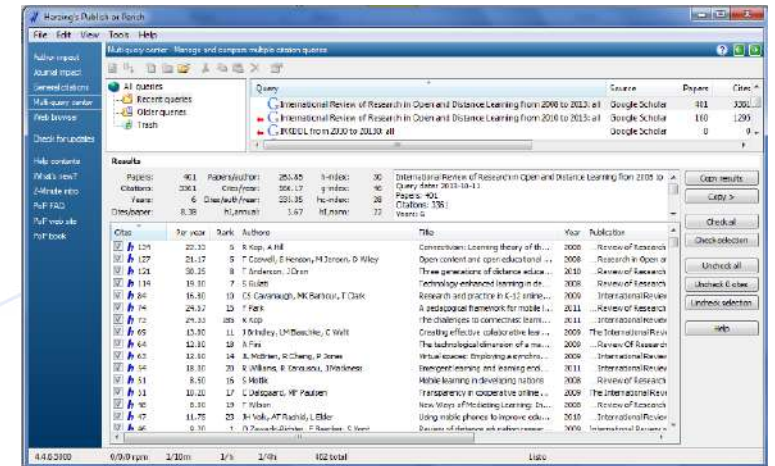
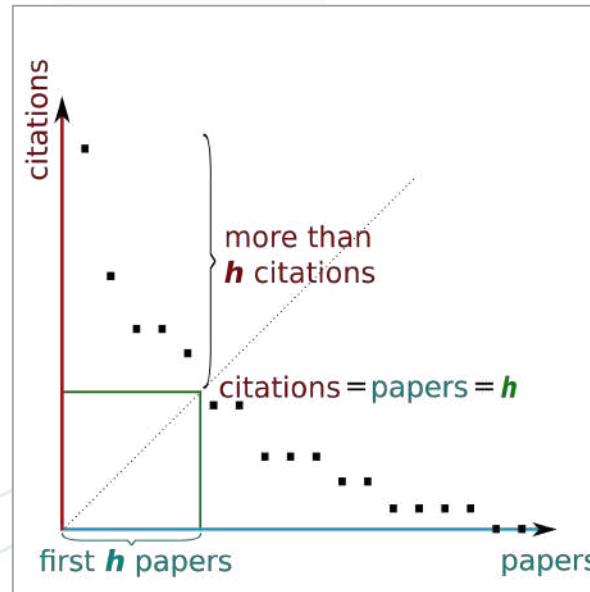
PEZAT M
*TANGUY B VLASSE M PORTIER J HAGENMUL P—(FR)
RARE EARTH NITRIDE FLUORIDES
J SOL ST CH 18(4):381-390 87 A4884 28R

ISI® Journal Accession Number



- Pre – Internet era: Science Citation Index (SCI), Current Contents, Journal Citation Reports
- WOS: monopoly based on sole database focused on the “core” science, shared algorithms, proprietary tools
- Scopus: sold for having more content, rising questions about the coverage

Research evaluation and Open Science a transition in the making

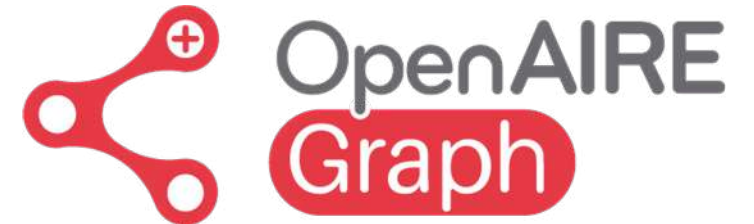


- Google Scholar + H-index + publish or perish: bibliometrics @ home
- Google Scholar researcher profiles
- Question about openness

Research evaluation and Open Science a transition in the making



I40C



OpenAIRE Graph

Putting research into context, making the connections

Foundations of a complete, open, and transparent scholarly publishing infrastructure



Reproducibility and transparency require tracking of all products of research, their “context”, and their semantic links

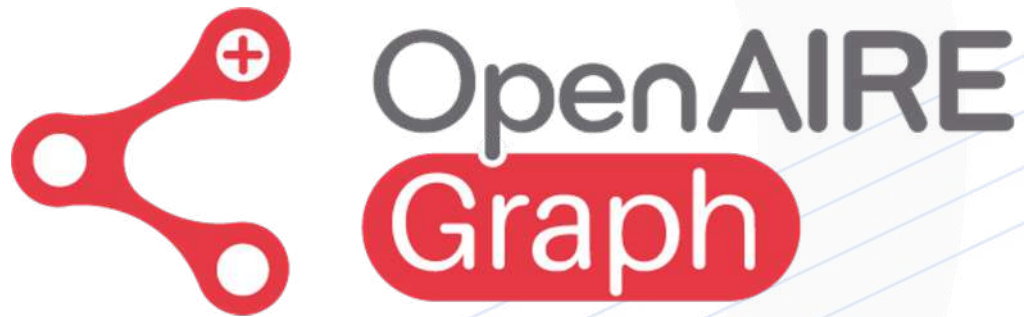


Monitoring and assessing quality, impact, and “open scienceness” of research must be a transparent, reproducible process, inclusive of research “context” and metrics

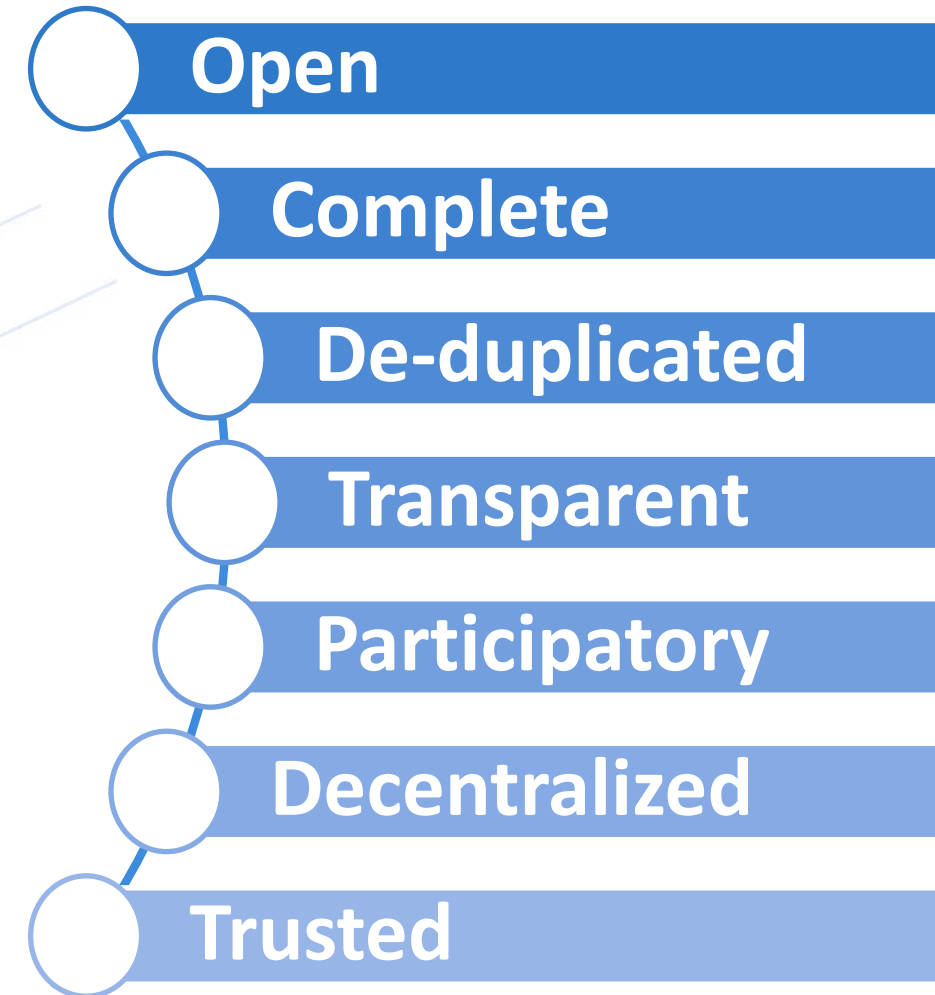


Discovery of reproducible research must find new ways, moving beyond the “article-driven” search, taking into account metrics and intent

Overview of the OpenAIRE Graph



“A collection of metadata describing **objects** in the research lifecycle and **relationships** among them”



graph.openaire.eu



OpenAIRE Graph

OpenAIRE Graph documentation 6.0.0 Search

Overview

- Data model >
- Public API >
- Downloads >
- Graph production workflow >
- Relevant publications
- License
- Versions & changelog
- Helpdesk >

Version: 6.0.0

Overview

The **OpenAIRE Graph** (formerly known as the OpenAIRE Research Graph) is one of the largest open scholarly record collections worldwide, key in fostering Open Science and establishing its practices in the daily research activities. Conceived as a public and transparent good, populated out of data sources trusted by scientists, the Graph aims at bringing discovery, monitoring, assessment of science back in the hands of the scientific community.

Imagine a vast collection of research products all linked together, contextualised and openly available. For the past years OpenAIRE has been working to gather this valuable record. It is a massive collection of metadata and links between scientific products such as articles, datasets, software and other research products, entities like organisations, funders, funding schemes, projects, communities, and data sources.

The OpenAIRE Graph aggregates millions of metadata records collected from trusted data sources, including:

- Open Access journals registered in DOAJ
- Crossref
- Unpaywall
- ORCID
- Microsoft Academic Graph
- Datacite

graph.openaire.eu

OpenAIRE Graph




ABOUT RESOURCES SUPPORT


Open. Transparent. Interconnected.


OpenAIRE Graph is an open resource that aggregates a **collection of research data properties** (metadata, links) available within the OpenAIRE Open Science infrastructure for funders, organizations, researchers, research communities and publishers to interlink information by using a semantic graph database approach.

LEARN MORE

Data sources

 **GitHub**  Applications Database
Supporting 

 Software Heritage
PRESERVING TECHNICAL KNOWLEDGE

 **elixir**
bio.tools

... and more tools and software sources

 **frontiers**  **F1000**
Faculty of 1000

 **PLOS**  **Springer**

... and more publishers

 **CORDIS**
Community Research & Development
Information Service

 **NSF**

 **DFG**
Deutsche
Forschungsgemeinschaft


... and more European and international funders

 **unpaywall**



 **OpenCitations**


 **Microsoft**


... and more research graphs


 **OpenAIRE
Graph**


 **re3data.org**
REGISTRY OF RESEARCH DATA REPOSITORIES

 **OpenDOAR**  **Crossref**

 **FAIRsharing.org**
standards, databases, policies

 **ROR**

 **ORCID**

 **DataCite**

... and more registries

 **LA Referencia**
Red de repositorios de acceso abierto a la ciencia

 **SciELO**

 **DOAJ**
DIRECTORY OF
OPEN ACCESS
JOURNALS

... and more aggregators

 **arXiv.org**

 **zenodo**
Research. Shared.

 **PubMed**

 **HAL**
archives-ouvertes.fr

... and more thematic and institutional repositories

 **RePEc**

 **egi**

 **DARIAH-EU**

 **elixir**

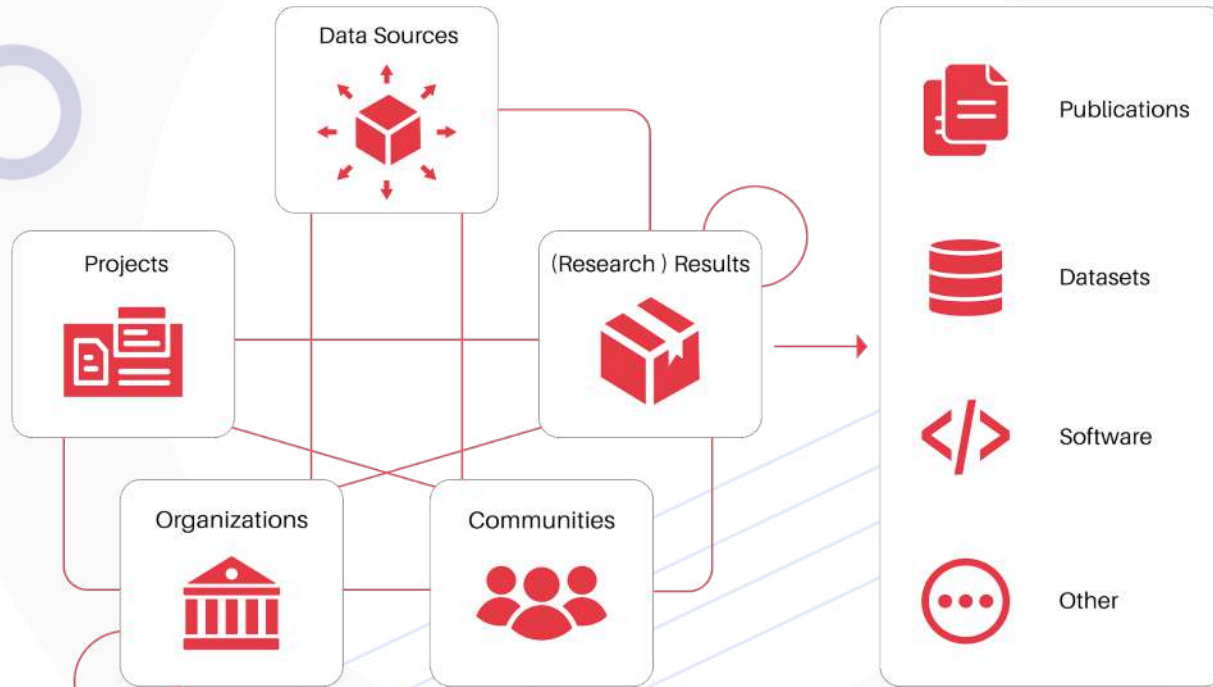
 **ECRIN**
EUROPEAN CLINICAL RESEARCH
INFRASTRUCTURE NETWORK

 **EPOS**
EUROPEAN PLATE OBSERVING SYSTEM

 **EOSC-Life**

... and more infra and RI sources

OpenAIRE Graph data model



OpenAIRE Graph documentation 6.0.0

Overview

- Data model
- Entities
- Relationships
- PIDs and identifiers
- Public API
- Downloads
- Graph production workflow
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- Versions & changelog
- Helpdesk

Data model

Version: 6.0.0

Data model

The OpenAIRE Graph comprises several types of **entities** and **relationships** among them.

The latest version of the JSON schema can be found on the **Downloads** section.

The figure above, presents the graph's data model. Its main entities are described in brief below:

- **Results** represent the outcomes (or products) of research activities.
- **Data Sources** are the sources from which the metadata of graph objects are collected.
- **Organizations** correspond to companies or research institutions involved in projects, responsible for operating data sources or consisting the affiliations of Product creators.
- **Projects** are research project grants funded by a Funding Stream of a Funder.
- **Communities** are groups of people with a common research intent (e.g. research infrastructures, university alliances).

FURTHER READING

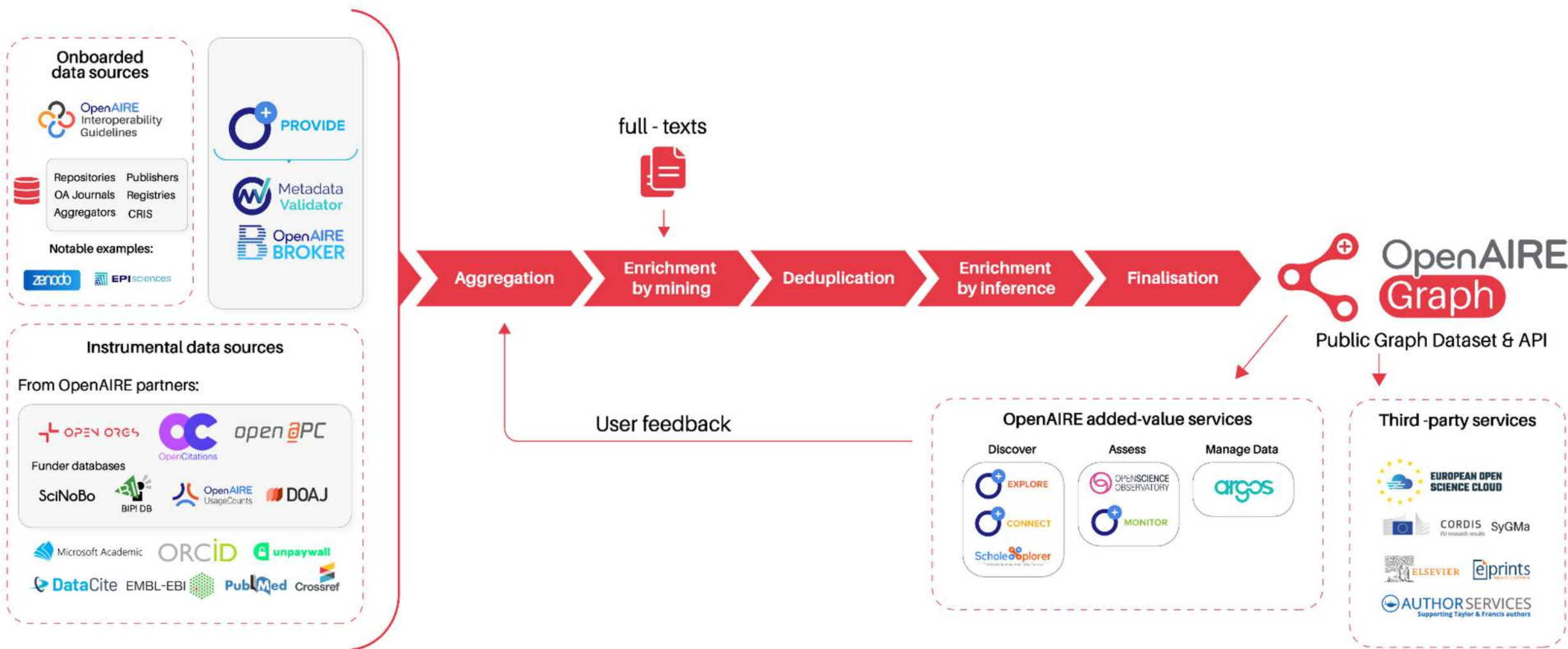
A detailed report on the OpenAIRE Graph Data Model can be found on Zenodo.

Previous [« Overview](#)

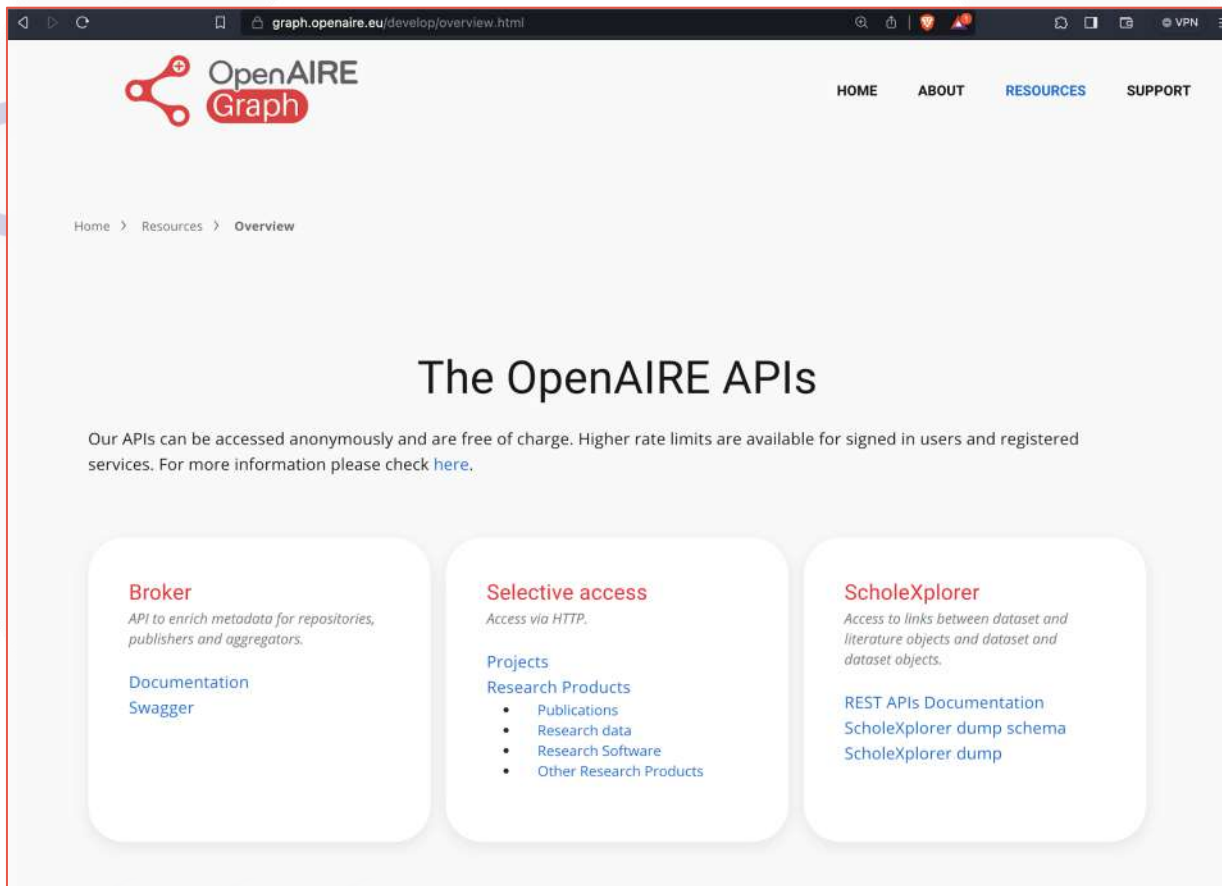
Next [Entities »](#)

more @ graph.openaire.eu/docs/data-model

OpenAIRE Graph: the supply chain



Access to the OpenAIRE Graph



The screenshot shows the 'OpenAIRE Graph' developer overview page. The page title is 'The OpenAIRE APIs'. Below the title, it states: 'Our APIs can be accessed anonymously and are free of charge. Higher rate limits are available for signed in users and registered services. For more information please check [here](#).' There are three main sections: 'Broker' (API to enrich metadata for repositories, publishers and aggregators), 'Selective access' (Access via HTTP, listing Projects and Research Products like Publications, Research data, Research Software, and Other Research Products), and 'ScholeXplorer' (Access to links between dataset and literature objects and dataset and dataset objects, listing REST APIs Documentation, ScholeXplorer dump schema, and ScholeXplorer dump).

Datasets @

graph.openaire.eu/docs/category/downloads

- OpenAIRE Graph
- OpenAIRE Funded products
- OpenAIRE COVID-19
- OpenAIRE communities
- DOIBoost
- OpenAIRE ScholeXplorer

zenodo.org/communities/openaire-research-graph

OpenAIRE MONITOR

WHY MONITOR?



Know Thyself

Resources
Research Output
Open Science Uptake
Collaborations
Visibility
Impact



Understand Thyself

Pathways
Insights
Opportunities



Position Thyself

Decision making
Reporting
Story telling

Why OpenAIRE MONITOR?

- **Relevance for the community**
 - Co-develop indicators that make sense to all
- **It's all about open science and open data**
 - Inclusiveness, transparency and replicability
- **Full coverage of Open Science**
 - Beyond publications: Research Data, Software, Other Research Products
 - Linked science
- **Fully embedded in EOSC infrastructure**
 - Starting from content providers to included metrics

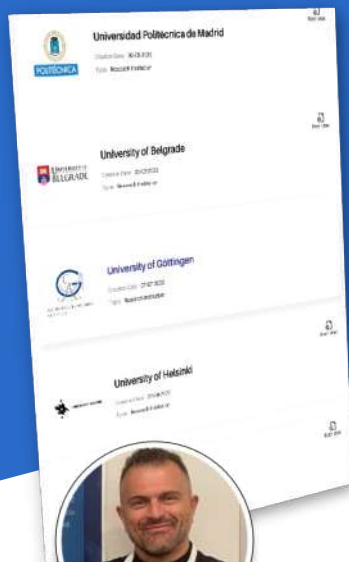
How? Methodological Principles

- **Openness & transparency:** Assumptions are openly and clearly presented
- **Coverage & accuracy:** Based on data from multiple authoritative data sources with proven AI-driven mechanisms
- **Clarity & replicability:** Indicators documented, verified and used by the scholarly communication community
- **Readiness & timeliness:** Big data infrastructure operational workflows to warrant timely results

What? Dashboard on Demand

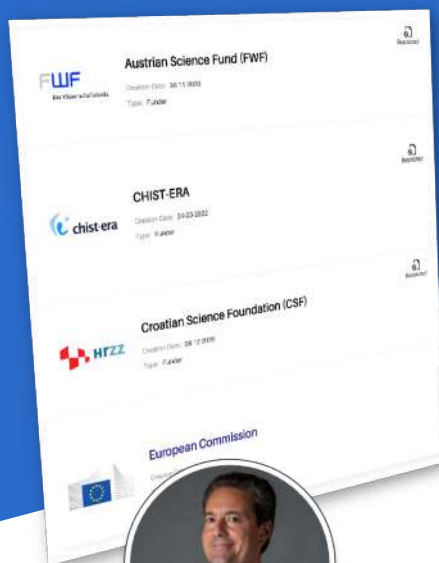


Institutions



Your OpenAIRE expert
Leonidas Pispiringas

Funders



Your OpenAIRE expert
Harry Dimitropoulos

Research Initiatives



Your OpenAIRE expert
Alessia Bardi

Countries



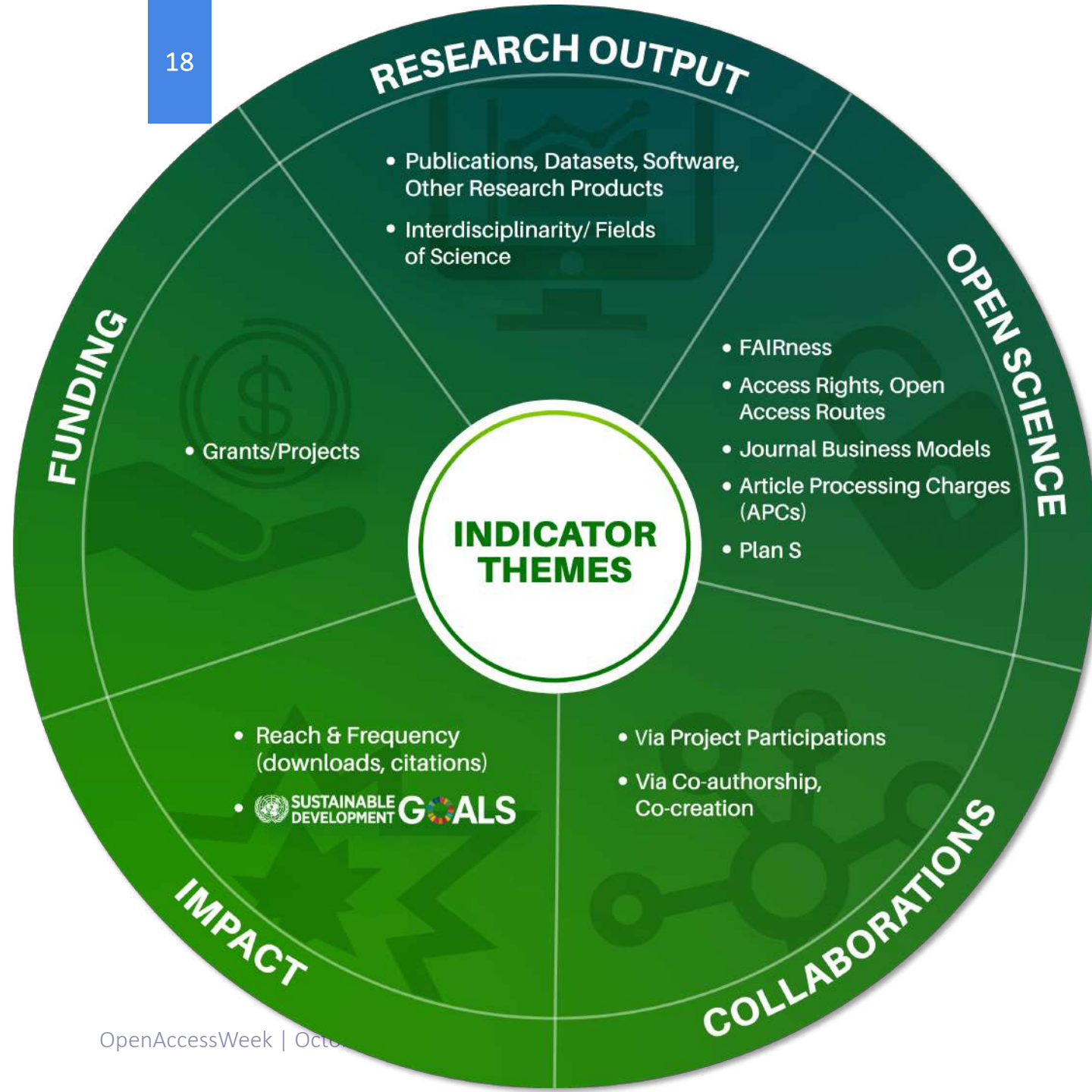
Your OpenAIRE expert
Ioanna Grypari

<https://monitor.openaire.eu>

<https://osobservatory.openaire.eu>

What?

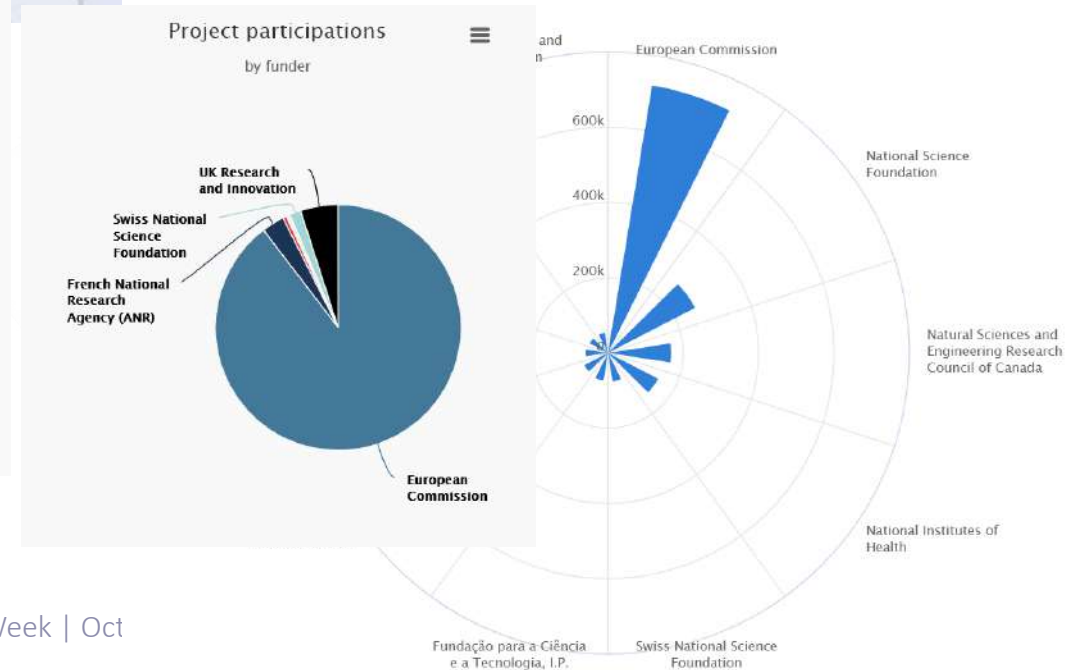
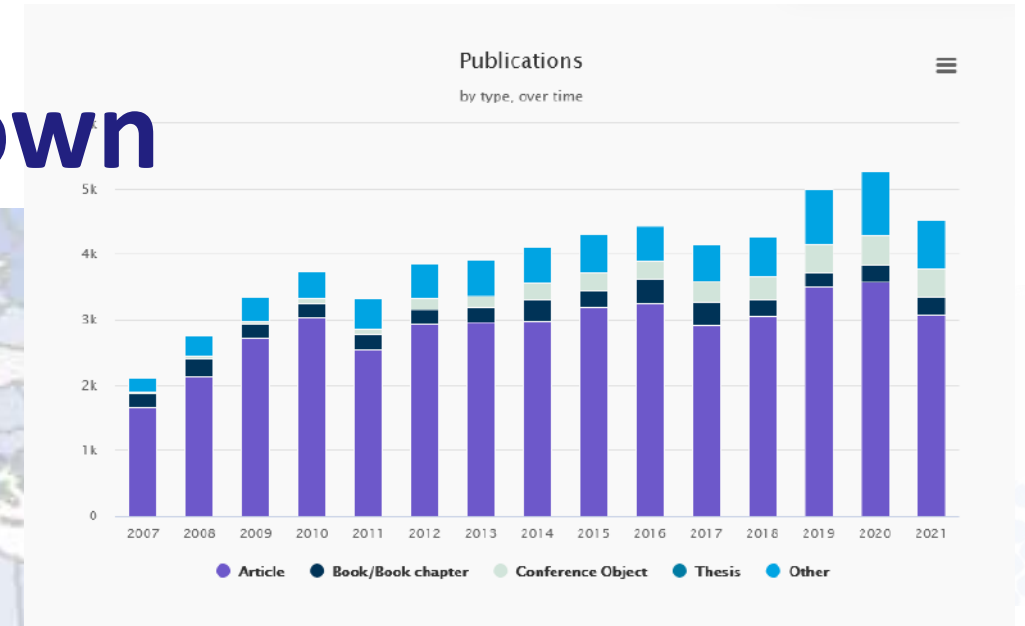
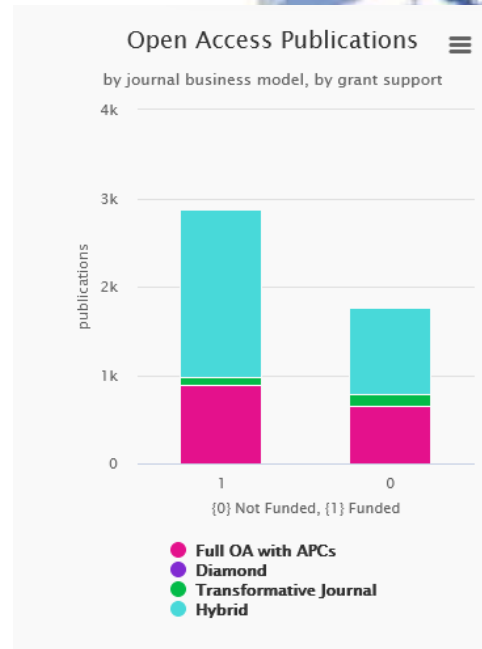
Indicator themes




What? Indicators Breakdown

By fields of interest

- research product type
- domains (FoS)
- time
- countries
- data sources
- funders
- ...



What? Features

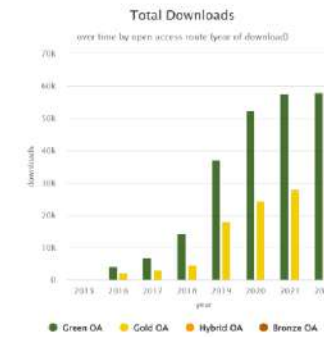
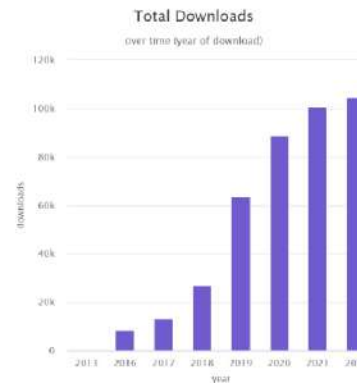
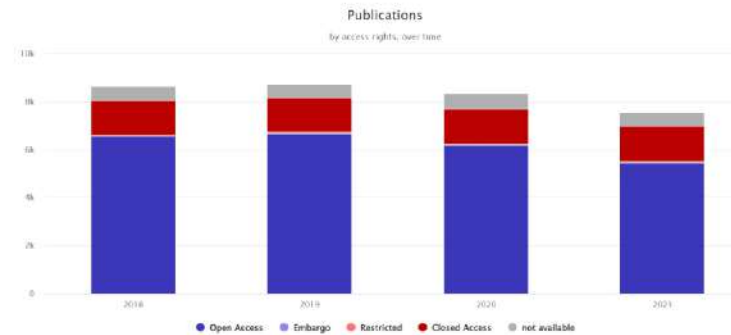
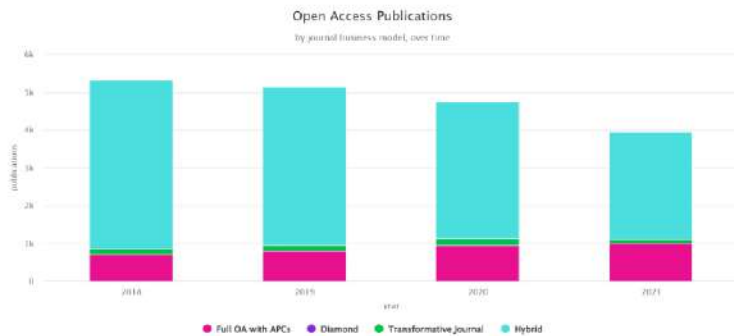
- **User-friendly** dashboards
 - interactive visualizations
 - exporting capabilities (download data & visualizations in different formats)
 - filtering
 - browsing via direct links to  EXPLORE
 - editing of visualizations
- **Control** how you share
 - **Public** indicators for external stakeholders – *Showcasing*
 - **Restricted** indicators for **team-members** – *Internal Monitoring*
 - **Private** indicators for “work in progress” - *Reviewing*
- **Customize & validate** in one-on-one sessions with our experts

<https://unimibox.unimi.it/index.php/s/9WsbKCCEzm7trri>

Future of scholarly communication



Si presentano qui alcuni dati tratti dall'Open science monitor di OpenAIRE. La dashboard dedicata all'ateneo (in versione beta) registra fra gli altri dati il modello di business delle pubblicazioni open access, le politiche di accesso e i download (anche per tipologia di file scaricato)



Relazione Open science 2022

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Can I trust the indicators?

a.k.a can I trust the processes for their calculation?

a.k.a can I trust the underlying data?

Challenges

- Data access / availability
- Data incompleteness, format inconsistency, default values
- Duplicate data
- Old / stale data
- Inconsistent record identification
- Coverage

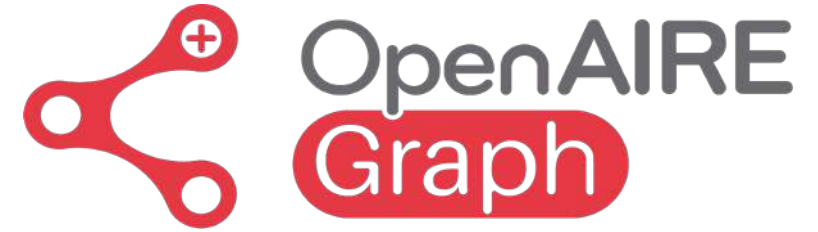
“Not everything that counts can be counted, and not everything that can be counted counts.”

The Graph as a trustable resource

- Vocabulary based cleaning
- Automation of the aggregation processes
- Provenance information
- Transparency of the processes
 - Documentation
- Repeatability

Supporting projects

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Several extensions in the context of ongoing & future projects



FAIRCORE4EOSC

- Intelligent NL and impact-based search, community recommendation profiles, support for and inference of RAIDs
- Adopting the RDA SKG common data representation for Scientific Knowledge Graphs



SciLake

- metadata enhancements & indicators derived from community specific use case pilots leveraging SKGs



GraspOS

- Innovate the research assessment process leveraging the OpenAIRE Graph contents

CRAFT-OA

CraftOA

- Diamond institutional open access publishing & plugins for the OJS platform (broker and guidelines)



OSTrails

- Become part of a federation of cross-border and cross-discipline SKGs, interoperable with DMP and FAIR assessment platforms



Thank you

On behalf of the OpenAIRE Graph team

claudio.atzori@isti.cnr.it

info@openaire.eu