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e-infrastructures for Research and education

Keynote EuroCRIS24

Vienna 15.5.2024

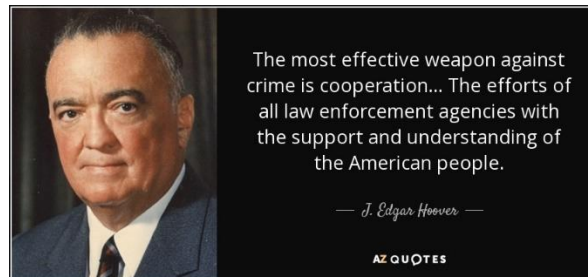


"Our propensity to cooperate has old evolutionary roots".

Why Humans and Other Primates Cooperate

Our ability to cooperate in large societies has deep evolutionary roots in the animal kingdom

BY FRANS DE WAAL



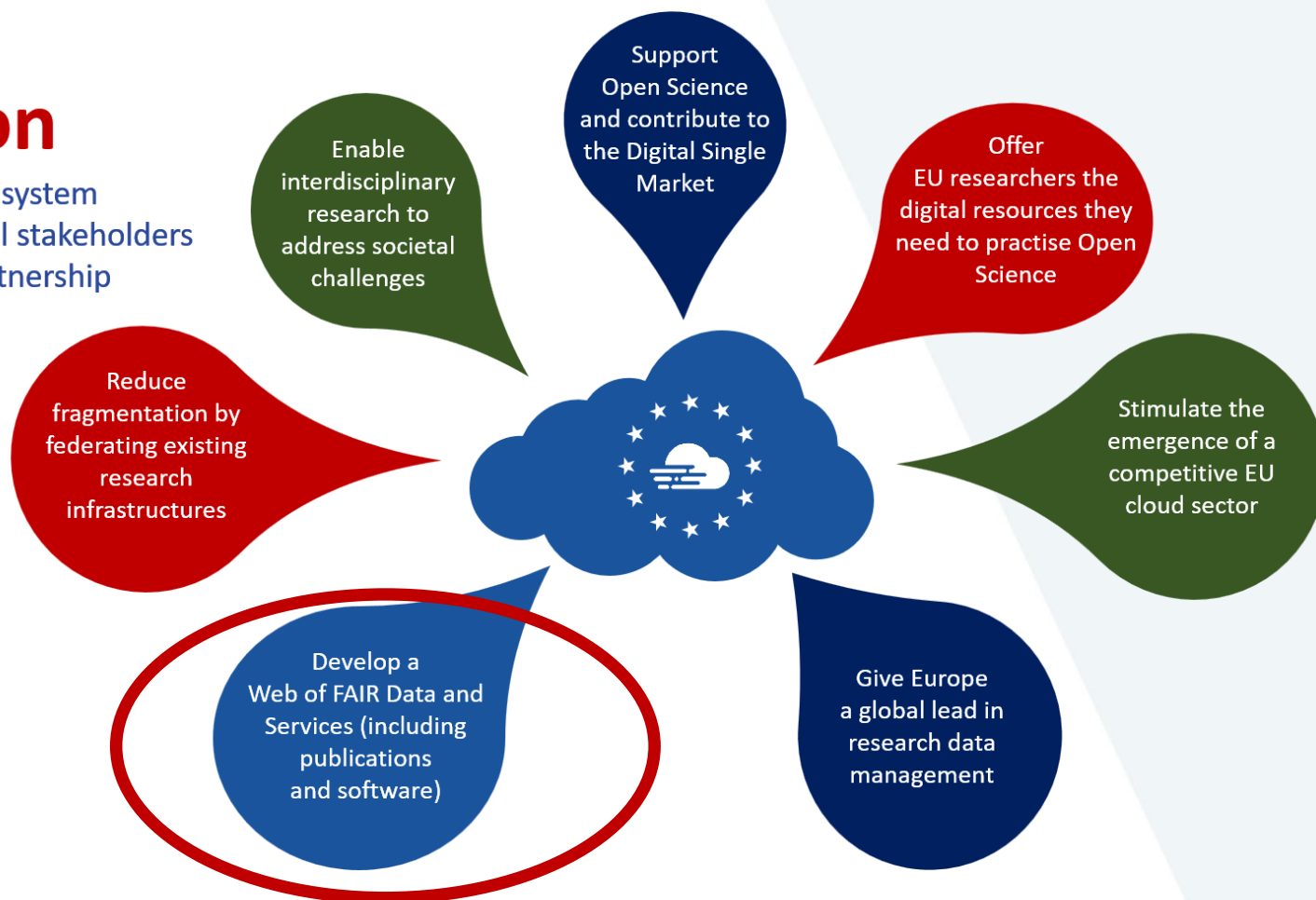
The European Open Science Cloud

“We therefore declare to work together towards realising the potential of the European Open Science Cloud for the benefit of citizens, society and the economy”

Vienna Declaration October 2018

The Vision

Building the EOSC ecosystem
collaboratively with all stakeholders
through the EOSC Partnership



EOSC-a definition

ABI Technik 2019; 39(2): 130–141

DE GRUYTER

Fachbeitrag

Paolo Budroni, Jean-Claude Burgelman, Michel Schouppe

Architectures of Knowledge: The European Open Science Cloud

<http://doi.org/10.1515/abitech-2019-2006>

Abstract: In November 2018, the European Commission launched the European Open Science Cloud (EOSC) in Vienna. The EOSC envisions establishing a European data infrastructure, integrating high-capacity cloud solutions, eventually widening the scope of these services to include the public sector and the industry. Understanding the EOSC structure is a first step in recognizing the opportunities offered by the newly launched EOSC. This article offers some reflections for a better understanding of the realization of the EOSC at the present stage, including currently ongoing developments.¹

Keywords: European Open Science Cloud, EOSC, Digital Single Market

1 European Open Science Cloud (EOSC): a process, not a project

In November 2018, under the Austrian Presidency, the European Commission launched the European Open Science Cloud at the University of Vienna.²

The EOSC is not a new infrastructure or software package, it is a process of making research data in Europe accessible to all researchers under the same terms of use and distribution. The initiative aims to push Europe towards a culture of open research data that are detectable, accessible, interoperable and reusable (FAIR), hence allowing all European researchers to embark on a journey towards data-driven science.

EOSC-the vision

22 Jan 2020

EC President Ursula von der Leyen talks EOSC in Davos



"We are creating a European Open Science Cloud now. It is a trusted space for researchers to store their data and to access data from researchers from all other disciplines. We will create a pool of interlinked information, a 'web of research data'. Every researcher will be able to better use not only their own data, but also those of others. They will thus come to new insights, new findings and new solutions."

<https://eosc-portal.eu/news/ec-president-ursula-von-der-leyen-talks-eosc-davos>

EOSC vision in a nutshell

What

EOSC is the European web of FAIR data and related services for research

Research data that is easy to find, access, interoperate and reuse (FAIR)
Trusted and sustainable research outputs are available within and across scientific disciplines

Why

Unlock the full potential of research data to accelerate discoveries and innovation

How

- Ensure that Open Science practices and skills are rewarded and taught, becoming the 'new normal'
- Enable the definition of standards, and the development of tools and services, to allow researchers to find, access, reuse and combine results
- Establish a sustainable and federated infrastructure enabling open sharing of scientific results



Strategic
Research and
Innovation
agenda (SRIA)
eosc.eu/sria-mar

Credits: Karel Luyben, EOSC A

EOSC Lustrum Event (October 2023)

The 2023 statement on the future of the European Open Science Cloud (EOSC):

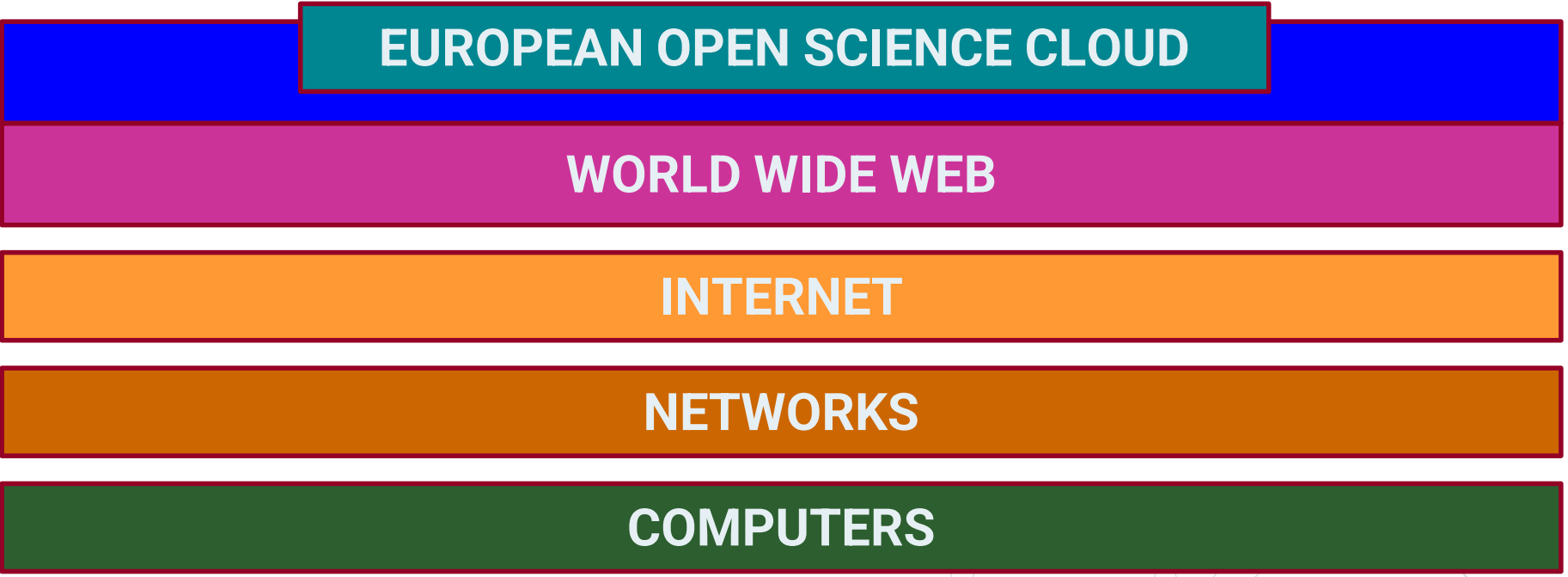
To ensure a swift and effective implementation, the signatories proposed a three-phase approach:

1. **FAIR Digital Objects:** This initial phase focuses on making digital objects FAIR (Findable, Accessible, Interoperable, and Reusable) in a manner that is both achievable and readily machine-implementable. This approach would enable the inclusion of all structured legacy data, setting a strong foundation for EOSC.
1. **FAIR4Humans:** As a transitional step, the signatories acknowledge the importance of metadata integration. While this phase demands metadata improvements, it recognizes that not all legacy systems can be transformed immediately. This approach strikes a balance between immediate progress and accommodating legacy setups.
1. **FAIR4Machines:** The long-term objective is to make EOSC truly FAIR for machines, paving the way for advanced automation and data-driven processes. This aspirational phase underscores the commitment to continually evolve EOSC to meet the changing needs of the research community.

By adopting these phased strategies, Europe can advance towards the EOSC vision using a clear roadmap, ensuring that research data and resources are not only accessible but also optimized for both human and machine processing. This approach will clearly help the whole European scientific sector to create a more open, collaborative, and data-driven scientific landscape.

The document was proposed by (alphabetically listed): Paolo Budroni, Jean-Claude Burgelman, Stefan Hanslik, Karel Luyben, Michel Schouppe, Peter Wittenburg - https://eosclustrum.eu/fileadmin/user_upload/k_eosc_lust/Statement_regardingthe_future_of_EOSC.pdf

EOSC – additionality to the web of FAIR data



EUROPEAN OPEN SCIENCE CLOUD

WORLD WIDE WEB

INTERNET

NETWORKS

COMPUTERS

Modelled after: World Wide Web - Wikipedia

The Common European Data Spaces

Common European data spaces

Rich pool of data
(varying degree of
accessibility)

Free flow of data
across sectors and
countries

Full respect of GDPR

Horizontal
framework for data
governance and data
access



Health



Industrial &
Manufacturing



Agriculture



Finance



Mobility



Green Deal



Energy



Public
Administration



Skills

- Technical tools for data pooling and sharing
- Standards & interoperability (technical, semantic)

- Sectoral Data Governance (contracts, licenses, access rights, usage rights)
- IT capacity, including cloud storage, processing and services

<https://dataspaces.info/common-european-data-spaces/#page-content>

Position of EOSC according to the European Commission

Taken from EC slides



“EOSC is the basis for a science, research and innovation data space that will bring together data resulting for research and deployment programmes and will be connected and articulated with the sectoral data spaces”

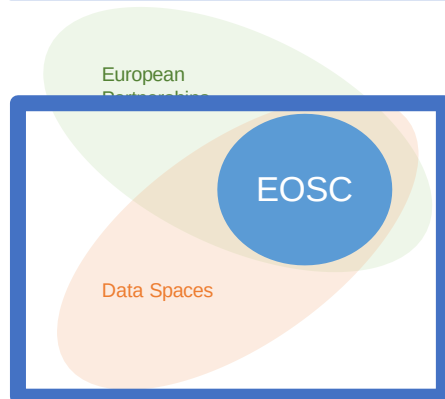
(European Data Strategy, COM(2020) 66 final)

Credits: Karel Luyben, EOSC A

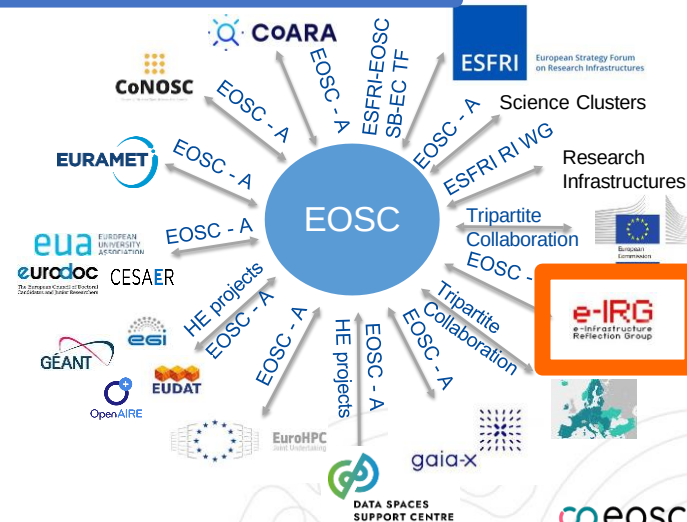
EOSC in the broader context

- EOSC is one of the Horizon Europe Partnerships:

EOSC is one of the emerging Data Spaces



EOSC in the European Data Strategy landscape



e-Infrastructure Reflection Group (e-IRG)

Trans-national, cross-sectoral engagement since 2003

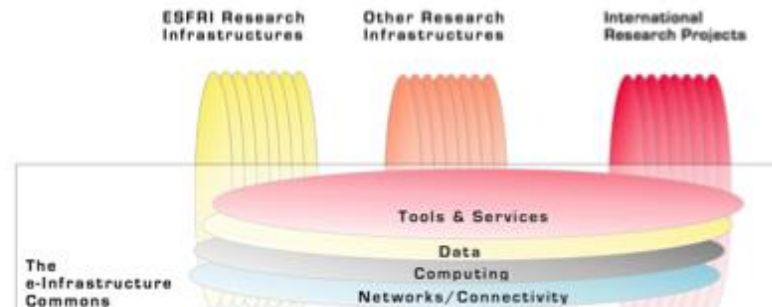
- e-IRG is a self-regulated and independent **policy advisory body**
Composed of national delegates nominated by research-related ministries
Independent body with a consensus-based decision-making process (see <http://e-irg.eu/bylaws>)
- e-IRG advises national authorities and the EC on electronic Infrastructures (**e-Infrastructures**)
Networking-, Computing-, Data Infrastructures and related services
(middleware/AAI, software, tools, etc.)
On national and international initiatives of EU significance

The e-IRG e-Infrastructure Commons → Foundation of EOSC

e-IRG e-Infrastructure Commons

(e-IRG Roadmap 2012 -> e-IRG White Paper 2013 -> e-IRG Roadmap 2016)

The e-Infrastructure Commons can be defined as the integrated living ecosystem of resources and services (along with its policies and governance) that is open, user friendly and accessible to European researchers and scientists, and continuously adapts to the changing requirements of research and science.



e-Infrastructures

Working in e-Infrastructures since year 2000



EOSC= e-IRG Commons + Open Science

In Dec 2014, related doc published:

- <https://zenodo.org/record/406356>

Towards the e-Infrastructure Commons 2020:

A marketplace for e-Infrastructure services

A concrete step towards e-Infrastructure services integration

- Expanding the e-IRG Infrastructure Commons idea
- **Contributing to the definition of EOSC and several of its key concepts (portal)**

Point of access, catalogue of services, search, research + commercial services, compliance (rules of participation), AAI, multiple views (national, regional, EU..)



e-IRG advice on coordination & cooperation

e-IRG stresses the need for e-Infrastructure **coordination at the national level** and strong national building blocks, enabling coherent and efficient participation in European efforts [**e-IRG Roadmap, 2016**]

Role of **National Nodes**, in the implementation of the e-Infrastructure Commons and its instantiation as the European Open Science Cloud [**National Nodes, 2019**]

Good practices of **coordination** within and across e-Infrastructures and thematic Research Infrastructures [**e-IRG White Paper 2021**]

Realisation and enhancement of **coordination and collaboration** in the e-Infrastructure landscape covering the full spectrum of e-Infrastructures (networking, computing, data infrastructures) and related services [**e-IRG White Paper 2022**] published 2023



e-IRG White Paper 2022

Coordination at EU-level

Background

- Some e-Infrastructures are in production for decades
- Considerable developments in computing/data infrastructures in the last 5-15 years



- Two significant initiatives have been launched → well underway



PARTNERSHIP FOR ADVANCED
COMPUTING IN EUROPE



Collaborative
Data Infrastructure
Data shared and preserved across borders and disciplines



OpenAIRE

European Open Science Cloud (EOSC)



EuroHPC Joint Undertaking



EuroHPC
Joint Undertaking

- Coordination across EU players is ad-hoc and at an early stage

e-IRG White Paper 2022

Coordination at EU-level

Topic

- Bridge the identified **cooperation/coordination gaps**:

reflecting on the above issues

providing concrete advice and recommendations to all stakeholders

contributing towards increasing cooperation and coordination

Envisaged outcome (in the long run)

- Provide **integrated user-friendly services, easing the work of researchers**

So that they can focus on their (cross-)disciplinary research, not on infra/tools!

Challenges of Creating Networks of National and Trans-national Digital Infrastructures: European Experiences

e-IRG and the „Recommendations on European e- Infrastructures for Research and Education”

March 2024 – Recommendations on European e-Infrastructures for Research and Education

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Co-authors: Panos Argyrakis, Arūnas Stašionis, Ignacio Blanquer

The public foundation serving Research and Education

European e-infrastructures are:

Geant : European NREN

EGI: European Grid Infrastructure

PRACE: HPC connectivity

EUDAT: Data infrastructure

OpenAire: Open Science infratructure

The collective of e-Infrastructures forms a 'public foundation' for solutions tailored to the research sector's needs.

This is achieved through a combination of federated infrastructures, a rich set of digital skills, and consensus on standards.

The European “e-Infrastructure Assembly”

A Network of National and
Trans-national Digital Infrastructures

About the e-Infrastructure Assembly

The group of e-Infrastructures delivering advanced digital services for the European research and education community in support to open science

EGI Federation, EUDAT CDI, GÉANT, OpenAIRE, PRACE



e-Infrastructure Assembly Objectives

- **Promote e-infrastructure activities** in Europe to EC and MSs increasing awareness and visibility.
- **Seek dialogue and foster interaction** with new e-infrastructure players, the ESFRI and Research Infrastructure ecosystem, as well as projects funded through CEF, DEP and HE relevant to the Research and Education community, with the aim of increasing collaboration and avoiding duplication of efforts and fragmentation.
- **Align and coordinate activities** in areas of work of common interest.
- **Improve the e-Infrastructure interface** towards international initiatives of pan-European and international relevance, complementing existing individual collaborations and aligning individual efforts and contributions.

The e-Infrastructure Assembly will connect its participants with international initiatives of pan-European and international relevance complementing existing individual collaborations and aligning individual efforts and contributions.

EGI in a Nutshell

www.egi.eu



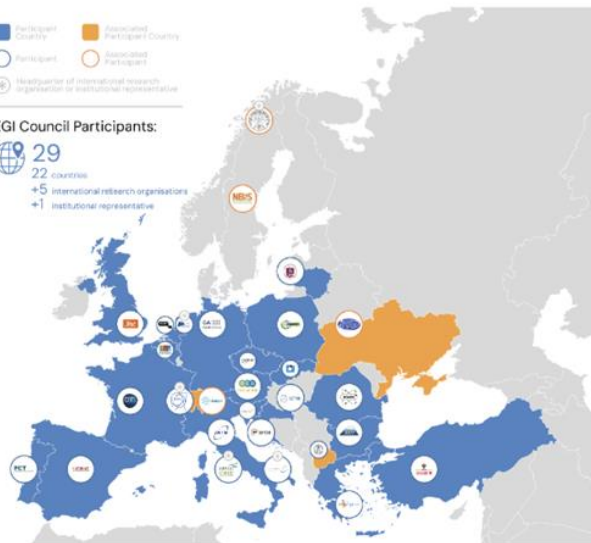
EGI Federation

A European flagship digital infrastructure for data-intensive scientific computing



EGI Council Participants:

 29 countries
+5 international research organisations
+1 institutional representative



EGI in numbers¹



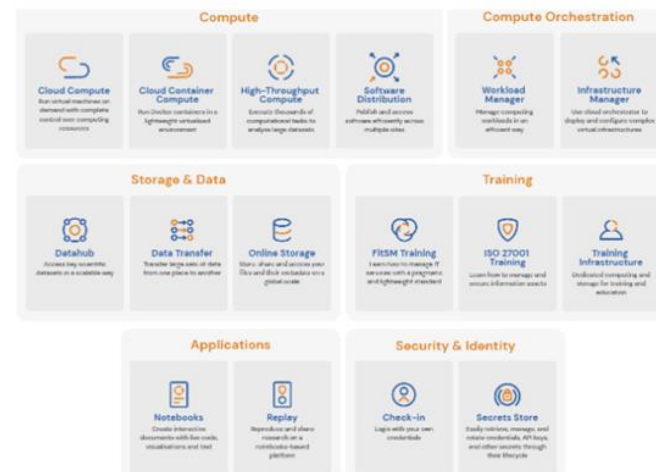
Why a federation?

- Support science at international scale
- Build an hyperscale facility for research
- Invest nationally, access globally
- Bring computing to the data

EGI Services

EGI delivers advanced computing services to support scientists, international projects, research infrastructures and businesses.

EGI services for research



¹ the key numbers are correct as of April 2024.

Leveraging Data Services from European Scientific Institutes

- Consolidated collaboration of large research institutions and providers
- Close to research and researchers
- Long term commitment to data management operations and development
- Offering integrated data services and data resources
- Transnational and cross discipline data management and data sharing
- Collaboration and integration with e-Infrastructures incl. EOSC and EOSC node
- € 25 M EU grants invested in services development since (2016)
 - EUDAT, EUDAT2020, EOSC Hub, EOSC Future, FAIRCORE4EOSC, EOSC Beyond, . . .

EUDAT aims to:

Extent co-operation in the development, support and provision of data services with and for research infrastructures as part of the group of e-Infrastructures



A (Very) Brief GÉANT Overview

GÉANT is the collaboration of European National Research and Education Networks (NRENs). Together we deliver a dedicated information ecosystem of infrastructure and services to advance research, education, and innovation on a global scale.

Cathrin Stöver, GÉANT, April 2024

OpenAIRE AMKE

- Non-profit organisation, established **Oct 2018**
- **Mission:** Shift scholarly communication towards openness and transparency and facilitate innovative ways to communicate and monitor research
- A **Scholarly Communication e-Infrastructure** that brings together **human capital** and advanced **ICT services**
- A **network of experts** from major national organisations (National Open Access Desks) in operation since 2009



52
members

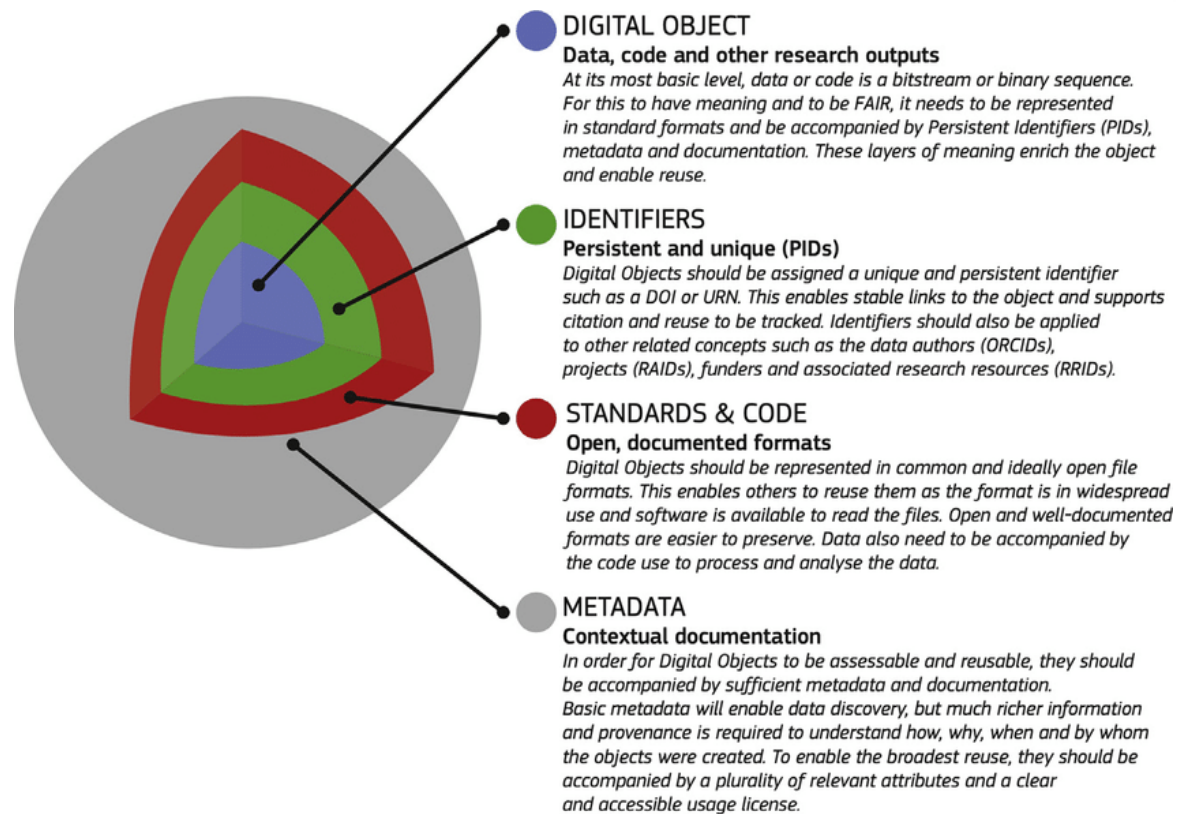
36
countries

Global Collaborations: Latin America, US, Canada, Japan, Korea, ...

The promotion and realisation of FAIR data (principles) and FAIR digital Objects

- The FAIR principles promote the reuse of research objects generated by researchers operating in all fields of science and innovation
- The promotion and realisation of FAIR data (principles) and FAIR digital Objects
- The FAIR-AI alliance is already a fact that needs to be described and understood.

FAIR Digital Objects



Thank you for your continued attention !

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