



**EUROPEAN OPEN
SCIENCE CLOUD**

EOSC developments

Karel Luyben

President EOSC Association

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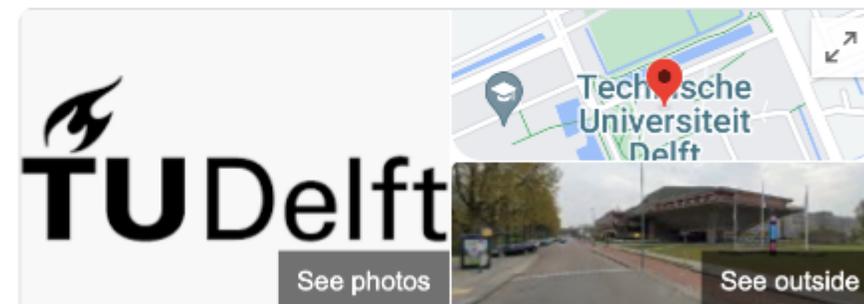
Over TU Delft

Faculteiten - Zoek medewerkers - Onze campus - ...

People also ask

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Is Delft a good university?



Delft University of Technology (TU Delft)

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Research institution in Delft, Netherlands

Delft University of Technology, also known as TU Delft, is the oldest and largest Dutch public technical university, located in Delft, Netherlands. As of 2022 it is ranked by QS World University Rankings among the top 10 engineering and technology universities in the world. [Wikipedia](#)

Address: Mekelweg 5, 2628 CD Delft, Netherlands

Phone: +31 15 278 9111

Undergraduate tuition and fees: 2,060 EUR, International tuition 10,384 EUR (2018 – 19)

Total enrollment: 24,703 (2018)



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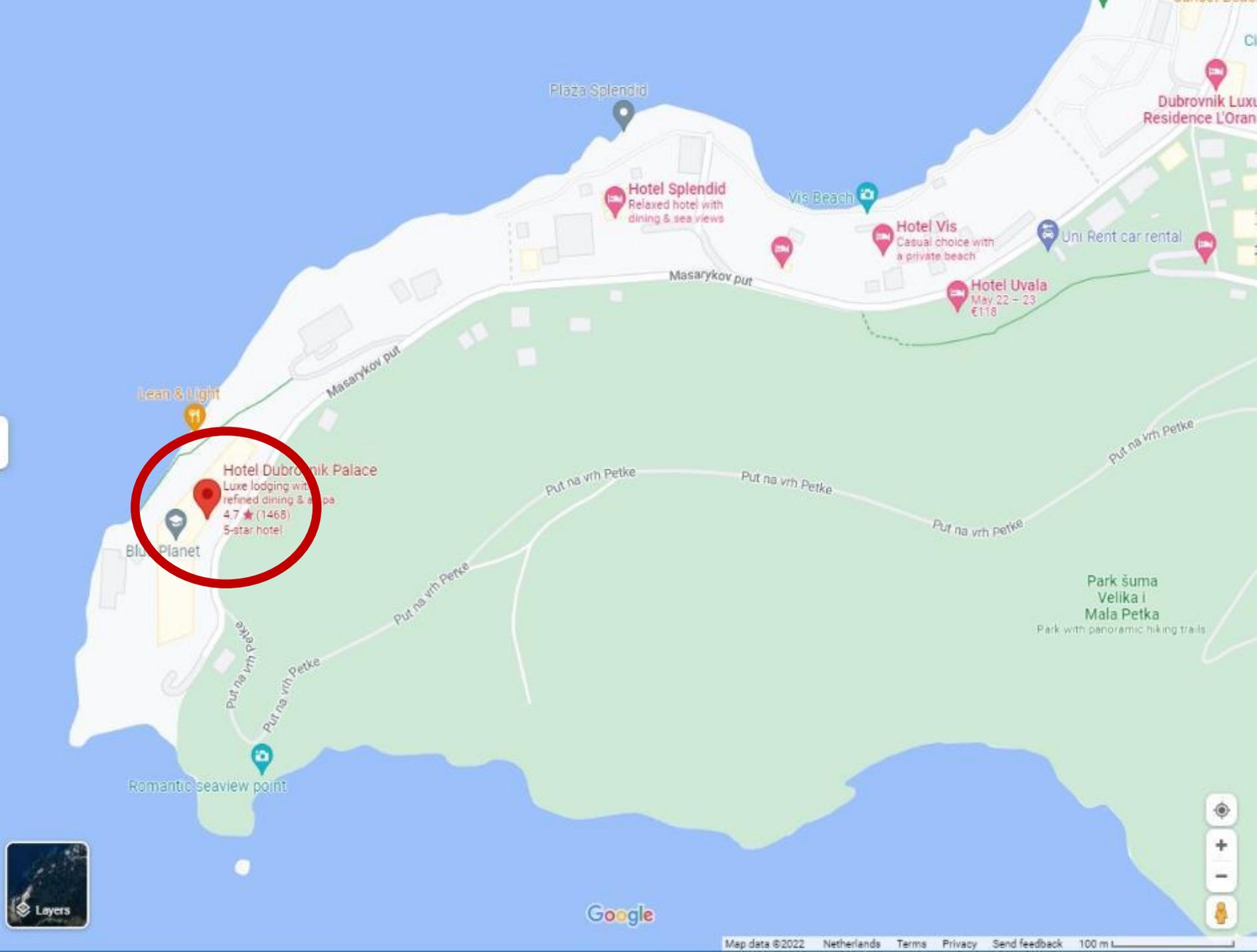
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<https://www.nature.com> › scientific reports › articles ⋮

Optimization of fish gelatin drying processes and ... - Nature

by C da Silva Araújo · 2021 — This study aims to optimize **drying** methods such as convection hot air alone and combined with infrared radiation to obtain **gelatin** from acoupa ...

<https://www.agriculturejournals.cz> › web › cjfs ⋮

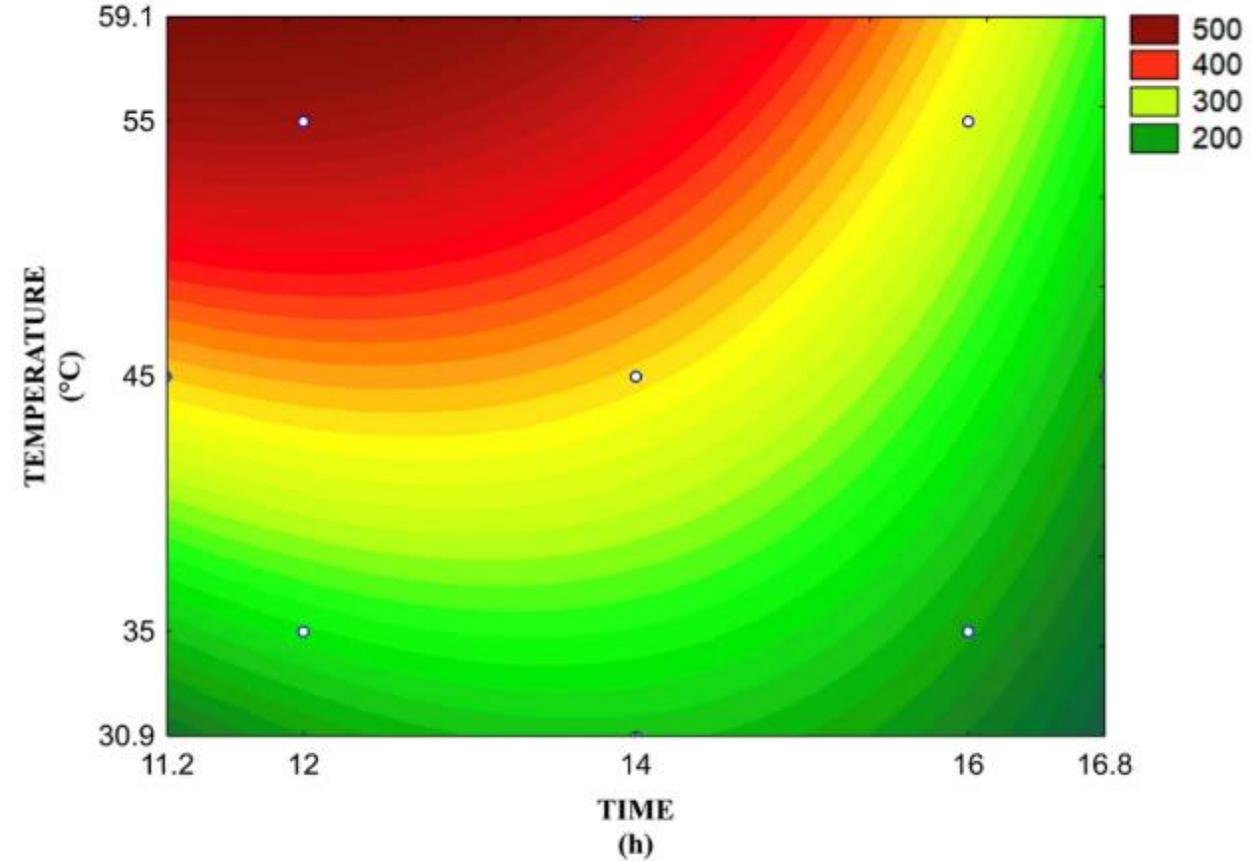
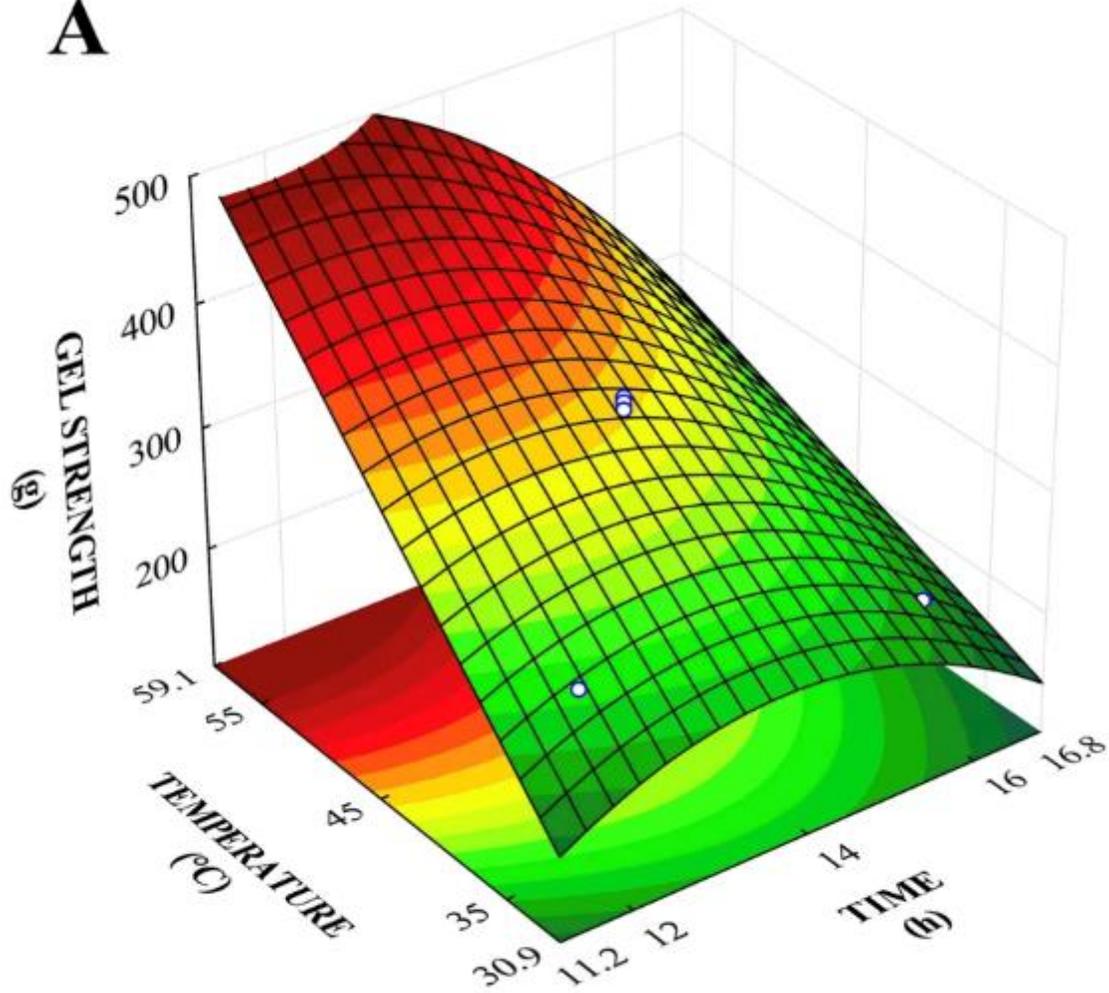
The effect of drying temperature on the properties of gelatin ...

by J Tkaczewska · 2019 · Cited by 2 — The influence of **drying** temperature on the characteristics and gel properties of **gelatine** from *Cyprinus carpio* L. skin was studied.

<https://www.researchgate.net> › publication › 355401465_... ⋮

(PDF) Optimization of fish gelatin drying processes and ...

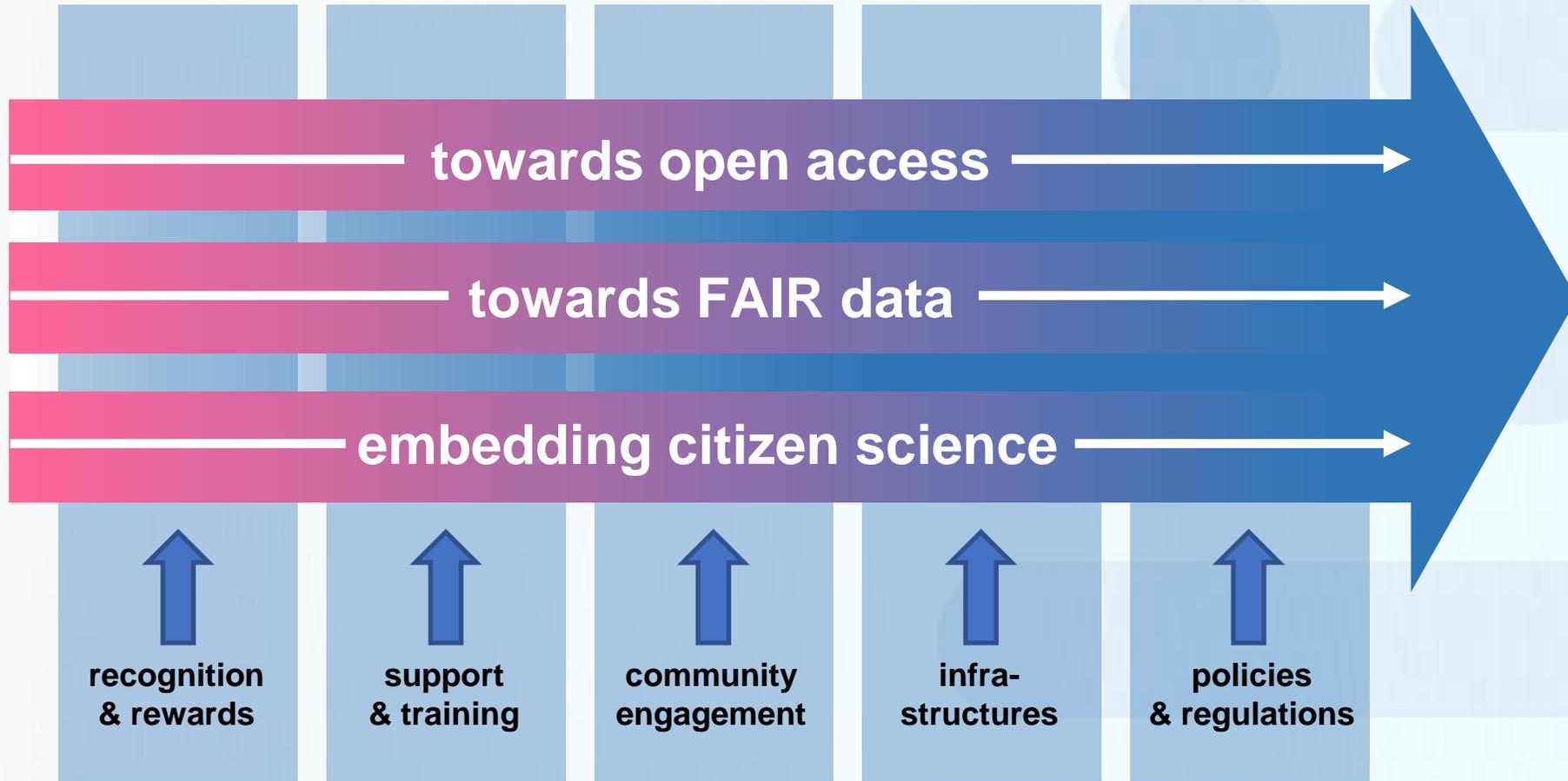
This study aims to optimize **drying** methods such as convection hot air alone and combined with infrared radiation to obtain **gelatin** from acoupa weakfish skin by ...

A

Wouldn't it be great if we all could find a relevant dataset for our work as easy through the 'Web of FAIR data' as we can find many things through an adequate search engine?

Open Science

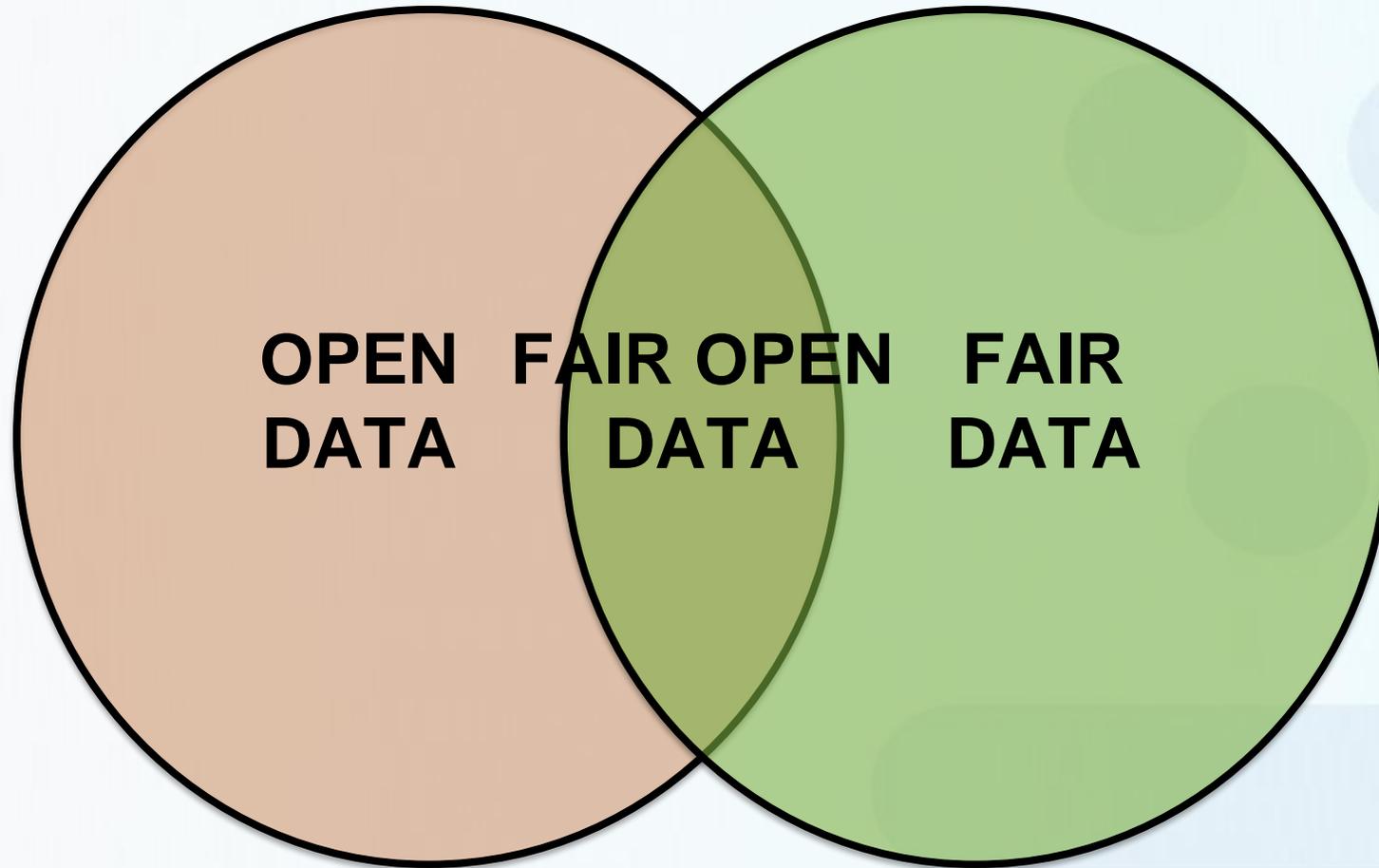
“science
as is”



“science
as
will be”

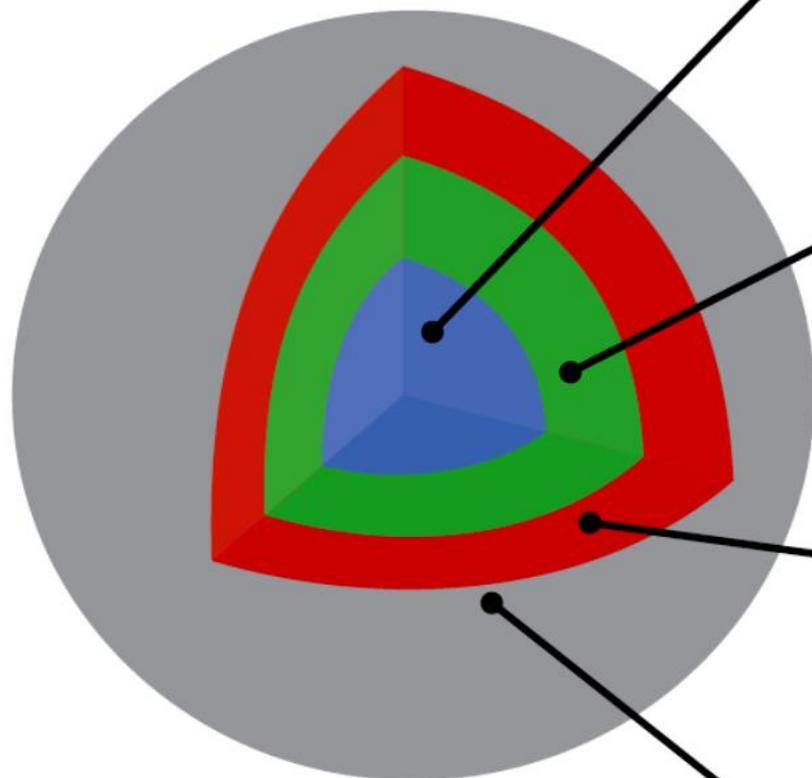
ENGAGEMENT, COORDINATION AND SUPPORT

OPEN DATA and/or FAIR DATA



FAIR ≡
Findable
Accessible
Interoperable
Reusable

Towards “as FAIR as possible” and “as open as possible”



DIGITAL OBJECT

Data, code and other research outputs

At its most basic level, data or code is a bitstream or binary sequence. For this to have meaning and to be FAIR, it needs to be represented in standard formats and be accompanied by Persistent Identifiers (PIDs), metadata and documentation. These layers of meaning enrich the object and enable reuse.

IDENTIFIERS

Persistent and unique (PIDs)

Digital Objects should be assigned a unique and persistent identifier such as a DOI or URN. This enables stable links to the object and supports citation and reuse to be tracked. Identifiers should also be applied to other related concepts such as the data authors (ORCIDs), projects (RAIDs), funders and associated research resources (RRIDs).

STANDARDS & CODE

Open, documented formats

Digital Objects should be represented in common and ideally open file formats. This enables others to reuse them as the format is in widespread use and software is available to read the files. Open and well-documented formats are easier to preserve. Data also need to be accompanied by the code use to process and analyse the data.

METADATA

Contextual documentation

In order for Digital Objects to be assessable and reusable, they should be accompanied by sufficient metadata and documentation. Basic metadata will enable data discovery, but much richer information and provenance is required to understand how, why, when and by whom the objects were created. To enable the broadest reuse, they should be accompanied by a plurality of relevant attributes and a clear and accessible usage license.

What is FAIR?

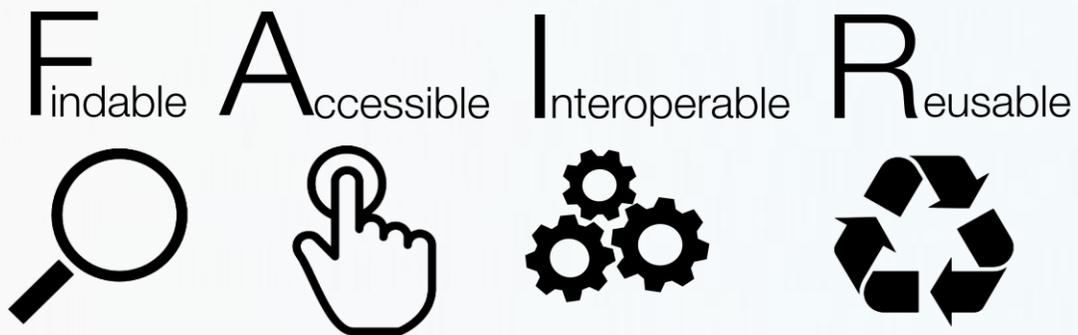


Image CC-BY-SA by [SangyaPundir](#)

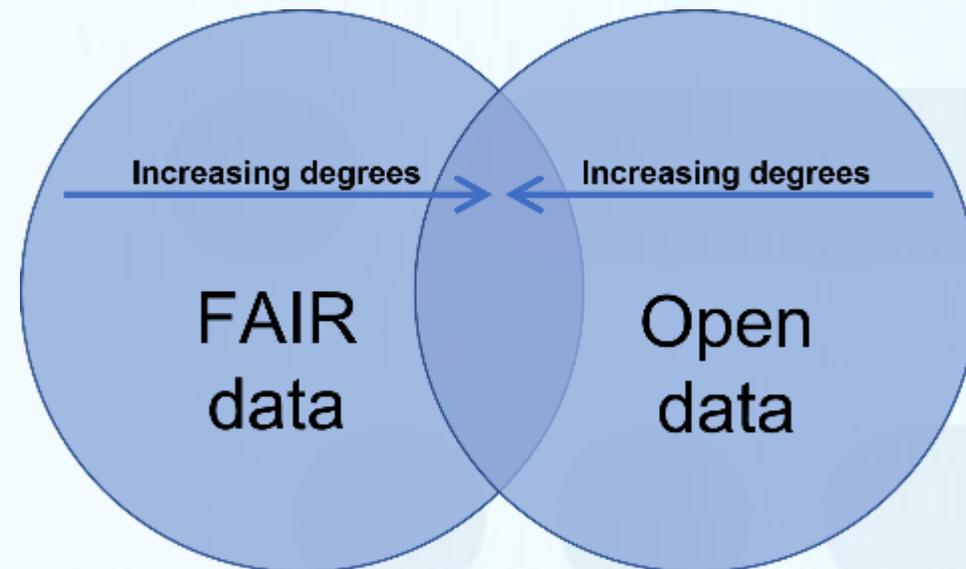


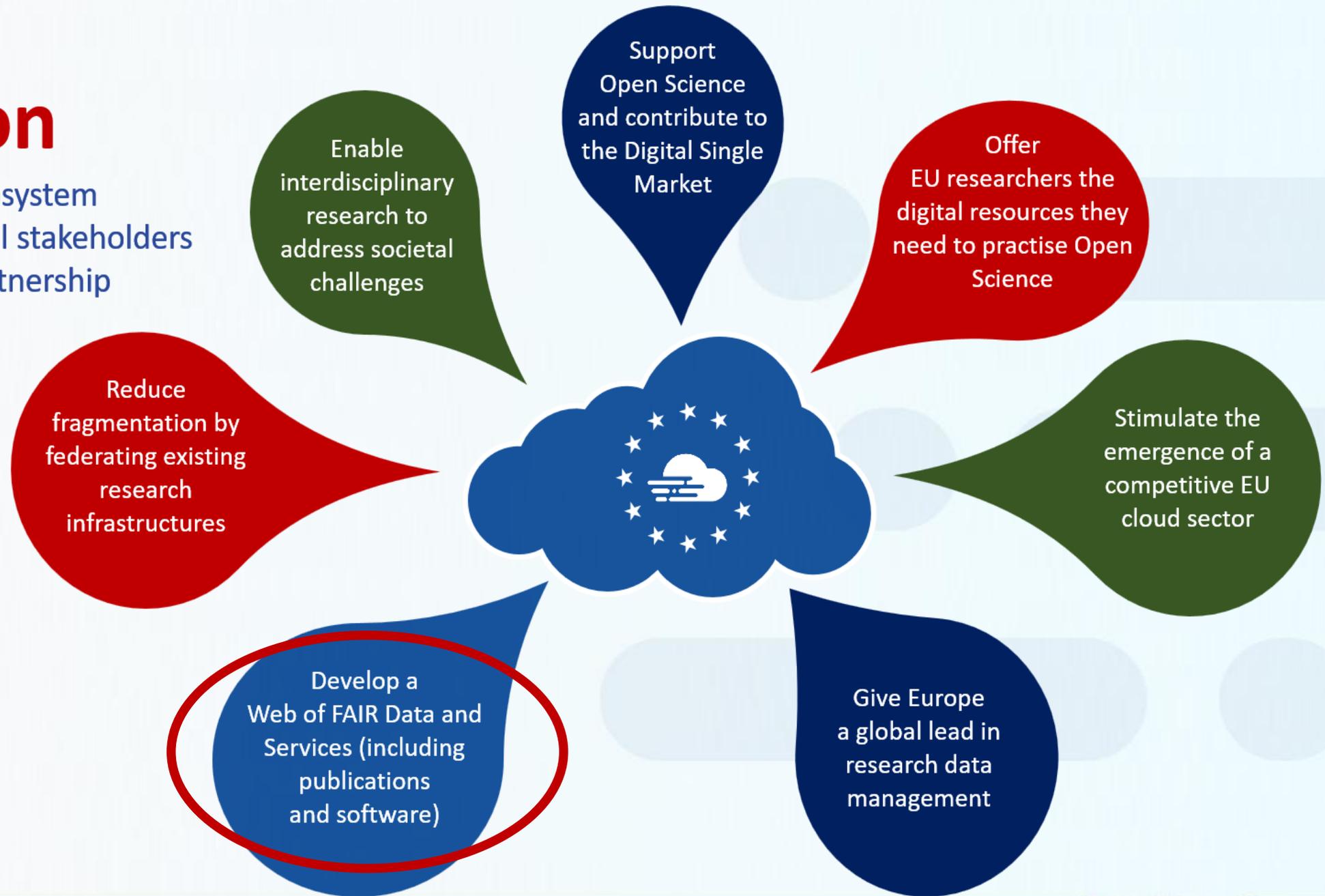
Image CC-BY by European Commission FAIR data expert group

- FAIR ≠ Open
- FAIR ensures data can be found, understood and reused
- Data can be shared under restrictions & still be FAIR

"As open as possible, as restricted as necessary"

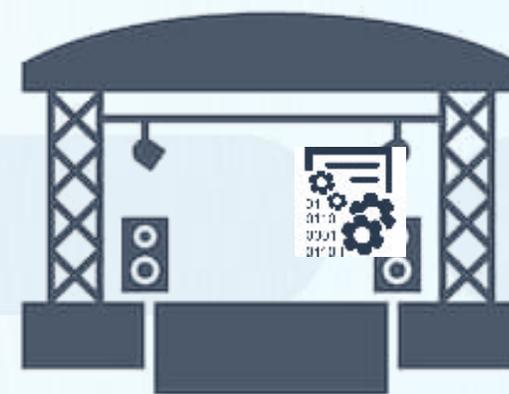
The Vision

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



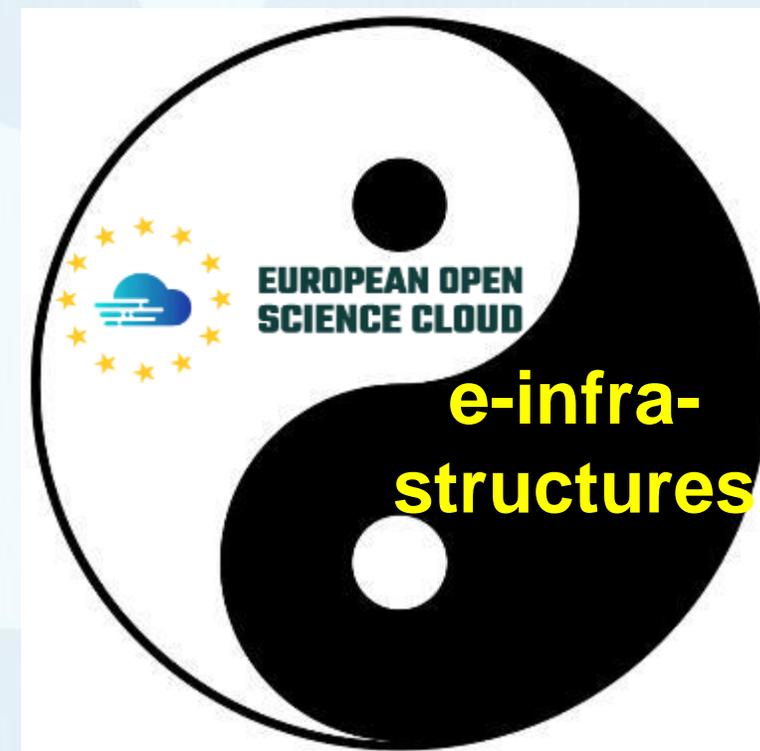
“A web of scientific insight”

- **Web of FAIR Data and related Services**
- **Federation of relevant existing and future data sources**
- **Virtual space where science producers and consumers come together**
- **An open-ended range of content and services**
- **Meeting all European data requirements**
- **In interaction with other regions of the world**



Twinning the data- to the e-infrastructures

EOSC is a data-infrastructure and could be seen as a twin sister (or brother) of the European e-infra-structure organisations (yin/yang). The last offering the store, compute and connect services used by EOSC to offer the servicing of data and creating interoperability. The combination forms the EOSC-ecosystem



Guiding principles for EOSC

The **overarching** principle for developing EOSC is that research has to be at the centre of the EOSC initiative.

- **Multi-stakeholderism**
EOSC will succeed if and only if it follows a multi-stakeholder approach;
- **Openness**
EOSC will ensure research artefacts be ‘as open as possible, as restricted as necessary’;
- **FAIR principles**
EOSC research artefacts need to be findable, accessible, interoperable and reusable;
- **Federation of infrastructures**
EOSC will federate existing and upcoming data- and e-infrastructures;
- **Machine-actionable**
EOSC will strike the right balance between machines and people in delivering the services that will serve the needs of European scientists.

History of a partnership



**Initial
EOSC Governance**

2019-2020

History of a partnership



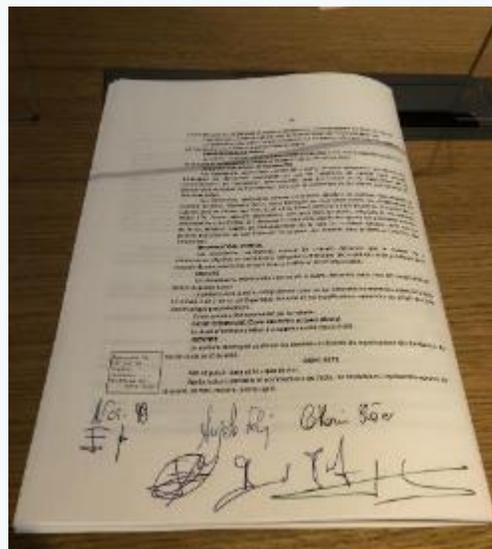
**Initial
EOSC Governance**

2019-2020

**EOSC
Association AISBL**

29-07-2020

History of a partnership



Initial EOSC Governance

EOSC Association AISBL

Co-programmed EOSC Partnership

2019-2020

29-07-2020

23-06-2021



EOSC Association

**An Exciting
Journey**



EOSC Association: Milestones

- **Four founding members (CESAER, GEANT, GARR, CSIC)**
- **Was incorporated as AISBL on 29th July 2020**
- **Obtained Royal Decree on 11th September 2020**
- **First General Assembly on 17-12-2020 elected President and Board; GA#2 mid 2021 and GA#3 end 2021**
- **Research Performing; Research Funding and Service Proving organisations**
- **Now >160 members and >70 observers (62% - 8% - 30%) (end 2021)**
- **A European Co-programmed Partnership, between the EC and the EOSC Association, MoU signed mid 2021**
- **Joining the EOSC Association = Joining the EOSC Partnership!**

Present: Co-programmed EOSC Partnership Mission of EOSC Association AISBL

- To provide a single voice for advocacy and representation for the broader EOSC stakeholder community in Europe
- To promote the alignment of European Union research policy and priorities with activities coordinated by the Association (SRIA)
- To ultimately enable seamless access to data through interoperable services that address the entire research data life cycle, from discovery to storage, management, analysis and re-use across borders and scientific disciplines (*the dream*)

Content of the MoU (I)

- ❑ The MoU is established between the Partners
 - ✓ The EU represented by the Commission
 - ✓ The EOSC Association, including its constituent entities (members)
- ❑ The MoU is a contractual arrangement, not legally binding
- ❑ Scope & objectives
 - ✓ Expected financial and in-kind commitments by the partners
 - ✓ KPI's
- ❑ Governance: Partnership Board
 - ✓ Composition: Representatives appointed by the Partners other than the Union, Commission officials and Representatives of the Steering Board
 - ✓ Rules of Procedure of the Partnership Board have been drafted based on a proposal by the Commission
- ❑ Duration: from signature date until 31.12.2030

Content of the MoU (II)

- ❑ Activities and commitments of the Commission
 - ✓ Take into account the input and advice from the Partners other than the Union when identifying & defining call topics for R&I activities to be included in the Work Programmes
 - ✓ Contribute through the Work Programmes
- ❑ Activities and commitments of the Partners other than the Union
 - ✓ Provide input and advice to the Commission
 - ✓ In-kind contributions in Horizon Europe actions
 - ✓ In-kind contributions in additional activities
 - ✓ Investments in operational activities
- ❑ Openness and Transparency, Dissemination, Coordination
- ❑ Monitoring and reporting
 - ✓ The partners will set up and implement an effective reporting and monitoring system, using
 - ✓ A list of Key Performance Indicators

Task Forces in Advisory Groups



Suzanne
Dumouchel

Implementation of EOSC

- Rules of Participation compliance monitoring
- PID policy and implementation
- Researcher engagement and adoption



Ignacio
Blanquer

Technical challenges on EOSC

- Technical interoperability of data and services
- Infrastructure for quality research software
- AAI Architecture

Metadata and data quality

- Semantic interoperability
- FAIR metrics and data quality

Research careers and curricula

- Data stewardship curricula and career paths
- Research careers, recognition and credit
- Upskilling countries to engage in EOSC

Sustaining EOSC

- Defining funding models for EOSC
- Long-term data preservation



Sarah
Jones



Wilhelm
Widmark



Bob
Jones

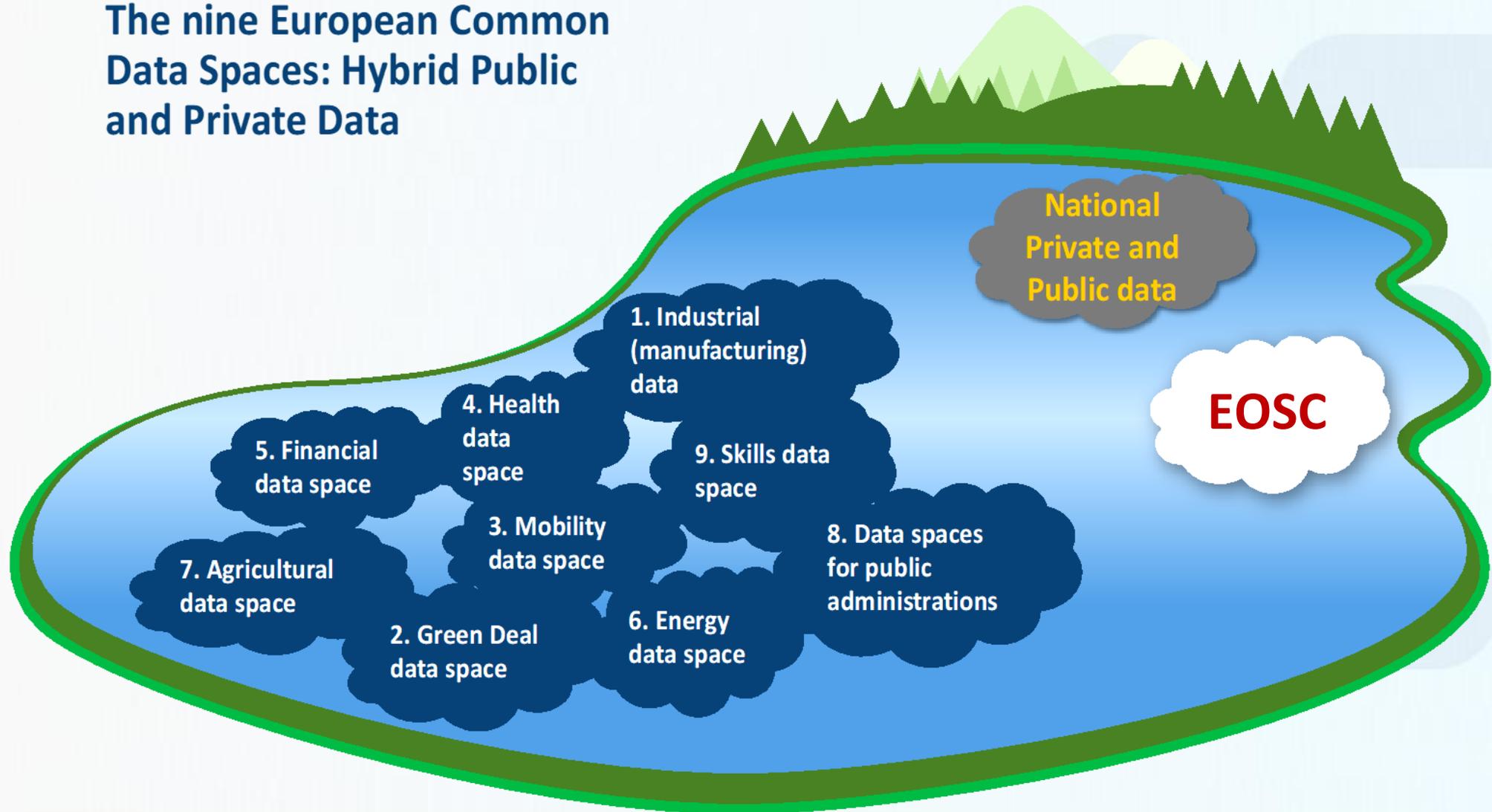


Tasks for EOSC Association to see to:

- Develop and govern federating core
- Manage the AAI
- Manage PID policies
- Manage compliance framework
- Manage trusted certification
- Outreach to stakeholders
- Monitor services and transactions
- Manage the 'EOSC' trademark(s)
- Contribute to Horizon EU policy

EOSC in wider context

The nine European Common Data Spaces: Hybrid Public and Private Data



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 from research and deployment programmes and will be connected and articulated with the sectoral data spaces”

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

EOSC on a global stage

- **Service providers from third countries can participate in EOSC but have adhere to EOSC Rules of Participation and applicable legislation**
- **EOSC will work with other regional initiatives towards common goals for Open Science, driving global convergence on standards in support of the implementation of an open science commons**



Grand Challenges for delivering EOSC

Technical

- Create in the long run truly broad multidisciplinary interoperability
- For the short term this means: optimal Authentication and Authorisation Infrastructure (AAI); stepwise growing interoperability

Social

- Getting the noses in the same direction
- Combining local and regional initiatives towards a true Open Science Commons with global convergence on standards in support of the implementation

Implementation steps of EOSC

- EOSC interoperability framework is premised on FAIR principles
- Currently defining a minimum metadata model (and crosswalks) to ease discovery over existing federated research data and metadata
- Need clear, publicly-available definitions for all concepts, metadata and data schemas → challenge is that not all communities apply standards
- Need repositories of semantic artefacts and mapping across these
- Aim for all metadata and measurements to be machine-readable
- Sufficient local compute capacity to handle the request

Quality of research data

Objective

Explore what are the most relevant quality dimensions considered in different communities and how they can be incorporated in EOSC.

Approach

- Measures are context dependent and defined by research communities.
- Quality attributes and dimensions (e.g. accuracy, completeness, conformity) vary within and across disciplines and are closely related to the research subject they are intended to measure.
- Identify common measures and align them with the FAIR principles

Access to unstructured & non-standard data

Objective

Lack of structure and heterogeneity of non-standard data, i.e. data for which there is either no previously defined data model or which is not organised in a predefined way (e.g. social media streams), innovative, reusable access methods are needed.

Approach

- Structure such data and make it accessible using AI
- AI as an integral part of the life cycle of research data; need to be managed and made accessible in the same way as the data and the scientific publication itself.
- Include concepts for and implementations of knowledge graphs in EOSC which link data, software, publications and other entities (e.g. authors) to one another.

Keep on dreaming

If in 2040 50% of the **relevant** research data (data, publications and software) would be as FAIR **as possible**, my dream would come true!
(**world-wide 😊**)

In other words: When I will be able to find with a few clicks the diffusion coefficient of water as function of temperature and water concentration for the compositions of gelatine I am interested in, then I will be able to predict the drying behaviour of this material under different conditions in different scales of different set-ups of drying equipment, using the computerprogramme I developed. Thus saving a whole lot of time in the development and lots of energy in the application.

Keep on dreaming

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(world-wide 😊)

In other words: When I will be able to find the diffusion coefficient of water as function of water concentration for the compositions of gels used in, then I will be able to predict the drying behavior of material under different conditions in different scales. I will be able to simulate the groups of drying equipment, using the computer programs developed. Thus saving a whole lot of time in the development and a whole lot of energy in the application.

Thanks EOSC!

Let's co-create EOSC





**EUROPEAN OPEN
SCIENCE CLOUD**

Thanks



@eoscassociation



info@eosc.eu

EOSC-A Activities Jan – March 2022

- **Defining the role of the Mandated Organisations**
- **Monitoring Framework**
- **Additional Activities Plan**
- **Input for Horizon Europe programme 23/24**
- **Multi Annual Roadmap up-date**
- **Meeting with ongoing Horizon 2020 projects**
- **Interaction with EOSC Future**
- **General Assembly #4, Brussels, 24/25 May 2022**
- **Consistent EOSC branding**
- **Resourcing the EOSC Secretariat**
- **EOSC Focus**