

European Open Science Cloud – EOSC for general Open Science

Internationalization of the Armenian Science:
Challenges and Solutions

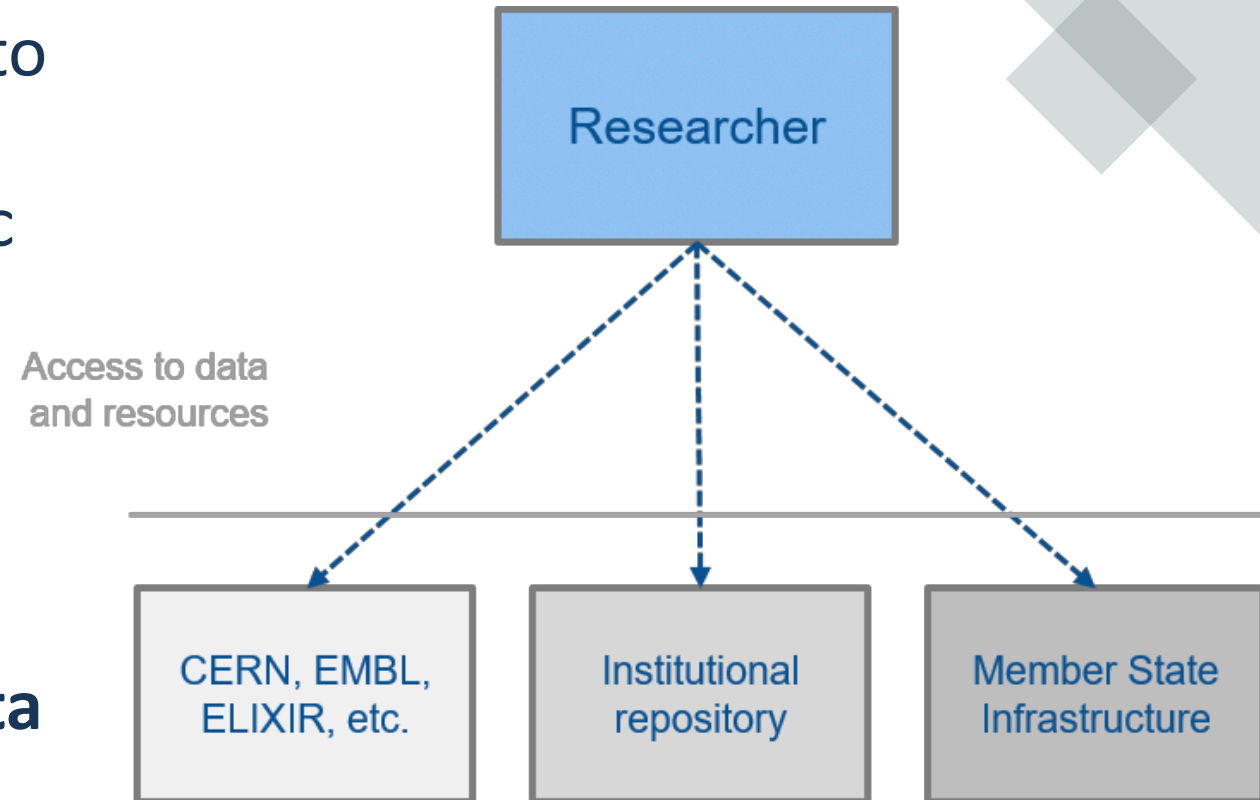
Prof. Anastas Mishev

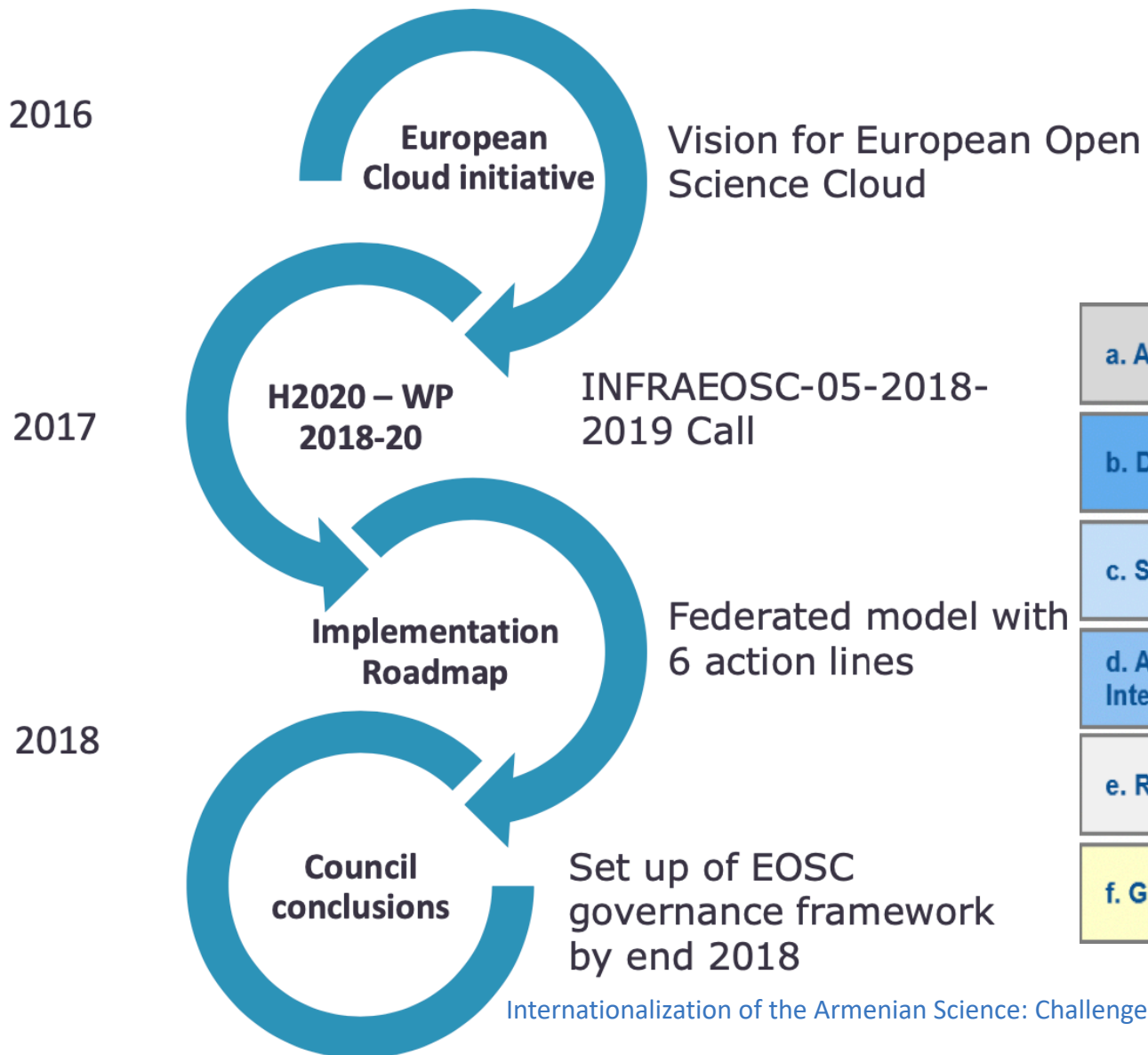
Ss. Cyril and Methodius University, North Macedonia



Motives for EOSC initiative

- ❑ European researchers face **data fragmentation** and unequal access to quality information sets
- ❑ **Fragmented access** (across scientific domains, countries and governance models; varying access policies)
- ❑ **Limited cross-disciplinary access** to data sets (i.e. interdisciplinary research)
- ❑ **Non-interoperable services and data**
- ❑ **Closed data**



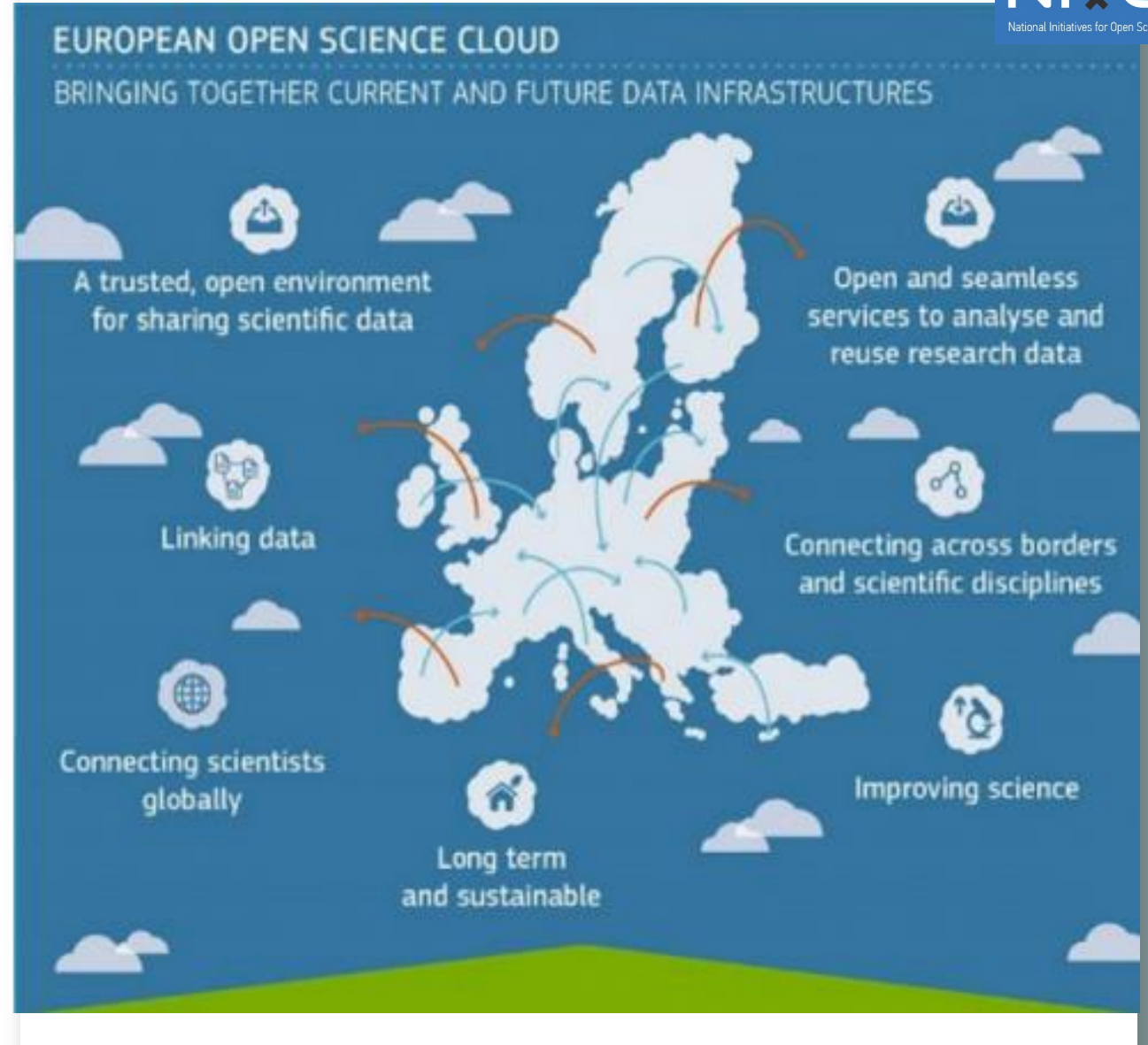


- The **EOSC implementation roadmap** describes **six action lines** for the implementation of the European Open Science Cloud with specific examples and related milestones

a. Architecture	Architecture of the federated infrastructures as the solution to the current fragmentation in research data infrastructures which are insufficiently interoperable.
b. Data	FAIR data management and tools. A common data language to ensure data stewardship across borders/disciplines based on FAIR principles.
c. Services	Available services from a user perspective. A rich environment offering a wide range of services covering the needs of the users.
d. Access & Interface	Mechanisms/interfaces for accessing EOSC. A simple way for dealing with open data obligations or accessing research data across different disciplines.
e. Rules	Rules of participation for different EOSC actors. An opportunity to comply with existing legal and technical frameworks and increase legal certainty & trust.
f. Governance	Governance of the EOSC, aiming at ensuring EU leadership in data-driven science but requiring new governance frameworks.

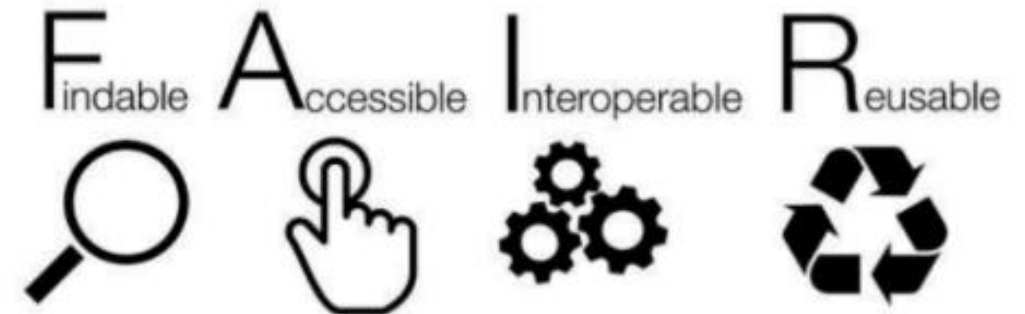
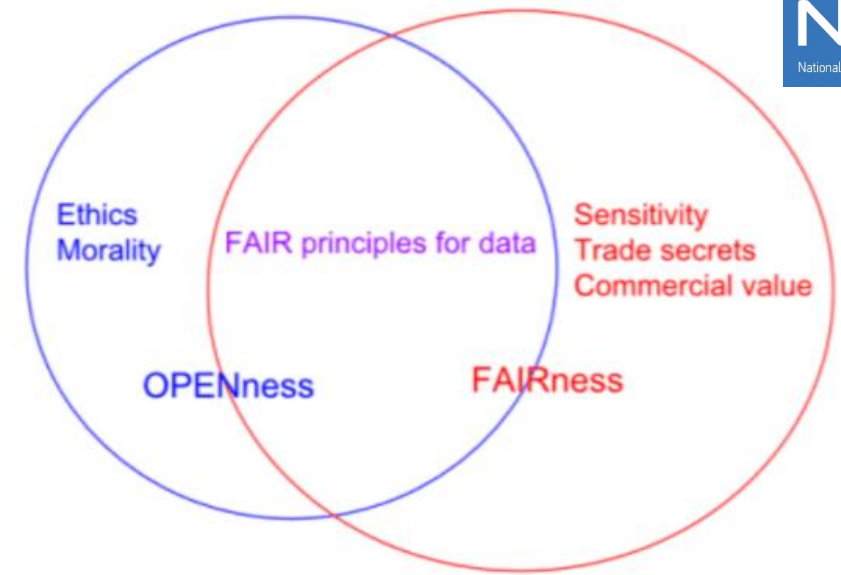
European Open Science Cloud EOSC

- ❑ EOSC has the ambition to be a virtual environment for Europe's 2 million researchers and 70 million science and technology professionals from every research, innovation and educational area.
- ❑ EOSC will provide researchers an environment with open services for data storage, management, analysis and re-use across disciplines.
- ❑ EOSC will join existing thematic data Infrastructures.
- ❑ EOSC will add value and leverage past infrastructure investment.



EOSC, new level playing field for EU researchers

- ❑ The EOSC will allow universal access to data, as a universal access point for ALL European researchers
- ❑ Cross-disciplinary access to data and services unleashes potential of interdisciplinary research
- ❑ Services and data are interoperable (Findable, Accessible, Interoperable and Reusable-FAIR)
- ❑ Data funded with public money is in principle open (as open as possible, as closed as necessary)
- ❑ EOSC will help increase recognition of data intensive research and data science





Current model of European data infrastructures

From fragmentation and uneven access to information to a federated model, where access to data would be universal, building on a strong legacy



Future EOSC model: federation of data infrastructures

Source: EOSC Strategic Implementation Roadmap 2018-2020, May 2018, European Commission

A challenging landscape



Entities of all kinds – diversity in the EOSC range from data sets to storage to computing to publications



An open ecosystem – rules of participation will favour no barrier to entry regarding operational maturity, service management quality



A diverse ecosystem – providers will come from e-Infrastructures, from member states, from research infrastructures, and private sector



An interdependent ecosystem – aim includes composability and collective service design through an open AAI (Authentication and authorisation infrastructure) federation

Implementation challenges

The EOSC governing bodies have identified 14 action areas to help deploy the EOSC ecosystem.

The 7 areas relating to the primarily technical challenges and prerequisites to implementing the EOSC ecosystem are as follows:

- Identifiers
- Metadata and ontologies
- FAIR metrics and certification
- Authentication and authorisation infrastructure (AAI)
- User environments
- Resource provider environments
- EOSC Interoperability Framework

□ Interim EOSC Governance 2019-2020

Governing bodies

EOSC Governance Board

- representatives from EU countries, countries associated with Horizon 2020 and the Commission
- ensures effective supervision of the EOSC implementation.

EOSC Executive Board

- representatives from the research and e-infrastructures communities.
- ensures the implementation and accountability.

EOSC Stakeholder Forum

- organised by the EOSCsecretariat is formed by representatives from a wider range of actors, tasked to provide input and recommendations through events and online consultation mechanisms.

Working Groups

Landscape

FAIR

Architecture

Rules of participation

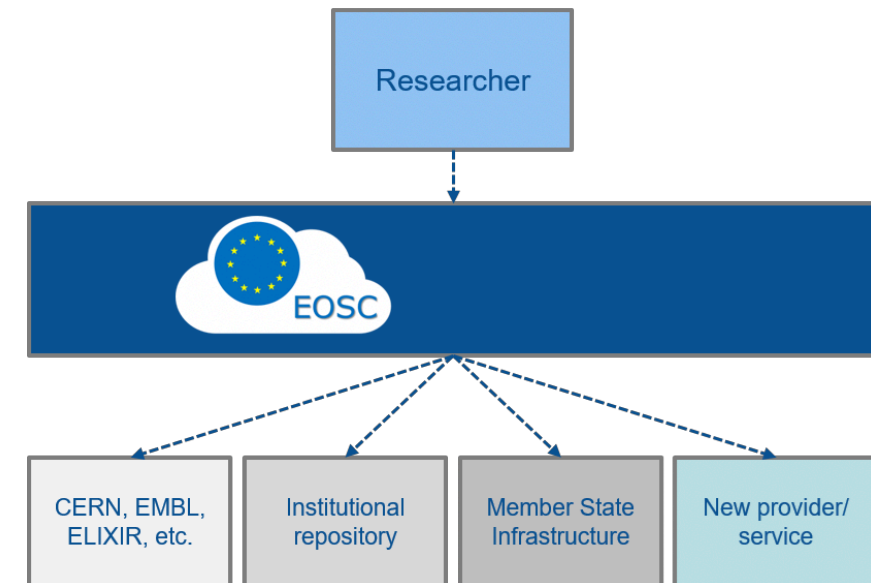
Skills and Training

Sustainability

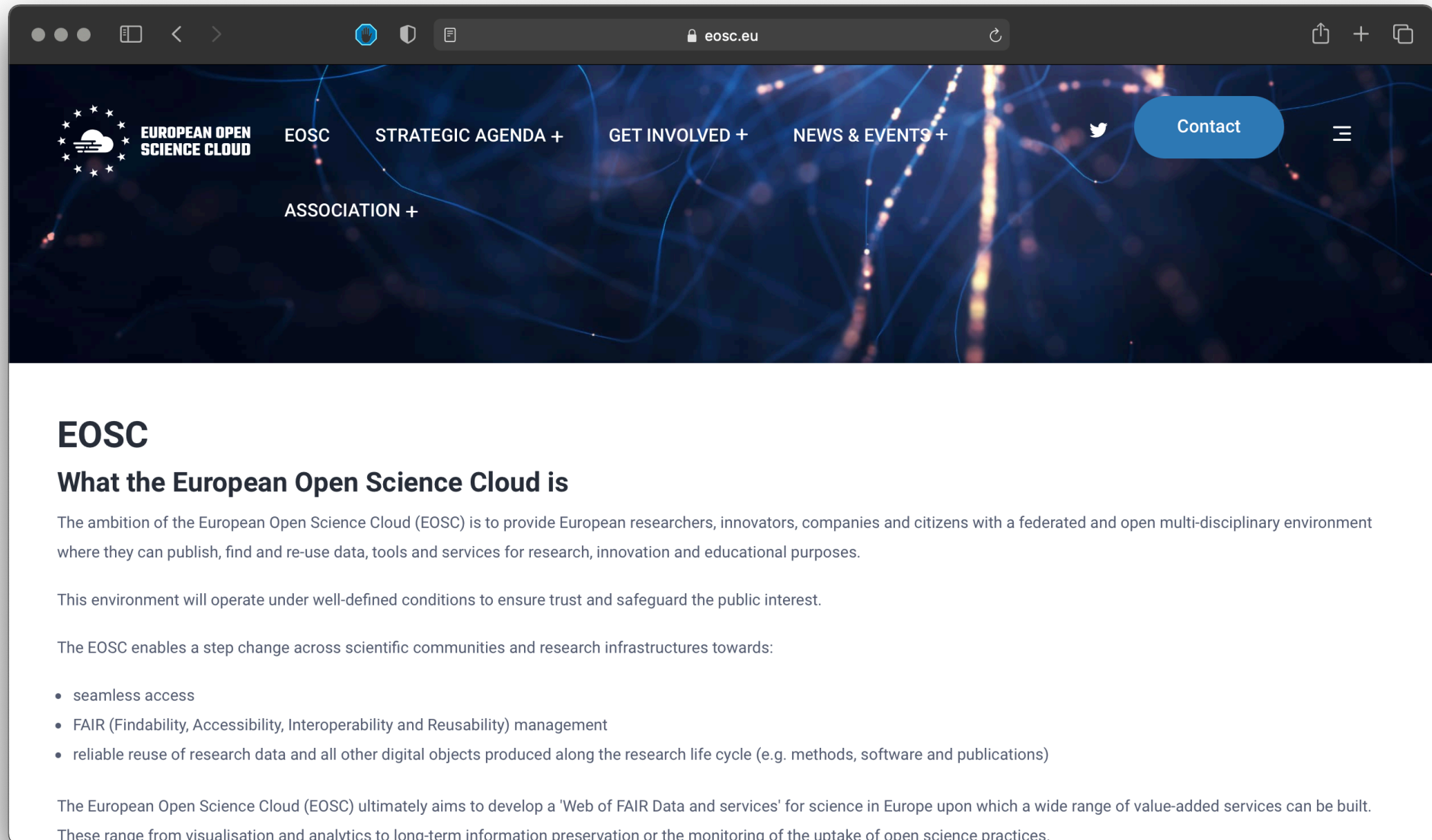
- ❑ Was established in Belgium on 29 July 2020 as a not-for-profit international association (AISBL) involving research and innovation stakeholders.
- ❑ Provides a means to serve the EOSC community, promote EOSC, and enable Open Science in Europe.
- ❑ Focal point of the EOSC Partnership with the European Commission.
- ❑ Strategic Research and Innovation Agenda (SRIA) was published on 19 October, sets out the elements needed to implement the EOSC Partnership.
- ❑ The EOSC Partnership aims to:
 - ❑ create a growing ecosystem, bringing together relevant European initiatives around the FAIR data economy,
 - ❑ fostering collaboration among those initiatives towards the objective of open research,
 - ❑ attracting small and medium-sized enterprises (SMEs) and start-ups to use and benefit from the federated services and data sources,
 - ❑ and raising awareness in society about the benefits of FAIR-data-driven innovation.
- ❑ The EOSC Association plays a crucial role in gathering EOSC stakeholders such as research funders, policy makers, research-performing organisations and operators of research infrastructures to contribute to and monitor the future EOSC developments.

□ The Association will:

- support EOSC's mission of enabling seamless access to data through interoperable services that address the entire research data,
- identify key infrastructure requirements for the:
 - representation,
 - capture,
 - storage,
 - processing and
 - appropriate sharing of diverse forms of data,
- by engaging with stakeholders and service providers,
- enable key services, including but not limited to e-infrastructures,
- to promote broad and secure access to data resources and data processing services, through its role in:
 - shaping parts of the Horizon Europe work programmes and
 - monitoring the output of funded actions,
- coordinate and foster technical environments and promote the skills that enable the
- federation of existing and new scientific data infrastructures.



An ecosystem more than an infrastructure



The screenshot shows a web browser window with the URL `eosc.eu`. The navigation menu includes: EUROPEAN OPEN SCIENCE CLOUD, EOSC, ASSOCIATION +, STRATEGIC AGENDA +, GET INVOLVED +, NEWS & EVENTS +, a Twitter icon, a Contact button, and a hamburger menu icon. The main content area features the heading **EOSC** and the sub-heading **What the European Open Science Cloud is**. The text describes the mission of EOSC to provide a federated and open multi-disciplinary environment for European researchers, innovators, companies, and citizens. It also lists key features: seamless access, FAIR (Findability, Accessibility, Interoperability and Reusability) management, and reliable reuse of research data and all other digital objects produced along the research life cycle (e.g. methods, software and publications). The text concludes by stating that EOSC ultimately aims to develop a 'Web of FAIR Data and services' for science in Europe upon which a wide range of value-added services can be built.

EOSC

What the European Open Science Cloud is

The ambition of the European Open Science Cloud (EOSC) is to provide European researchers, innovators, companies and citizens with a federated and open multi-disciplinary environment where they can publish, find and re-use data, tools and services for research, innovation and educational purposes.

This environment will operate under well-defined conditions to ensure trust and safeguard the public interest.

The EOSC enables a step change across scientific communities and research infrastructures towards:

- seamless access
- FAIR (Findability, Accessibility, Interoperability and Reusability) management
- reliable reuse of research data and all other digital objects produced along the research life cycle (e.g. methods, software and publications)

The European Open Science Cloud (EOSC) ultimately aims to develop a 'Web of FAIR Data and services' for science in Europe upon which a wide range of value-added services can be built. These range from visualisation and analytics to long-term information preservation or the monitoring of the uptake of open science practices.

Current EOSC Governance 2021 and beyond

- The 1st constitutional GA on 17th December 2020.
- The 1st GA elected the Board of Directors (9), and budget 2021.
- Official webpage: <https://www.eosc.eu/>
- Statutes published | [Link](#)
- Still work ongoing:
 - ✓ MoU with the European Commission
 - ✓ Secretary General
 - ✓ Operational and Advisory bodies
 - ✓ Bylaws

Governance of the Partnership



General Assembly (GA)

- Is the supreme authority of the Association.

Board of Directors

- The President is the Chair of the Board.
- The Board is appointed by Delegates of the GA

Secretary General

- The Secretary General is entrusted with the day-to-day management of the Association, leads the Secretariat.

Operational & Advisory Bodies

- Working groups and task forces to address issues or concerns relating to the mission and operations of the Association.

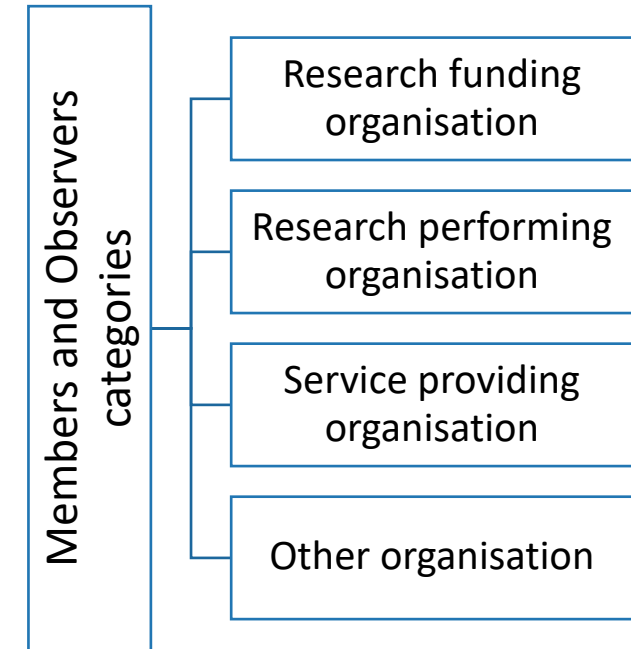
□ Current EOSC Governance 2021 and beyond

✓ Membership Categories

Members
<ul style="list-style-type: none">• Must be a legal entity.• Cannot be a department of national governments and ministries.• Should have a presence in an EU MS or AC, or any other country associated with the EU Framework Programme for Research and Innovation.• So far around 150 Members.

Observers
<ul style="list-style-type: none">• Must be a legal entity.• Cannot be a department of national governments and ministries.• May be established outside this area.• So far around 50 Observers.

Mandated Organisations
<ul style="list-style-type: none">• Each MS or AC that has one or more organisations that are Members of the Association may appoint one (1) Member to act as its Mandated Organisation, to represent national interests.• So far around 20 Mandated Organisations



□ Current EOSC Governance 2021 and beyond

✓ Rights

Members

1. Attending the meetings of the General Assembly;
2. Presenting in person their defence before the General Assembly, prior to being excluded from Membership;
3. Resigning from the Association;
4. Participating in the activities of the Association;
5. **Vote at the General Assembly;**
6. **Proposing candidates for the Board of the Association.**

Observers

1. Attending the meetings of the General Assembly;
2. Presenting in person their defence before the General Assembly, prior to being excluded from Membership;
3. Resigning from the Association;
4. Participating in the activities of the Association;

✓ Obligations

Members

1. Paying the annual membership fee → **10.000€ for 2021**
2. Adhering to the Statutes, Bylaws and decisions of the governing bodies;
3. Notifying the Secretary General of any changes regarding the status of the Member, which affect compliance with the membership criteria.

Observers

1. Paying the annual membership fee → **2.000€ for 2021**
2. Adhering to the Statutes, Bylaws and decisions of the governing bodies;
3. Notifying the Secretary General of any changes regarding the status of the Member, which affect compliance with the membership criteria.

- ❑ A structure to allow Association members and others to help steer the implementation of EOSC
- ❑ Groups should liaise with EOSC projects and offer feedback and advice
- ❑ Identify strategic gaps and areas for investment to input to SRIA
- ❑ EOSC Association members can propose and lead groups. Externals can also be members
- ❑ Each working group focuses on a set of topics, covered by a Task Force

❑ Implementation of EOSC

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

❑ 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

- ❑ Draft charters of the TF published
 - ❑ <https://www.eosc.eu/news/draft-charters-eosc-association-task-forces-published>
- ❑ New call for members was opened in July 2021
- ❑ New TFs have been just established (members notified)
- ❑ The Board will hold a webinar with the coordinators of all the Task Forces on 5th of October 2021 to discuss the next steps for the Task Forces.
- ❑ TF kick-off meetings are expected during October 2021

□ Incentives for Researchers and Organisations 1/2

Brings together key stakeholders in the European research environment.

Mandated organisations are able to express views that represent the specificities of their national research system.

The **federation of infrastructures and interlinking of data sets** stimulate collaboration between institutions and researchers -not only across research projects- but also across professional sectors and countries.

Countries that are already **advanced in FAIR data and Open Science policies** can share their **best practices** and lead in developing EOSC.

□ Incentives for Researchers and Organisations 2/2

Access to data and services at European level, EOSC will facilitate and widen the opportunities of researchers for collaboration, and will enable them to start new research activities.

Researchers and innovators will be able to jointly create innovative new technologies and services, which in turn will lead to the **creation of new jobs and markets**.

Agree together on **strategies for the advancement of Open Science and Open Innovation** to benefit European society such as the **SRIA** → A roadmap for realising EOSC and support EC next work programme **Horizon Europe (2021-2027)**.

Join the
Association

Join the
Stakeholder
Registry

Join the
EOSC
Future User
Groups

Member categories

- Members
- Observers

Mandated members (one per country)

Eligible organization types

- Research funding organisation;
- Research performing organisation;
- Service providing organisation;
- Other organisations, e.g. intergovernmental organisations.

Roles

- Shape the European Open Science Cloud;
- Guide the strategy for the EOSC implementation phase;
- Participate in Advisory Groups and General Assembly meetings;
- Engage in policy dialogues; and
- Network with like-minded people.



EOSC Association in Numbers

184 Applications

- ★ 130 Membership applications
- ★ 41 Observer applications
- ★ 13 Mandated members

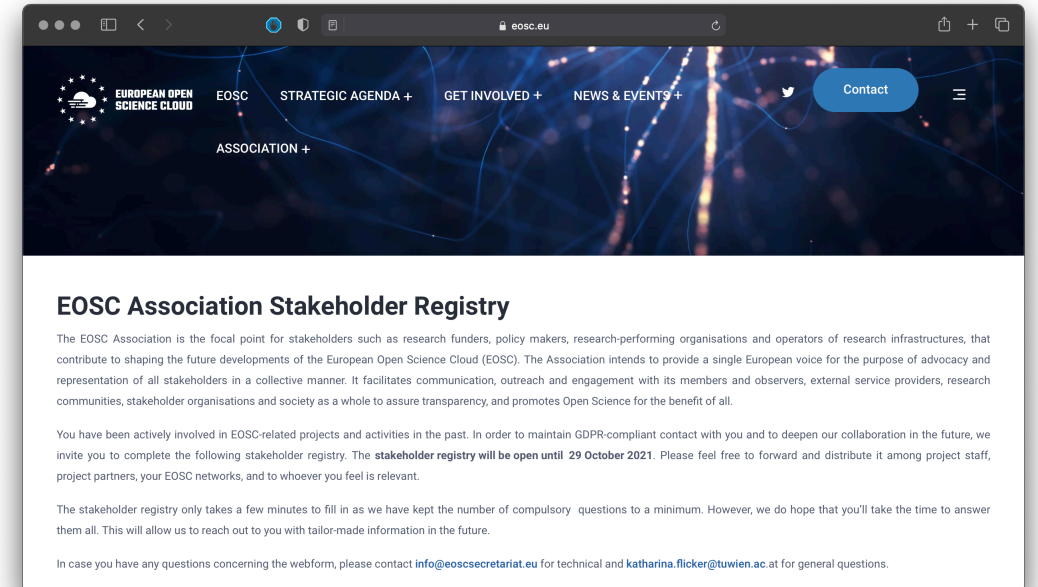
4 Organisation types

- ★ 114 Research performing organisations
- ★ 54 Service providing organisations
- ★ 13 Research funding organisations
- ★ 3 Other organisations

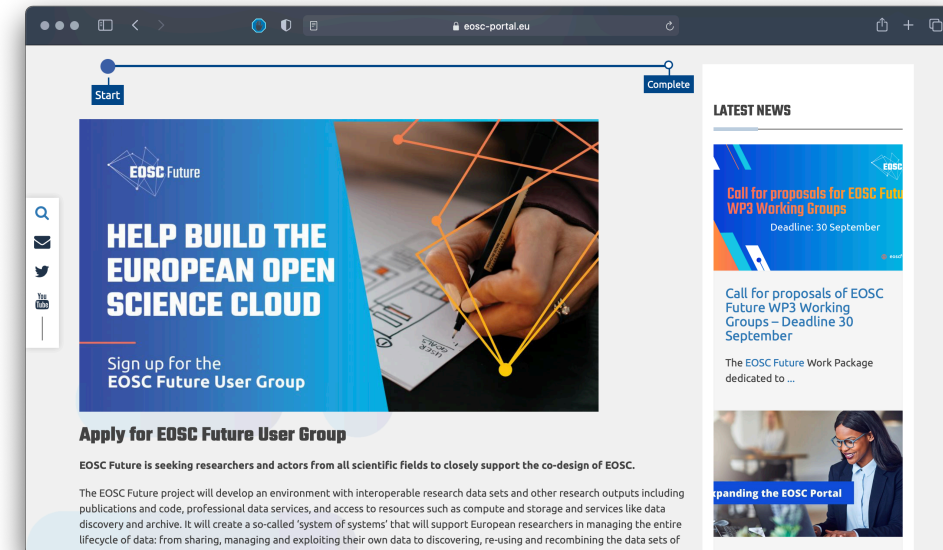
15 Countries with mandated members

- ★ Belgium
- ★ Denmark
- ★ Hungary
- ★ Ireland
- ★ Italy
- ★ Luxembourg
- ★ Moldova
- ★ Poland
- ★ Portugal
- ★ Romania
- ★ Slovakia
- ★ Slovenia
- ★ Spain
- ★ Switzerland
- ★ Ukraine

- ❑ The Association intends to provide a single European voice for the purpose of advocacy and representation of all stakeholders in a collective manner.
- ❑ **The stakeholder registry will be open until 29 October 2021.**
- ❑ <https://www.eosc.eu/eosc-association-stakeholder-registry>



- ❑ EOSC Future would like to engage and onboard a pool of diverse EOSC Users (the so-called EOSC Future User Group) that will provide input and feedback on the solutions developed by the project and promote the achievements
- ❑ The User Group will consist of at least 200 selected champions from all scientific areas who will support the project in co-designing and validating future EOSC services and products on the user-level.
- ❑ The application period is open **from 07 July 2021 to 30 September 2021 at 23:59 CEST.**



Researchers



Researchers are the first and ultimate target group of EOSC.



Their role within the EOSC is two-fold:

primarily users of the EOSC services

offer their assets (research output: data, software and other tools) to the EOSC



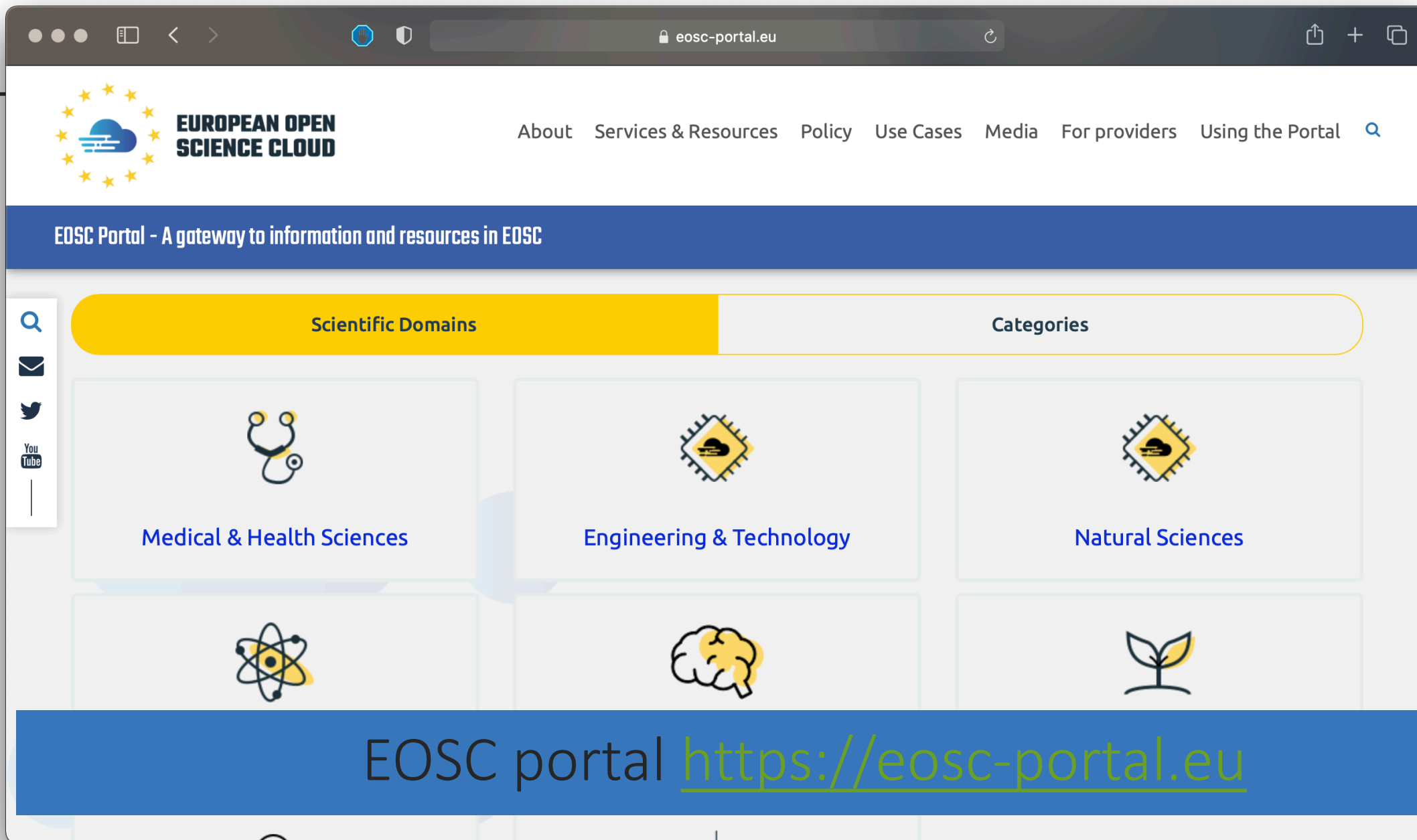
Not formed in homogeneous networks



Many individual researchers may not (yet) be aware about the EOSC or may be skeptical about it



Need to reach out to mediate target groups



The screenshot shows the EOSC Portal website in a browser window. The browser's address bar displays 'eosc-portal.eu'. The website header features the 'EUROPEAN OPEN SCIENCE CLOUD' logo on the left and a navigation menu with links for 'About', 'Services & Resources', 'Policy', 'Use Cases', 'Media', 'For providers', and 'Using the Portal' on the right. A search icon is also present. Below the header, a blue banner reads 'EOSC Portal - A gateway to information and resources in EOSC'. The main content area is divided into two tabs: 'Scientific Domains' (highlighted in yellow) and 'Categories'. Under 'Scientific Domains', there are six cards with icons and labels: 'Medical & Health Sciences' (stethoscope icon), 'Engineering & Technology' (chip icon), 'Natural Sciences' (chip icon), 'Physics' (atom icon), 'Cognitive Sciences' (brain icon), and 'Life Sciences' (plant icon). A vertical sidebar on the left contains social media icons for search, email, Twitter, and YouTube.

EOSC portal <https://eosc-portal.eu>

Ongoing EOSC related projects

<u>Project Acronym</u>	Project Name	<u>Start Date</u>	<u>End Date</u>	Website
NI4OS-Europe	National Initiatives for Open Science in Europe	09/2019	08/2022	ni4os-europe.eu
EOSC-Nordic	EOSC-Nordic	09/2019	08/2022	www.eosc-nordic.eu
EOSC-Pillar	Coordination and Harmonisation of National Initiatives, Infrastructures and Data services in Central and Western Europe	06/2019	06/2022	www.eosc-pillar.eu
FAIRsFAIR	Fostering Fair Data Practices in Europe	03/2019	02/2022	fairsfair.eu
EOSC-Life	Providing an open collaborative space for digital biology in Europe	03/2019	02/2023	www.eosc-life.eu
ESCAPE	European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures	02/2019	07/2022	www.projectescape.eu
CINECA	Common Infrastructure for National Cohorts in Europe, Canada, and Africa	01/2019	12/2022	www.cineca-project.eu

<https://www.eoscsecretariat.eu/eosc-projects-list>

Ongoing EOSC related projects

<u>Project Acronym</u>	Project Name	<u>Start Date</u>	<u>End Date</u>	Website
C-SCALE	Copernicus - eoSC AnaLytics Engine	01/2021	06/2023	c-scale.eu
DICE	Data Infrastructure Capacity for EOSC	01/2021	06/2023	www.dice-eosc.eu
EGI-ACE	EGI Advanced Computing for EOSC	01/2021	06/2023	www.egi.eu
OpenAIRE Nexus	OpenAIRE-Nexus Scholarly Communication Services for EOSC users	01/2021	06/2023	www.openaire.eu
RELIANCE	REsearch Lifecycle mAnagement for Earth Science Communities and CopErnicus users in EOSC	01/2021	12/2022	www.reliance-project.eu
CS3MESH4EOSC	Interactive and agile/responsive sharing mesh of storage, data and applications for EOSC	01/2020	12/2022	cs3mesh4eosc.eu
EOSC Enhance	Enhancing the EOSC portal and connecting thematic clouds	12/2019	11/2021	www.eosc-portal.eu
INODE	Intelligent Open Data Exploration	11/2019	10/2022	www.inode-project.eu

<https://www.eoscsecretariat.eu/eosc-projects-list>

Ongoing EOSC related projects

<u>Project Acronym</u>	<u>Project Name</u>	<u>Start Date</u>	<u>End Date</u>	<u>Website</u>
NEANIAS	Novel EOSC services for Emerging Atmosphere, Underwater and Space Challenges	11/2019	10/2022	www.neanias.eu
TRIPLE	Transforming Research through Innovative Practices for Linked interdisciplinary Exploration	10/2019	10/2023	cordis.europa.eu
FNS-Cloud	Food Nutrition Security Cloud	10/2019	09/2023	www.fns-cloud.eu
Blue-Cloud	Piloting innovative services for Marine Research & the Blue Economy	10/2019	09/2022	www.blue-cloud.org
EOSC-Synergy	European Open Science Cloud - Expanding Capacities by building Capabilities	09/2019	02/2022	www.eosc-synergy.eu
ExPaNDS	EOSC Photon and Neutron Data Services	09/2019	08/2022	expands.eu

<https://www.eoscsecretariat.eu/eosc-projects-list>

Upcoming EOSC Calls

<https://www.eosc.eu/calls-grants>

Grant

 Forthcoming

Services and tools to underpin a research assessment system that incentivises open science practices

Programme	Horizon Europe Framework Programme (HORIZON)	Deadline model	single-stage	Read more >
ID	HORIZON-INFRA-2022-EOSC-01-01	Opening date	19 January 2022	
Types of action	HORIZON Research and Innovation Actions	Deadline date	20 April 2022 Brussels time	

<https://www.eosc.eu/calls-grants>

Grant

 Forthcoming

Grant

 Forthcoming

Progr
ID
Type

Improving and coordinating technical infrastructure for institutional open access publishing across Europe

Programme	Horizon Europe Framework Programme (HORIZON)	Deadline model	single-stage	Read more >
ID	HORIZON-INFRA-2022-EOSC-01-02	Opening date	19 January 2022	
Types of action	HORIZON Research and Innovation Actions	Deadline date	20 April 2022 Brussels time	

<https://www.eosc.eu/calls-grants>

Grant

 Forthcoming

Grant

 Forthcoming

Grant

 Forthcoming

Progr
ID
Type

FAIR and open data sharing in support of healthy oceans, seas, coastal and inland waters

Programme	Horizon Europe Framework Programme (HORIZON)	Deadline model	single-stage	Read more >
ID	HORIZON-INFRA-2022-EOSC-01-03	Opening date	19 January 2022	
Types of action	HORIZON Research and Innovation Actions	Deadline date	20 April 2022 Brussels time	

<https://www.eosc.eu/calls-grants>

Grant

Forthcoming

Grant

Forthcoming

Grant

Forthcoming

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Support for initiatives helping to generate global standards, specifications and recommendations for open sharing of FAIR research data, publications and software

Programme	Horizon Europe Framework Programme (HORIZON)	Deadline model	single-stage	Read more >
ID	HORIZON-INFRA-2022-EOSC-01-04	Opening date	19 January 2022	
Types of action	HORIZON Coordination and Support Actions	Deadline date	20 April 2022 Brussels time	

<https://www.eosc.eu/calls-grants>



*"..we open up data as a resource for innovation and bring new solutions to the market - and our scientists are already beginning to do this. **We are now building a European Open Science Cloud.** It is a trusted space for researchers to store data and access data from researchers from other disciplines."*

EOSC is here to stay!

- EOSC aims at creating a virtual research environment to access and interoperate research data and other research outputs in Europe across the different disciplines.

Credits & contact

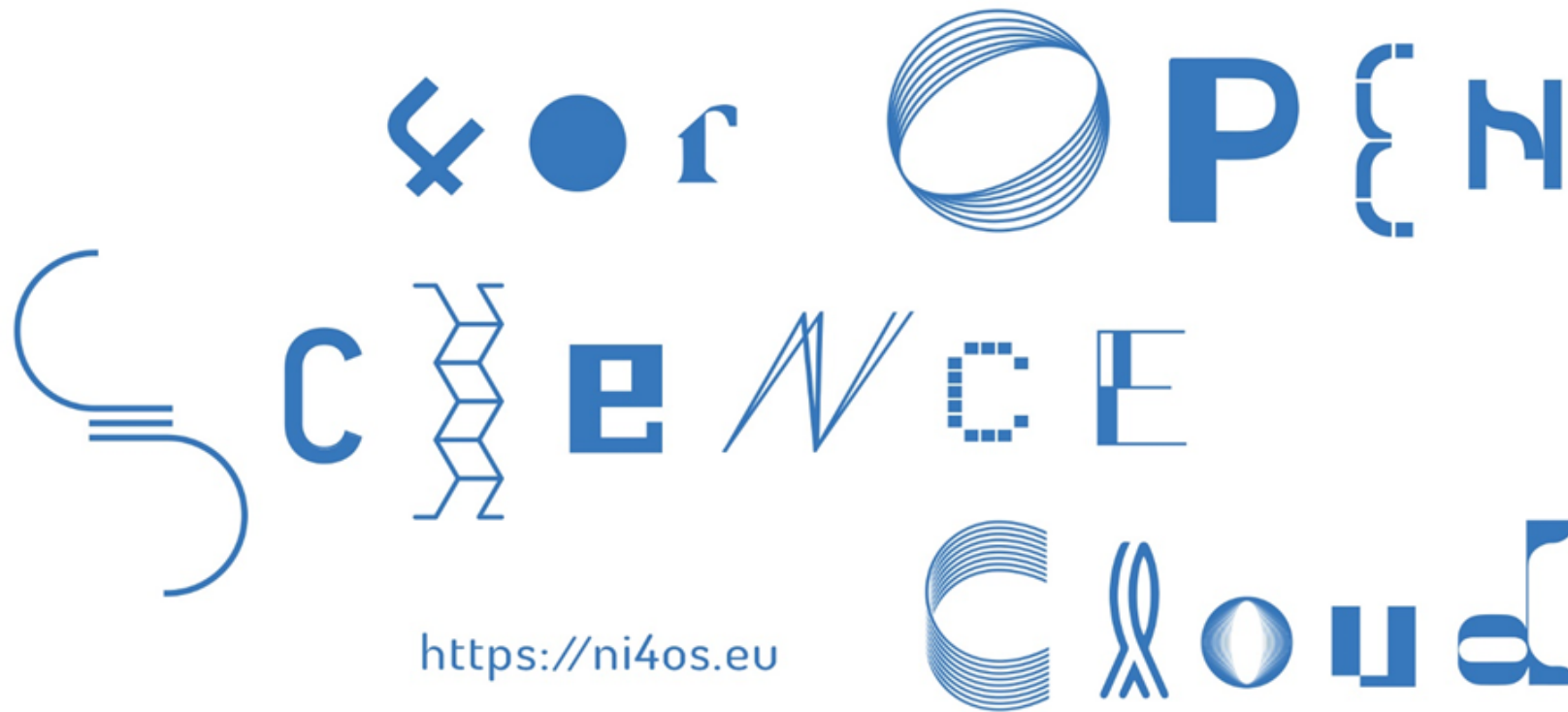
❑ Credits to:

- ❑ Emma Lazzeri Consiglio Nazionale delle Ricerche – CNR – Italy EOSCSecretariat.eu Supporting EOSC Governance and its stakeholders Introduction to EOSC, NI4OS webinar
- ❑ David Groep, chairman of EUGridPMA, NSF Cybersecurity Summit 2020 50th EUGridPMA, AARC & EnCo meeting, September 2020
- ❑ Lidija Milosavljević, European Open Science Cloud – EOSC, National Capacity Building NI4OS event in Montenegro, October 2020
- ❑ <https://www.eosc-portal.eu/>
- ❑ <https://marketplace.eosc-portal.eu/>
- ❑ <https://www.eoscsecretariat.eu/news-opinion/eosc-strategic-research-and-innovation-agenda-version-08>
- ❑ <https://www.eoscsecretariat.eu/events/eosc-symposium-2021>

❑ Get in touch with EOSC:

- ❑ <https://www.eosc.eu>
- ❑ <https://eosc-portal.eu/contact-us>
- ❑ info@eosc.eu
- ❑ info@eoscsecretariat.eu
- ❑ www.eoscsecretariat.eu
- ❑ <https://www.youtube.com/watch?v=3Hgnle1Xu8I>

Thank you!



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