



Data Management at a European context

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IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
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Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Outline of this module

- 🌐 Open Science and Marine Data Management
- 🌐 The European Open Science Cloud
- 🌐 The role of Data Stewards
- 🌐 The EU Marine Data platforms
- 🌐 ITINERIS Italian Integrated Ocean Observing System: RIs and data flow
- 🌐 What's next in the training








Marine Data Management & Data Quality Control



[Mentimeter code: 8143 4512](#)



Interactive exercise

-  What is your area of expertise? Data manager, data acquisition, scientist, IT, other
-  Is Open Science linked to MDM in your opinion? strongly connected - weakly connected - not connected
-  Please provide your definition of Open Science ...
-  How much of your time do you devote to data management? All, almost all, half, some, I am not involved in data management
-  Which data management activity do you like better (if any)? ...
-  Do you know the professional role of Data Steward? Yes/no
-  Please give a short description of a Data Steward ...

What is Open Science

- 🌐 **Open science** is defined as an **inclusive** movement and practices aiming to make **multilingual** scientific knowledge **openly available, accessible** and **reusable for everyone**, to increase scientific **collaborations** and **sharing** of information for the benefits of science and society...
- 🌐 Member States committed to reporting on their progress in implementing open science every four years.

NOT ONLY
SCIENTIFIC
KNOWLEDGE. OPEN
DIALOGUE, OPEN
ENGAGEMENT OF
SOCIETAL ACTORS

Training current future RI research staff: "Marine Data Management & Data Quality"



Figure 1.1. Elements of open science (UNESCO 2021b)

...Open Science components

FOCUS ON THE ENTIRE PROCESS,
NOT ONLY THE FINAL SYNTHESIS
(ARTICLE)



OPEN SCIENCE
≠ OPEN ACCESS

MDMC
Master in Data Management
and Curation

AREA
EVIDENCE BASED
RESEARCH

SISSA
Scienze Interdisciplinari
e Sociali

Consiglio Nazionale
delle Ricerche

Open Science – 2
What?

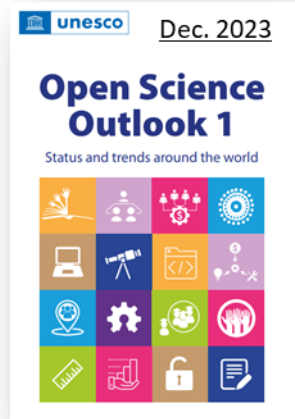
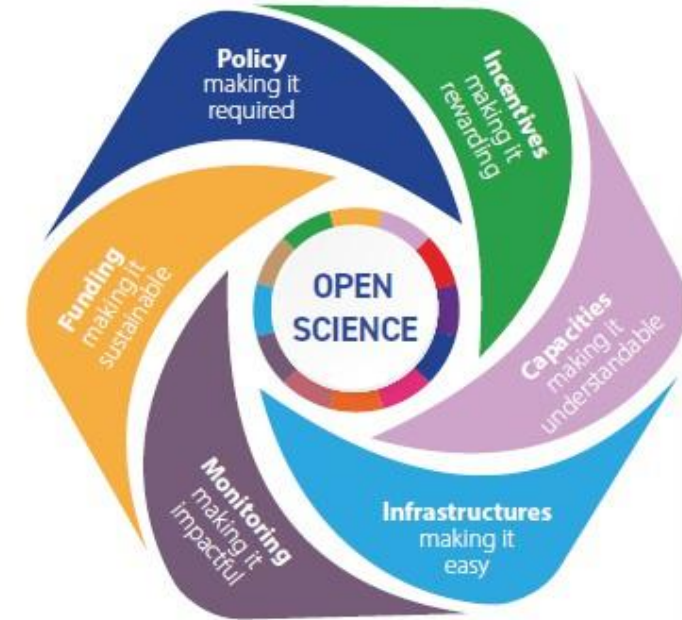
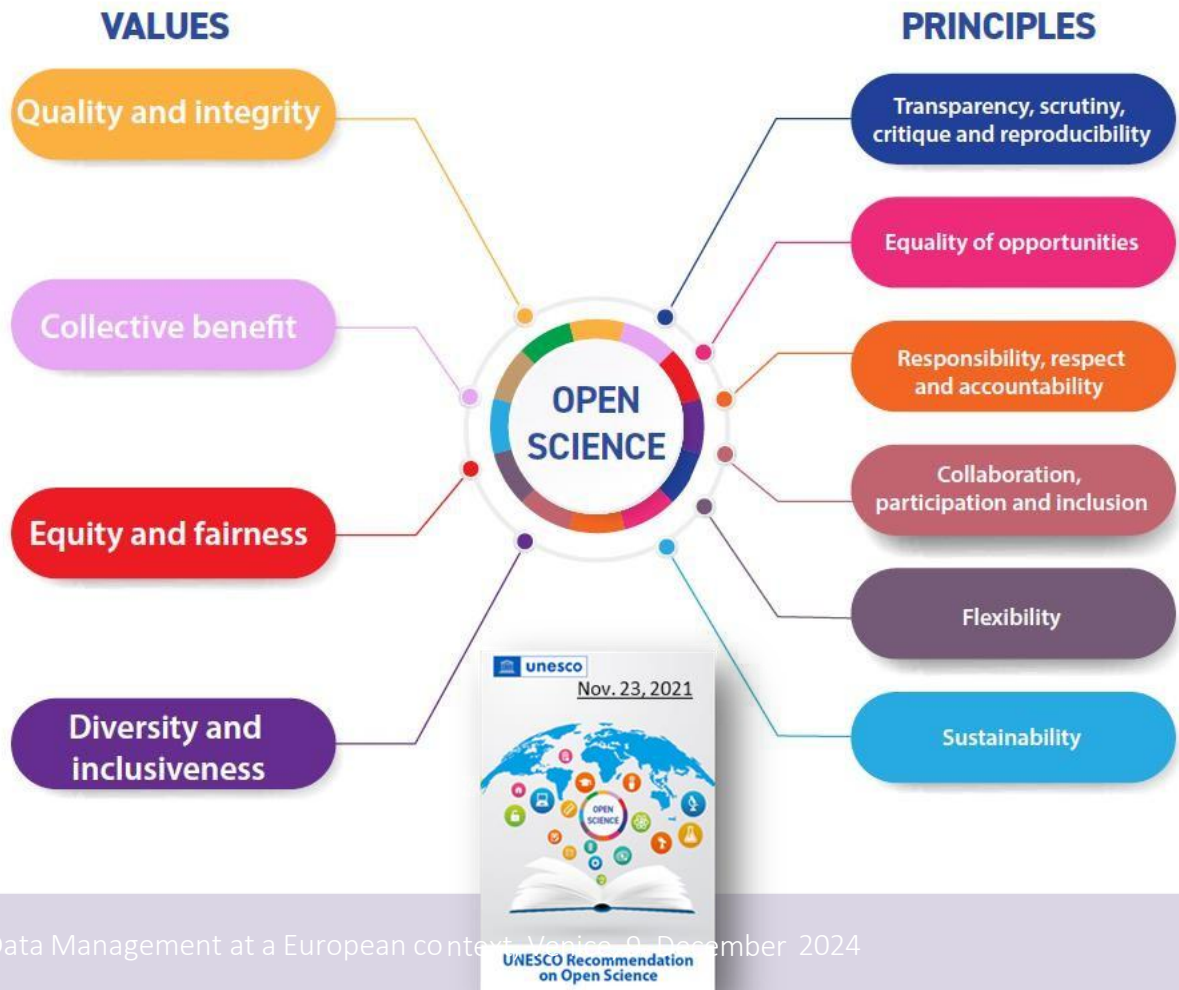
Elena Giglia
Trieste, 23/09/2024

CC BY

The importance of Open Science

OPEN SCIENCE HAS THE POTENTIAL TO REDUCE INEQUALITIES AMONG REGIONS, ACCELERATING PROGRESS AND PARTICIPATION

KEY FACTORS ENABLING THE CULTURAL SHIFT TO OPEN SCIENCE



- 🌐 Committing to global reform in research assessment: DORA
- 🌐 Collaborative action on research assessment: CoARA

San Francisco Declaration on Research Assessment (DORA)

- 🌐 to improve the ways in which the output of scientific research is evaluated
- 🌐 in San Francisco, CA, on December 16, 2012, a group of editors and publishers of scholarly journals developed a set of recommendations

25,662 individuals and organizations in 166 countries have signed DORA to date.



Coalition for Advancing Research Assessment (CoARA)



- 🌐 collective of organisations **committed** to reforming the methods and processes by which research, researchers, and research organisations are evaluated
- 🌐 CoARA signatories are invited to share the Action Plans on the process to implement the 10 Core Commitments
- 🌐 CoARA is governed by a General Assembly and a Steering Board
- 🌐 as of 25 November 2024, there are **706 CoARA member organisations** from across the world
- 🌐 Born in 2022

EUROPEAN COMMISSION INITIATIVE
TOWARDS A REFORM OF RESEARCH
ASSESSMENT (JOINED THE COALITION,
AS WELL AS ANVUR)

- SIGNATURE OF THE AGREEMENT
- IN 1 YEAR SHOW A ROADMAP
- IN 5 YEARS SHOW THE EFFECTS



National Chapter Italy

Mission

In Italy there is an active ongoing debate about the methods used for research assessment, promoted by single institutions and associations. The NC functions as a coordinating body, moving forward the current state of the national debate and developing a practical implementation proposal. It will bring together different communities involved in research assessment and scholarly communication.



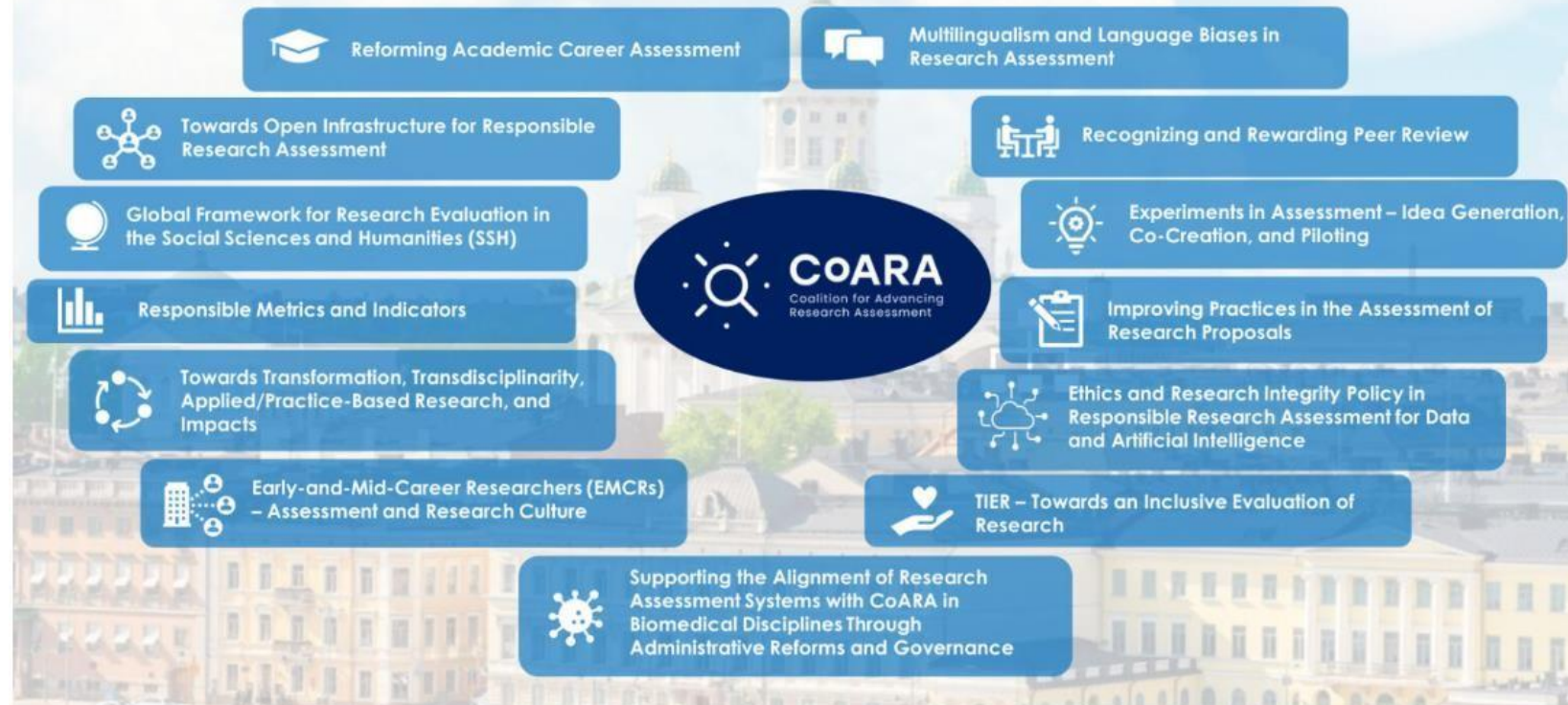
Objectives

- Enable mutual learning, share best practices, and raise awareness of best responsible assessment practices and indicators in the national community on the ongoing research assessment reform
- Foster discussion about reviewing and developing assessment criteria, tools and processes for assessing research institutions, individual researchers and projects
- Create an active network among Italian institutions, promoting the alignment of the Institutional Roadmaps requested by CoARA, and engaging with the relevant political decision-making national body(ies)
- Establish stable and bidirectional connections with the Working Groups, to explore the impact of their results on national practices and provide a feedback based on the experiences of the Italian communities on more specific topics
- Interact and collaborate with the other National Chapters

Members

- Agenzia nazionale di valutazione del sistema universitario e della ricerca – ANVUR (Marco Malgarini, Licia Romano)
- Alma Mater Studiorum – Università di Bologna (Alberto Credi, Francesca Masini)
- Associazione italiana per la promozione della scienza aperta – AISA (Maria Chiara Pievatolo, Roberto Caso)
- Ca' Foscari Università di Venezia (Marco Sgarbi, Tommaso Piazza)
- Consiglio Nazionale delle Ricerche – CNR (Francesca Di Donato, Ginevra Peruginelli)
- IRCCS Ospedale San Raffaele (Roberto Buccione, Monica Fabbri)
- Istituto Italiano di Tecnologia – IIT (Ugo Moschini, Elisa Molinari)
- Istituto Nazionale di Fisica Nucleare – INFN (Nadia Pastrone)
- Istituto Nazionale di Geofisica e Vulcanologia – INGV (Alessandro Carosi)
- Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS (Nicola Casagli, Angela Saraò)
- Italian Reproducibility Network – ITRN (Carlo Miniussi, Davide Crepaldi)
- IULM (Emma Zavarrone, Giovanna Rocca)
- Politecnico di Bari (Giuseppe Pascazio, Antonella Palermo)
- Politecnico di Torino (Federica Cappelluti, Antonella Marino)
- Scuola IMT Lucca (Emanuele Pellegrini, Anna Smaniotta)

CoARA Working Groups



<https://www.coara-italia.it/>

Quality and impact

Principles for assessment criteria and processes

- 🌐 Focus on **quality** and **originality** of ideas
- 🌐 Recognise the **diversity** of outputs, and reward early sharing and **open** collaboration. Consider the **full range of research outputs**, such as scientific publications, **data, software, models**, methods, theories, algorithms, protocols, workflows, exhibitions, strategies, policy contributions, etc.
- 🌐 Valorise the **diversity** in research roles and careers, the **skills** (including open science skills), competences and merits of individual researchers, but also recognise **team science** and collaboration
- 🌐 Ensure gender equality, **equal opportunities** and inclusiveness



Implementation of Open Science

THE IMPORTANCE OF DATA IN THE IMPLEMENTATION OF OPEN SCIENCE & FOR RESEARCH ASSESSMENT

ANNEX

COUNCIL CONCLUSIONS ON RESEARCH ASSESSMENT AND IMPLEMENTATION OF OPEN SCIENCE

THE COUNCIL OF THE EUROPEAN UNION,

a. moving to a more balanced approach between the quantitative and the qualitative evaluation of research, by strengthening the qualitative research assessment indicators while developing the responsible use of quantitative indicators;

18. UNDERLINES that the COVID-19 crisis has highlighted the benefits of Open Science and of immediate open access to research publications, enabling quicker ways of vetting the quality thereof, and of further expanding open access modalities, which has been key to developing rapid responses to the crisis by permitting quick access to new research results to combat the disease; RECOGNISES that the crisis has also highlighted the benefits of increased access to research data based on the FAIR principles;

- b. recognising all forms of research and innovation output and processes, including *inter alia*, datasets, software, codes, methodologies, protocols and patents, and not only publications; STRESSES that data should be findable, accessible, interoperable and reusable, in line with the FAIR principles;
- c. taking into consideration diverse career pathways and all research and innovation activities, including mentoring, leadership roles, entrepreneurship, data management, teaching, knowledge valorisation, industry-academia cooperation, support for evidence-informed policy making, interaction with society, including citizen science and public engagement;
- d. taking into consideration the specificities of the various research disciplines, the range from basic to applied research, the stages of research careers and the missions of research institutions;
- e. ensuring that ethics and integrity are accorded the highest priority and are not compromised by counter-incentives;
- f. ensuring diversity, gender equality, and actively promoting women in science;

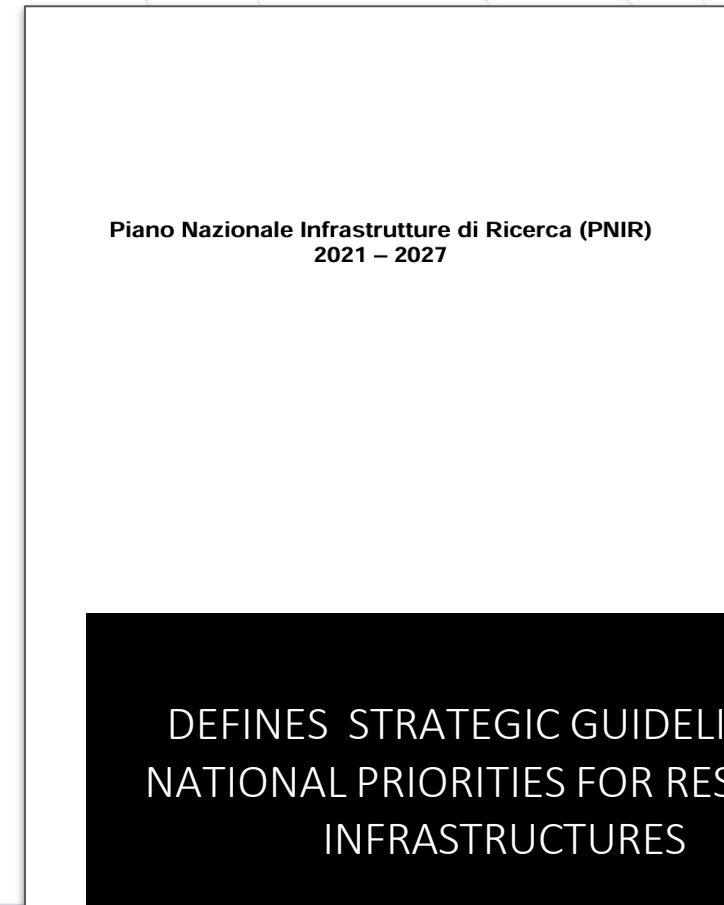
- 🌐 **‘dynamic data’** subject to frequent or **real-time updates**, in particular because of their volatility or rapid obsolescence; data **generated by sensors** are typically considered to be dynamic data;
- 🌐 **‘research data’** which are collected or produced in the course of scientific research activities and are **used as evidence in the research process**, or are commonly accepted in the research community as necessary to validate research findings and results;
- 🌐 **‘high-value datasets’** which are associated with important benefits for society, the environment and the economy, in particular because of their suitability for the creation of value-added services, applications and new, high-quality and decent jobs, and of the number of potential beneficiaries of the value-added services and applications based on those datasets;

The Italian Context

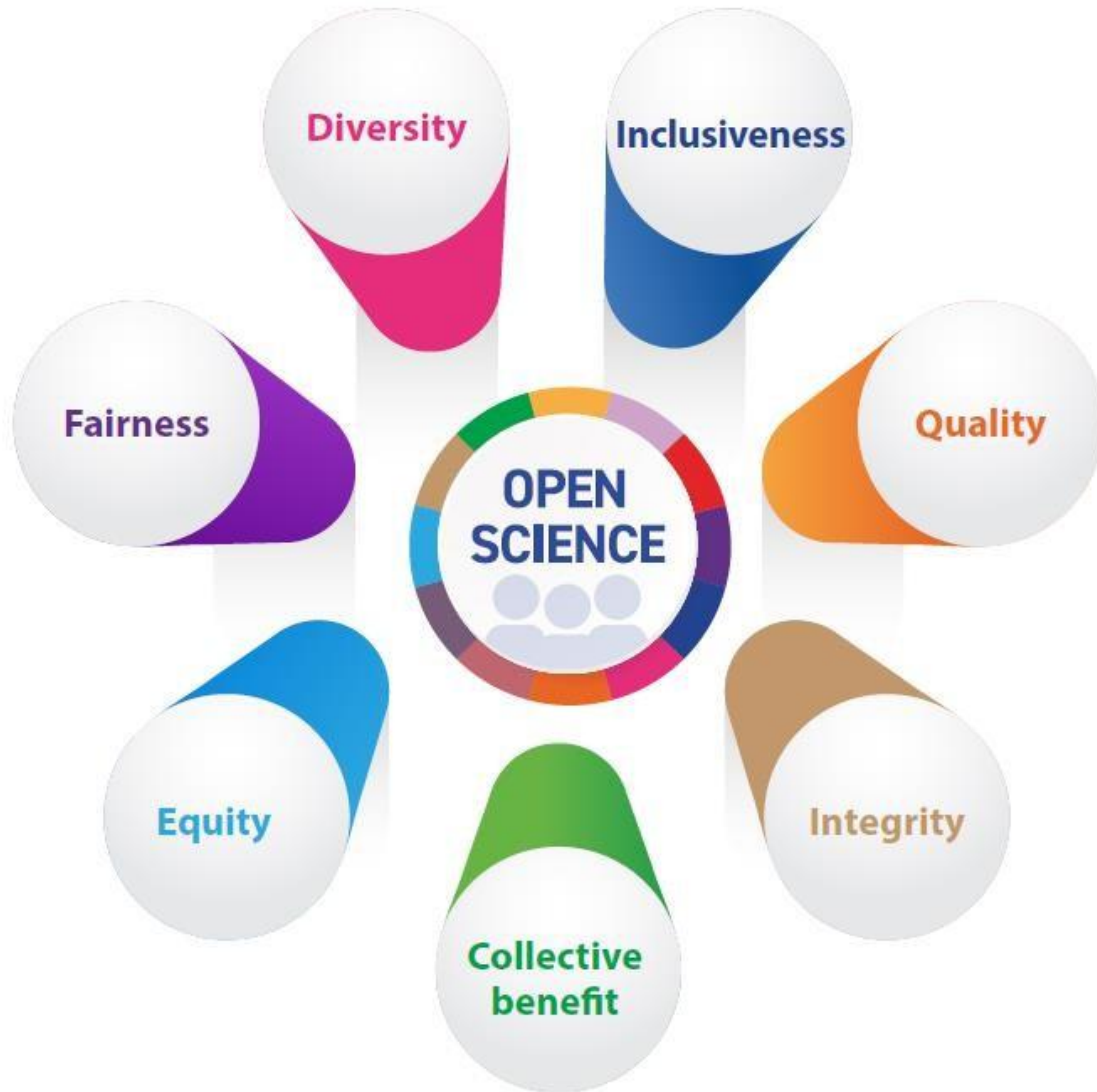
National Plan for Open Science (PNSA)



National Research Infrastructure Plan (PNIR)

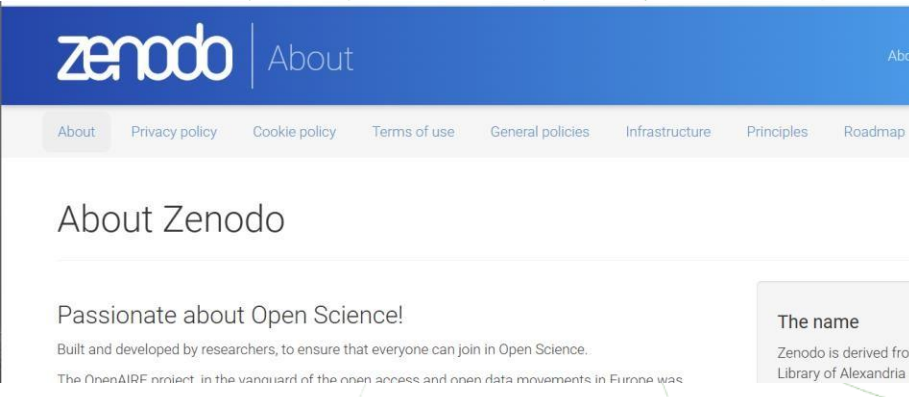
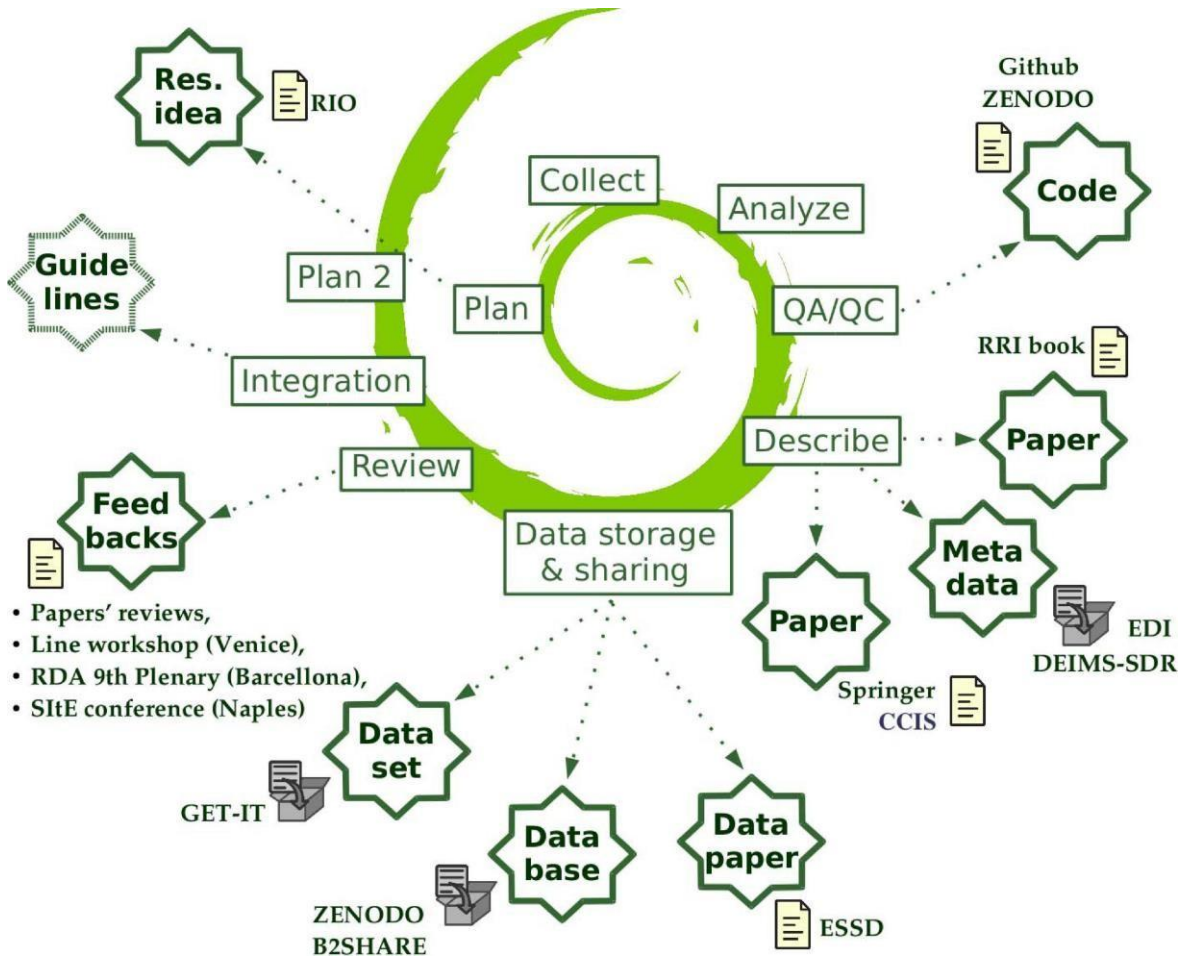


Shared values of open science

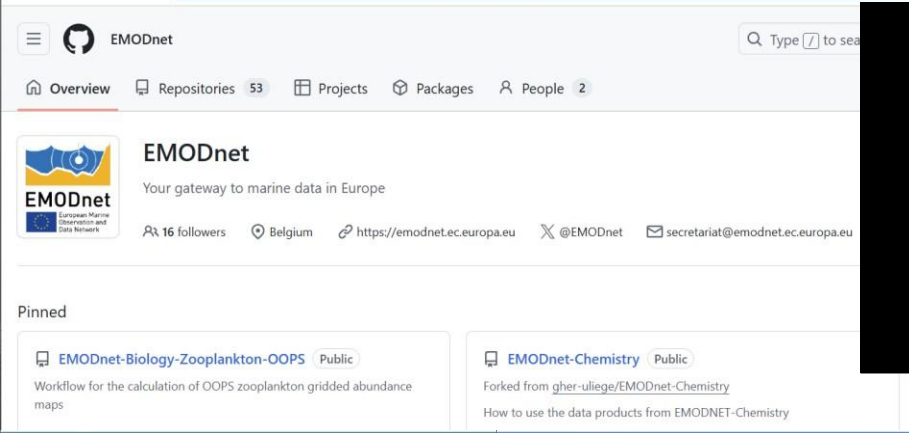


- 🌐 Open science is integrated in all **research** funded by the European Commission
- 🌐 Open science **infrastructures** funded by the European Commission include:
 - European Open Science Cloud (**EOSC**) an inclusive research FAIR data and services **ecosystem** for science; and
 - Open Research Europe (**ORE**), an open access and open peer-reviewed publication platform.

Open NOT only at the end



TO STORE & DISSEMINATE: CREATE A COMMUNITY ON ZENODO



USE GITHUB TO MANAGE YOUR PROJECT IN A COLLABORATIVE WAY



CREATE A VRE-VIRTUAL RESEARCH ENVIRONMENT

Opening Marine Long-Term Ecological Science: Lesson Learned From the LTER-Italy Site Northern Adriatic Sea

Annalisa Minelli¹, Alessandro Sarretta², Alessandro Oggioni³, Caterina Bergami^{4*}, Mauro Bastianini⁵, Fabrizio Bernardi Aubry⁵, Elisa Camatti⁵ and Alessandra Pugnetti⁵

OPEN WORKFLOW: A GOOD EXAMPLE

EOSC system for research and innovation



EOSC: European Open Science Cloud

EOSC Strategy – Status Current Thinking

What

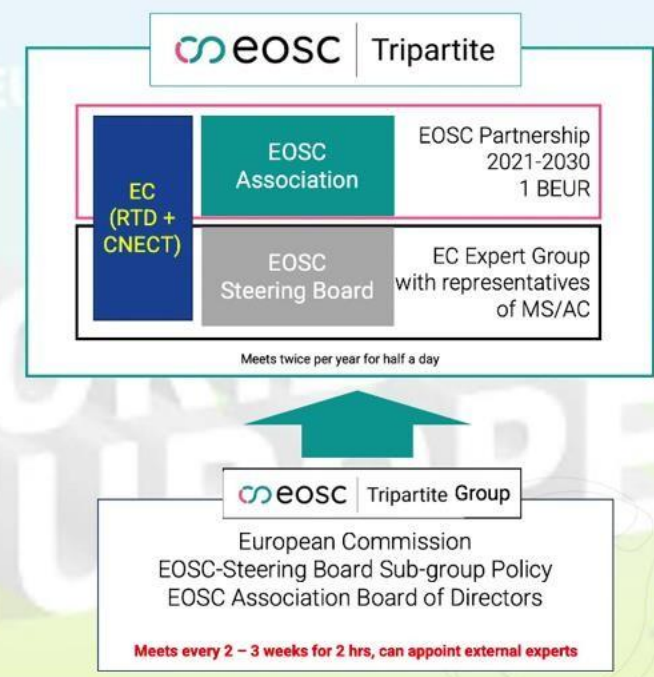
EOSC is a web of FAIR data and related services for research
 Research data that is easy to find, access, interoperate and reuse (FAIR)
 Trusted and sustainable research outputs are available within and across scientific disciplines

Why

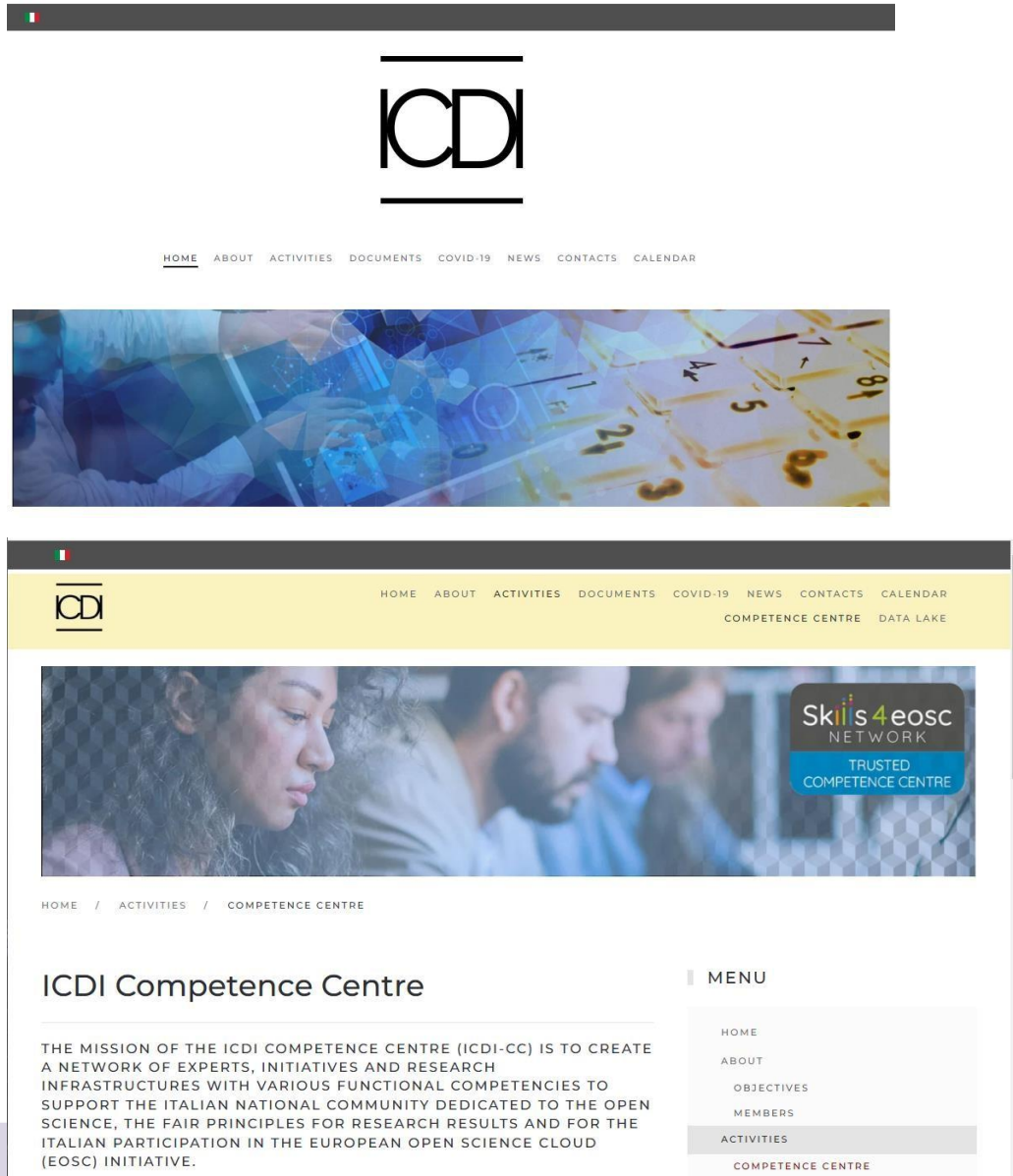
Unlock the full potential of research data to accelerate discoveries and innovation

- How**
- | | | |
|--|---|--|
| <p>Access and interoperability of research data and results</p> <ul style="list-style-type: none"> Define ownership, authorship and responsibility of data and research outputs Ensure long-term preservation of data throughout its lifecycle Enable the creation of standards for all research domains Make data machine-actionable Enable new scientific discovery methods and science disciplines Train researchers on adopting FAIR principles as an integral part in their activity | <p>A sustainable coordinated infrastructure</p> <ul style="list-style-type: none"> Establish and maintain a coordinated federated reference architecture Implement an operational infrastructure framework that is long term sustainable Ensure high quality of data and services Ensure secure access to data and services Define clear standards for API and interoperability of data and services Apply user friendly practices Inspire EOSC ambassadors to assist in on-boarding of researchers | <p>Inspired people and robust governance</p> <ul style="list-style-type: none"> Communicate an inspiring EOSC vision and strategy Implement an unambiguous and mandated governance structure Establish a framework to engage human capital in institutions, countries and scientific communities Enable disciplinary and cross-disciplinary transnational research to find new insights from existing research data and outputs |
|--|---|--|

EOSC Tripartite Governance



The Italian representation in EOSC



🌐 ICDI (Italian Computing and Data Infrastructure) one of the four **founding members** of the EOSC Association

🌐 ICDI Competence Center for Open Science, FAIR and EOSC
<https://doi.org/10.5281/zenodo.5512638>



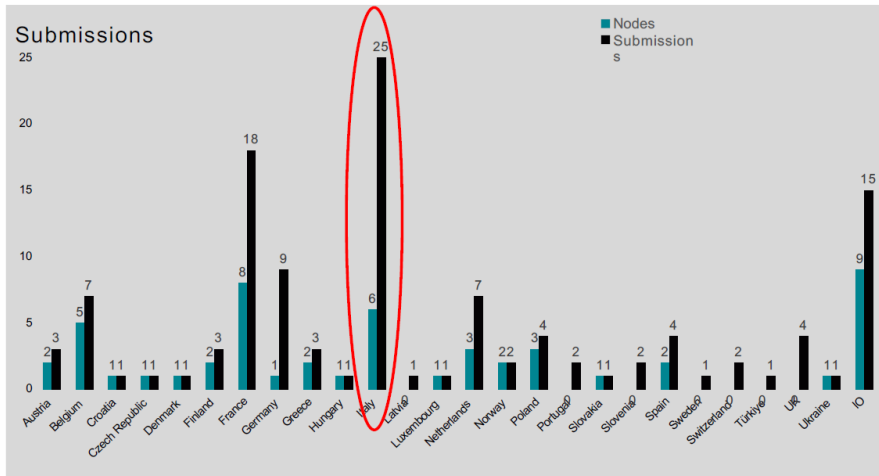


The screenshot shows the EOSC website's news section. At the top, there is a navigation bar with the EOSC logo and menu items: 'EOOSC', 'Collaborations', 'EOOSC Association', 'Activities', and 'EOOSC Focus'. A search bar is also present. The main content area features a breadcrumb trail: 'Home / Activities / News / EOOSC Symposium 20...'. The headline reads 'EOOSC Symposium 2024 moves EOOSC Federation toward operations phase'. Below the headline is a large photograph of a diverse group of people seated in a conference hall. A teal text box in the bottom-left corner of the photo states 'EOOSC Symposium 2024 21-23 October | Berlin'. Underneath the photo, the text reads: 'BERLIN—The EOOSC Symposium 2024 kept its promise to be a pivotal event for the advancement of the European Open Science Cloud (EOOSC). More than 450 participants gathered in Berlin under the patronage of the German Minister for Education and Research Bettina Stark-Watzinger, with another thousand registered for'. To the right of this text is a bullet point: '• Political and community backing reaffirmed'.

- Official launch of the EOOSC EU Node
- EOOSC Federation starts taking shape
- Process started in summer 2024
- Questionnaire filled by 121 organisations
- Criteria for sequencing
- Two-stage dialogue process

EOSC Nodes

eosc Distribution of nodes and resources across MS/AC and International Organisations

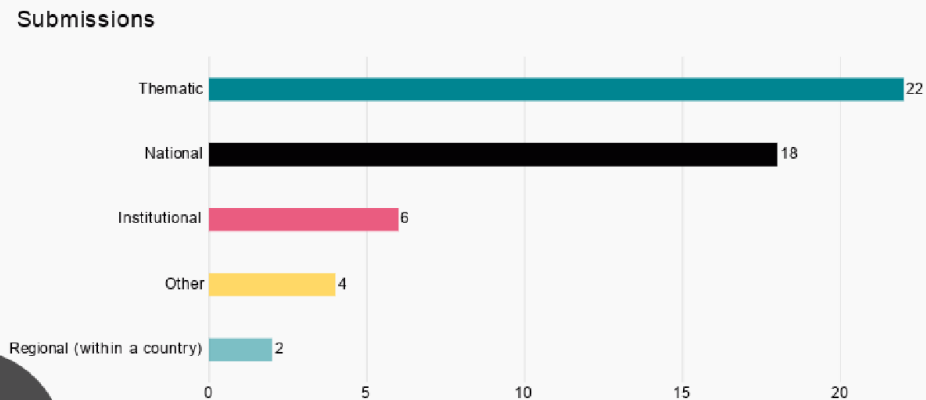


National EOSC Node with LE the Italian National Center for HPC, Big Data and Quantum Computing (22 submissions)

CNR IMAA/ITINERIS, FR/EURO-ARGO ERIC, ...

ICDI WG (coordinated by CNR)

eosc Categorisation of nodes



ICSC
Centro Nazionale di Ricerca in HPC, Big Data and Quantum Computing

Latest from ICSC

- ICSC ITALIAN EOSC NODE SELECTED TO JOIN THE EOSC FEDERATION AS POTENTIAL CANDIDATE NODE
6 Dec 2024
- INNOVATE: THE FIRST INDUSTRIAL SUPERCOMPUTER OF THE EUROPEAN EURO HPC INFRASTRUCTURE
5 Dec 2024
- REGISTRATION OPEN TO PARTECIPATE IN SIXTH EDITION OF THE INTERNATIONAL SCHOOL ON THE OPEN SCIENCE CLOUD (SOSC 2024)
4 Jun 2024
- REGISTRATION OPEN FOR COURSE IN BIOMEDICAL COMPUTING RE-TRAIN-ME
23 Mar 2024

We need Data Stewards

WE NEED DATA STEWARDSHIP EDUCATION AT UNIVERSITY

nature Feb. 25, 2020 [Subscribe](#)

WORLD VIEW · 25 FEBRUARY 2020

Invest 5% of research funds in ensuring data are reusable

It is irresponsible to support research but not data stewardship, says Barend Mons.

 Barend Mons

DATA DOMAIN COMPETENCES+ TRANSVERSAL SKILLS

KØBENHAVNS UNIVERSITET

Competence Profile

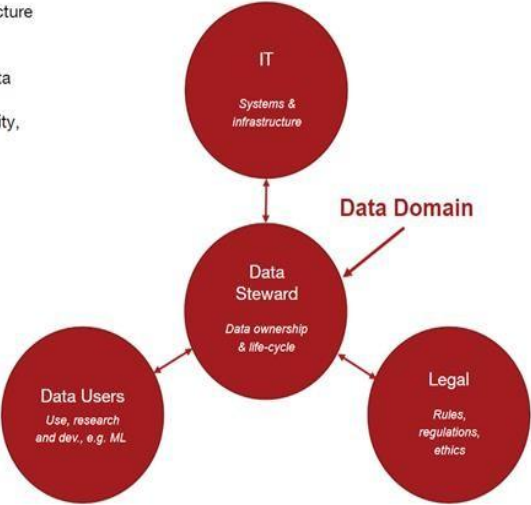
A data steward is a data specialist with strong domain-specific knowledge who understands and appreciates the relevance of data, data sources, data infrastructure and constraints within a scientific or other application domain.

The future Data Steward must assume ownership and responsibility for data, data quality, and the data life-cycle as their primary function. They should ensure collaboration and coherence between IT competences, quality assurance, security, rules & regulations, and facilitate the application and use of data internally and externally in the organisation.

Competence profile examples

- Domain-specific data understanding
- Ability to ensure that structured and unstructured data and meta data is modelled, harvested, stored, and maintained in a documented, and regulated fashion with focus and findability, accessibility, interoperability, and reusability.
- Competences to facilitate HPC (High Performance Computing) during development and research through handling of large-scale data in public and private enterprises.
- Understanding of and competences within legal, ethical and security aspects of data handling, data sharing, e.g., integrity and GDPR.

[Copenhagen Univ. June 17 2020](#)



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nature > career column > article

CAREER COLUMN | 14 April 2022

Time to re-think the divide between academic and support staff

Research professionals should not be split into two categories, say Marta Teperek, Maria Cruz and Danny Kingsley.

DATA STEWARDS ARE NOT TO BE INTENDED AS «SUPPORTING STAFF». THEY ARE PART OF THE RESEARCH TEAM



Open Science – 3 How?

Elena Diglia
Trieste, 23/09/2024

Training current future RI research

The community of data steward in Italy



Skills
4 eosc

Supporting eosc Co-funded by the European Union UK Research and Innovation co-funded by

ABOUT ▾ KERS NEWS RESOURCES ▾ NETWORK ▾ PARTICIPATE ▾

- Skills for the European
- Open Science
- Commons

CREATING AN EOSC-READY
EUROPEAN WORKFORCE



Open Science
Café



- 🌐 Launched in November 2023
- 🌐 Promoted by ICDI & Skills4EOSC
- 🌐 Create a document with the minimum set of skills (MVS) needed for the Italian Data Steward, based on the document created by Skills4EOSC
- 🌐 Look at the role of “Embedded DS” to describe the different roles that this generic term encompasses.

Data Steward: mission and outcomes

Coordinator Data Steward

Provides a 'centralised knowledge and communication hub' for researchers. Advises and trains on policy, guidelines, data management plans, institutional [infrastructure](#) and tools. These may include software code, and its development as a FAIR and open resource.

Associated function titles: Data Steward, Data Librarian, Research Data Management Specialist, Research Data Manager, Research Data Management Consultant, Research Data Coordinator. Reproducibility Librarian.

Embedded Data Steward

Serves research teams, faculties, departments, sections of organisations directly involved in producing research outputs. Helps embed FAIR and CARE principles in research practices, meeting needs of researchers as they arise, and working with others to ensure the long-term **preservation** and reusability of research outputs. These may include software code, and its development as a FAIR and open resource.

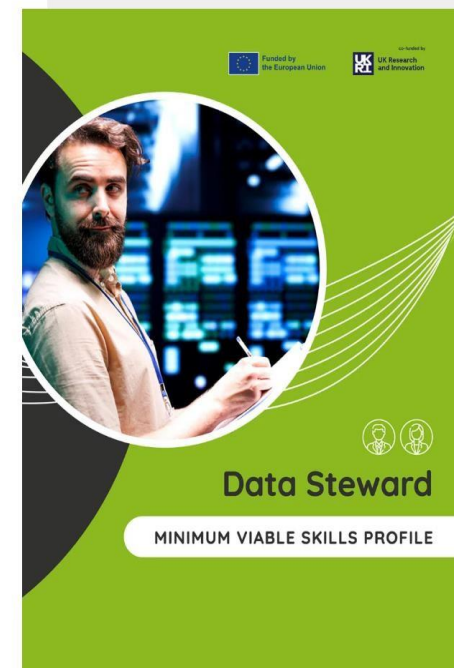
Associated function titles: Data Steward, Data Manager, Data Curator, Research Data Manager

Open Science mission: Data Stewards work with stakeholders to establish, govern and maintain processes. These include collecting research data, making it usable for research objectives, facilitating its transformation into research outputs, assist in their quality assurance, and support informed decision-making on their [FAIRness](#) and openness for reuse, according to ethical, [legal](#) and social expectations.

- *Relevance of Open Science dimensions (1-Low to 3-High): Technology: 3, Interpersonal: 2, Domain: 2, Communication: 1; Leadership: 1*
- *Organisational context: Research Performing Organisations, Research Infrastructures, Service Providers, Competence Centres.*
- *Related [EOSC](#) learning paths: service and resource consumers and providers*

Contributes to which Open Science outcomes?

- Research data and related digital objects are effectively managed to ensure their suitability for curating, sharing, and reuse, and potential impacts towards advancement of research methods appropriate to the discipline(s). Digital research objects are made as FAIR and open as possible, and as closed as necessary.
- Opportunities are identified for creating or connecting with professional Open Science networks at institutional, cross-institutional, regional, national, or international levels.
- Relevant competence centres with a FAIR data and Open Science support role are utilised effectively according to local needs and policies.
- Open Science skills and practices are facilitated and enhanced using, where appropriate, EOSC resources and services, including any relevant Open Educational Resources.



DATA STEWARD: MINIMUM VIABLE SKILLS PROFILE

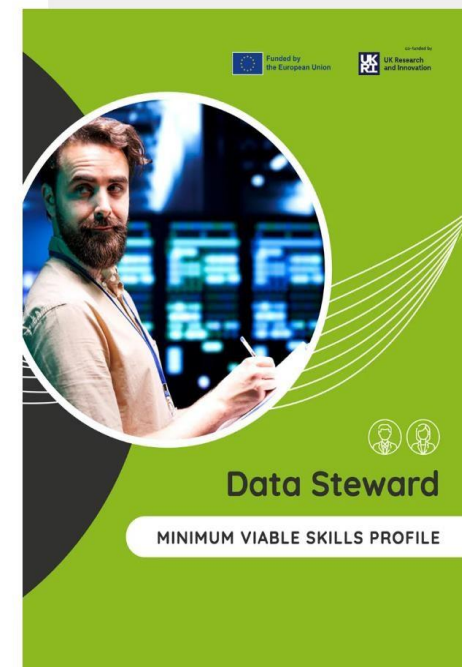
Data Steward: activities

Main activities - Coordinator

- Contributes to Open Science policy development and community governance by engaging with (inter)national policymaking, bringing cross-disciplinary expertise to local policy development, implementation and monitoring.
- Develops institutional guidance on Data management Planning, e. g. templates offering cross-domain knowledge to contextualise data handling and advice on planning how to use local services or infrastructure.
- Understands research stakeholder needs and contributes to developing, implementing, and monitoring Data Policy and Governance, along with service level management to support this.
- Promotes and communicates the importance of Open Science and FAIR to all levels within the organization (e. g. policymakers, senior management, researchers, postgraduates etc.).
- Analyses trends through landscape analysis of data infrastructure, tools, and methods that may improve the organisation's implementation of FAIR and CARE principles to enhance support for decision-making on Open Science. Advises on (meta)data standards and contextual documentation for data archiving.
- Monitors relevant RDM skills of researchers and research support staff in the institute and refers researchers to RDM related facilities and services.
- Develops and delivers training tailored to learners' needs, aligned with wider institutional policies and plans.
- Maintains networks of research data managers (RDMs) and research support related colleagues.

Main activities - Embedded

- Develops Data Management Plans templates tailored for research teams, offering support in writing a DMP according to the relevant template. Includes provision for archiving and FAIR sharing (standards, metadata exposure, PIDs, licensing, data repository management/selection).
- Implements good practice on data and/or software/code during proposal development for funders, and as a regular aspect of doing research, and liaises with other experts inside and outside the institute to adopt effective solutions to challenges.
- Advises on technical support for researchers on data sharing and publication infrastructure and tools, adoption of innovations, including those provided by relevant (inter)national data-infrastructures (product management of technology platforms).
- Identifies gaps and takes action to ensure ethical conduct and awareness of the potential impacts of data reuse, management and sharing on wider society.
- Advises on the use of disciplinary standards and ontologies, and relevant community practices that are applied in producing FAIR research outputs.
- Supports researchers on legal and regulatory compliance aligning local practices with these through connections with the institutional privacy officers, legal advisers, and research ethics bodies.
- Develops and delivers training tailored to learners' needs, aligned with wider institutional policies and plans.
- Maintains networks of RDMs and research support related colleagues.



DATA STEWARD: MINIMUM VIABLE SKILLS PROFILE

Creators: White, Angus; Green, Dominique

Data Steward: skills and competencies

Essential skills and competences

- Knowledge of Open Science practices, policies and regulation and translation of these (when necessary) to local level.
- Service provision to support specific Open Science practices including applying FAIR and CARE principles, Open Access (publishing), data curation and preservation.
- Knowledge brokering about Research Data Management, (personal) data governance and ethics, including to understand information security challenges, and provide access risk assessment and mitigation.
- Mentoring on open and fair methods, to develop professional practice including knowledge/awareness of programming, FAIR code and FAIR software and use of standards and ontologies.
- Advocacy, analysis and assessment on FAIR data criteria, FAIR code, and software preservation.
- Copy writing and editing guidance and advice material to support infrastructure and tools for data storage, versioning, publishing, and documentation.
- Support Open Science policies and practices through teaching and training design and delivery.
- Monitor the research and funding ecosystem and advise on securing sustainable funding, identifying conflicting motivations, drivers and incentives among different stakeholders.
- Moderation, mediation, and intervention through consulting and listening.
- Stakeholder engagement and collaboration building strategic relationships, bridging needs, and speaking and presenting to data creators, users, and research stakeholders about the value of good data management.
- Creativity, critical and analytical thinking, curiosity, openness, and cultural competence with a willingness to learn.
- Team- and project management and business modelling, working with researchers/professionals at varying levels of seniority to facilitate results-oriented planning and organising, evaluation and assessment.



DATA STEWARD: MINIMUM VIABLE SKILLS PROFILE

- 🌐 Data Steward enables the principles of Open Science
- 🌐 Data Steward is a **support** figure for the researcher, an expert in the management of data and other research outputs, with technical, legal and ethical skills.
- 🌐 Marine Data Management **responsibility** lies primarily with the PI or researcher who created or collected the data. It also extends to others involved in the research process who play a role in ensuring high quality data management.
- 🌐 It is essential that roles and responsibilities for data management are clearly defined and assigned, rather than simply assumed.

Marine Data Management in Europe



EU – MAST
EU – MASTII



EU-FP5

EU-FP6

EU-FP7



EU-HORIZON



90s

EDMED

Euronodim

MEDATLAS

EDIOS

2002-2005

Sea-Search

2006-2011

SeaDataNet

2011-2015

SeaDataNet II

2016-2020

SeaDataCloud

 **SeaDataNet** has built and operates a **pan-European infrastructure** linking more than 100 data centres with the aim of preserving and making re-useable marine observations from the fields of ocean physics, chemistry and biology

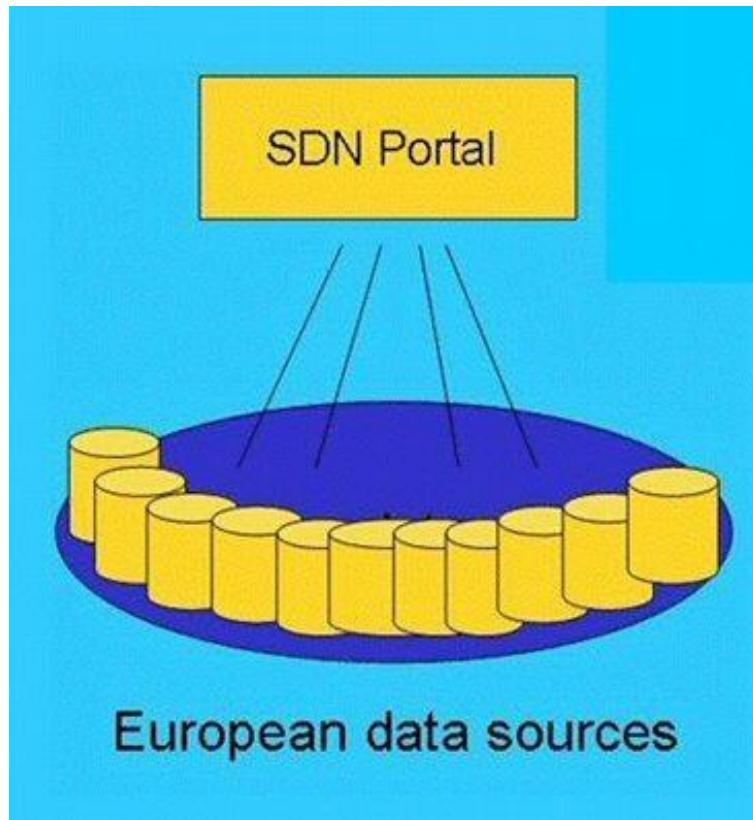
NODCs as core partners

- 🌐 **National Oceanographic Data Centres (NODCs)** and data focal points based in 35 countries surrounding the European seas are the core partners
- 🌐 NODCs are **experienced in managing data**, which includes **quality control**, documenting, long term stewardship and publishing, for their own institute and for many other institutes in their country
- 🌐 NODCs are members of **IOC-IODE** and ICES for sharing global practices
- 🌐 NODCs are **increasingly building national infrastructures** on SeaDataNet basis to support their national networking
- 🌐 Since 2019, SeaDataNet has become a **legal entity**, counting now 32 full members and one observer (ICES)



The International Oceanographic Data and Information Exchange (IODE) of the **Intergovernmental Oceanographic Commission (IOC)** of UNESCO was established in 1961.

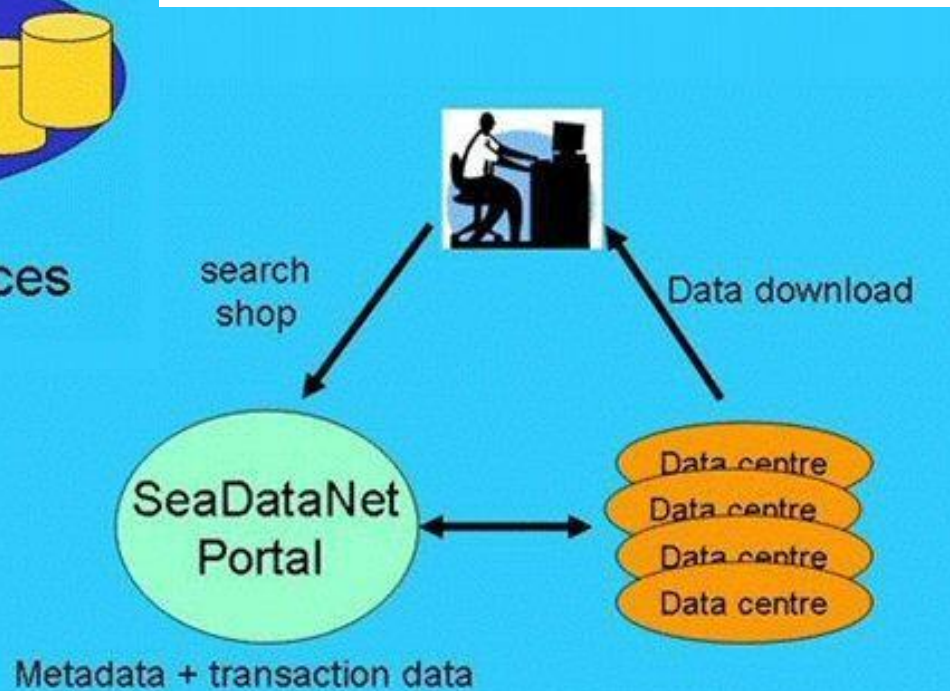
SeaDataNet principles



🌐 SeaDataNet is **based on a semi-distributed system** that links the NODCs network

🌐 Common data management **standards**, technical development and **semantic interoperability** enable the data centres to interact as a virtual data management system, able to **deliver integrated data, meta-data and products of controlled quality through a unique portal**

🌐 **Cloud** and high-performance computing **technologies** have significantly improved SeaDataNet services and increased performance



Marine Knowledge & Blue Growth strategy



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European Commission

MARITIME AFFAIRS

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Blue growth

- Aquaculture
- Coastal tourism
- Blue biotechnology
- Ocean energy
- Seabed mining

International ocean governance

Marine knowledge

Maritime spatial planning

Integrated maritime surveillance

Maritime Security Strategy

Sea basins

Blue growth

CLICK to see infographic

Blue Growth is the long term strategy to support sustainable growth in the marine and maritime sectors as a whole. Seas and oceans are drivers for the European economy and have great potential for innovation and growth. It is the maritime contribution to achieving the goals of the Europe 2020 strategy for smart, sustainable and inclusive growth.

The 'blue' economy represents roughly 5.4 million jobs and generates a gross added value of almost €500 billion a year. However, further growth is possible in a number of areas which are highlighted within the strategy.

The strategy consists of three components:

1. Develop sectors that have a high potential for sustainable jobs and growth, such as:
 - a. [aquaculture](#) (Fisheries website)

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Seguimos recogiendo vuestras iniciativas para #diaAcuicultura 2016 [observatorio-acuicultura.es/form/propuesta...](#) [pic.twitter.com/3MWG10xM3Y](#)

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News

30/06/2016 - [Blue Economy Business and Science Forum 1st Summit - Hamburg. Registration is now open](#)

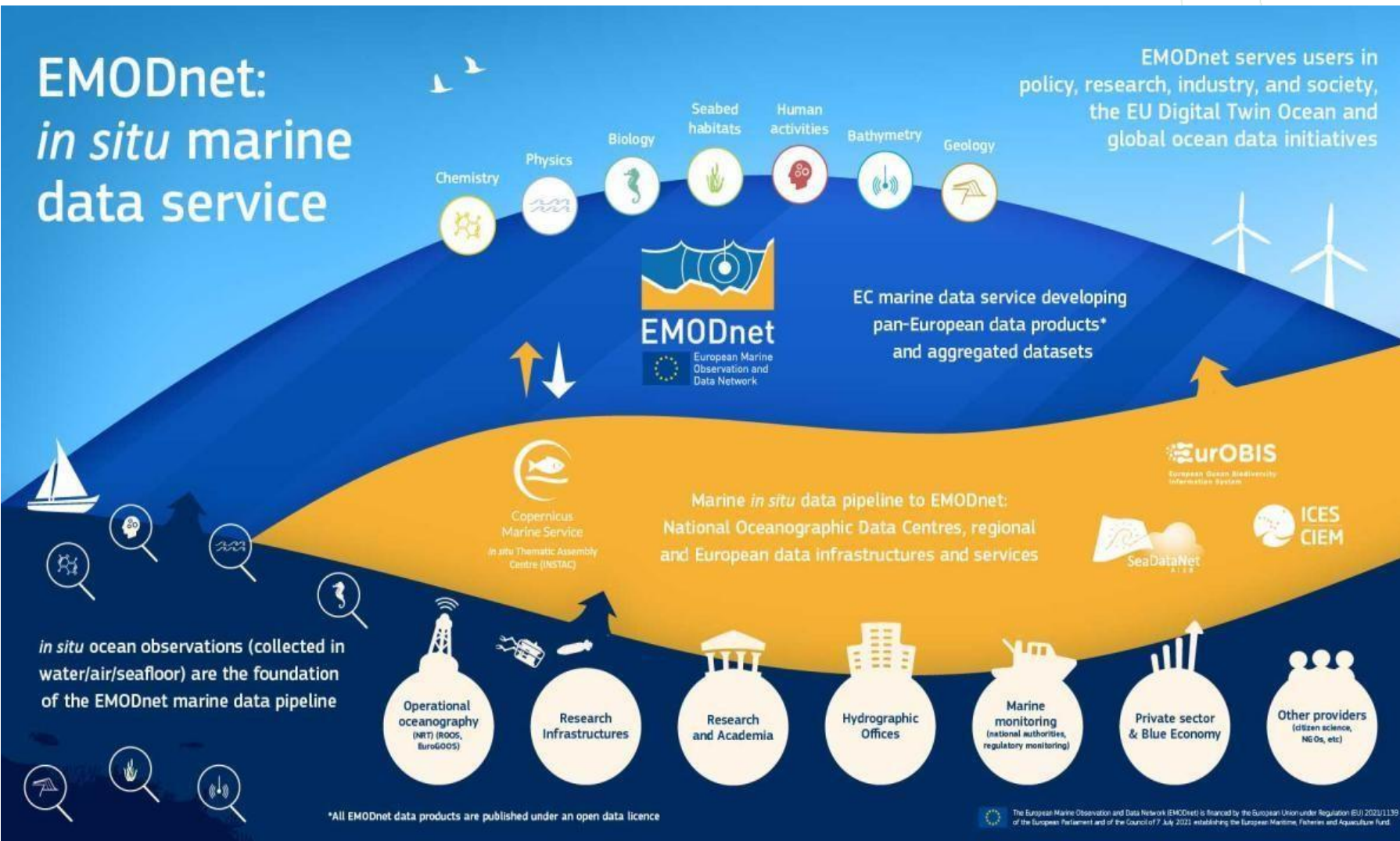
EU cost – benefit analysis: **cost of marine observation** in Europe is circa 400 Million Euro per year for space data and another 1 Billion Euro per year for in-situ data

Training current future RI research staff: “Marine Data Management &

The European Marine Observation and Data Network



- Since **2009**, with a long-term vision (to 2035)
- Funded by Directorate-General for Maritime Affairs and Fisheries (**EC DG MARE**)
- Adopting the **SeaDataNet standards** and expanding the infrastructure
- Provides **easy and free access** to marine data, metadata and data products from **7 different domains**



Your gateway to *in situ* marine data in Europe and beyond



The banner features a central blue circle with the text '1 OCEAN 1 EMODnet' and 'One single portal'. To the left, it says 'One central map viewer to visualise all EMODnet data' with an image of a map viewer. To the right, it says 'One central metadata catalogue to enhance data search and discovery' with an image of a metadata interface. Below the central circle, it lists '120 partners' and '+100 use cases'. The main text reads 'Discover, visualise and download marine data and products across 7 thematics and hundreds of parameters'. At the bottom, there are seven icons representing different marine data categories: Bathymetry, Human Activities, Physics, Geology, Seabed Habitats, Chemistry, and Biology. The URL 'EMODNET.EC.EUROPA.EU' is prominently displayed in the center. The bottom of the banner includes the text 'YOUR GATEWAY TO IN SITU MARINE DATA IN EUROPE AND BEYOND' and the EMODnet logo.

One central map viewer
to visualise all EMODnet data

120 partners

1 OCEAN
1 EMODnet
One single portal

+100 use cases

One central metadata catalogue
to enhance data search and discovery

Discover, visualise and download marine data and products across 7 thematics and hundreds of parameters

BATHYMETRY HUMAN ACTIVITIES PHYSICS GEOLOGY SEABED HABITATS CHEMISTRY BIOLOGY

EMODNET.EC.EUROPA.EU

YOUR GATEWAY TO *IN SITU* MARINE DATA IN EUROPE AND BEYOND

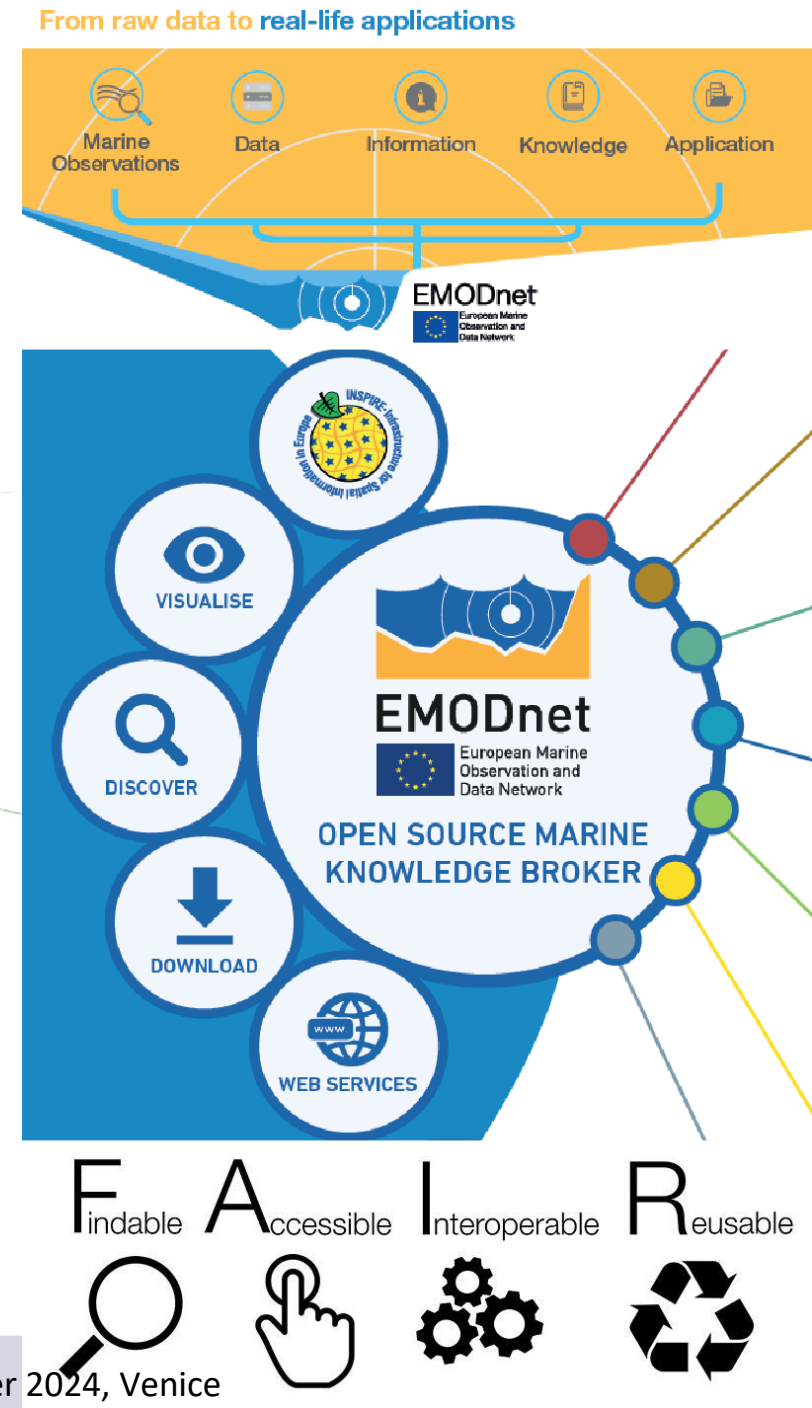
EMODnet
European Marine Observation and Data Network

Since Jan 2023, a **single point of access** to the most comprehensive collection of marine observations and products in Europe

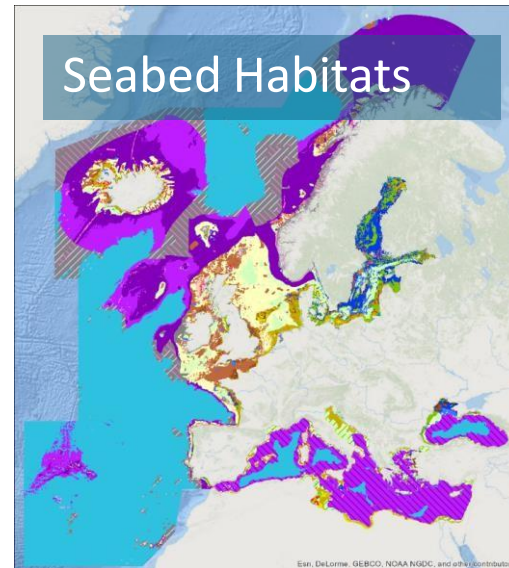
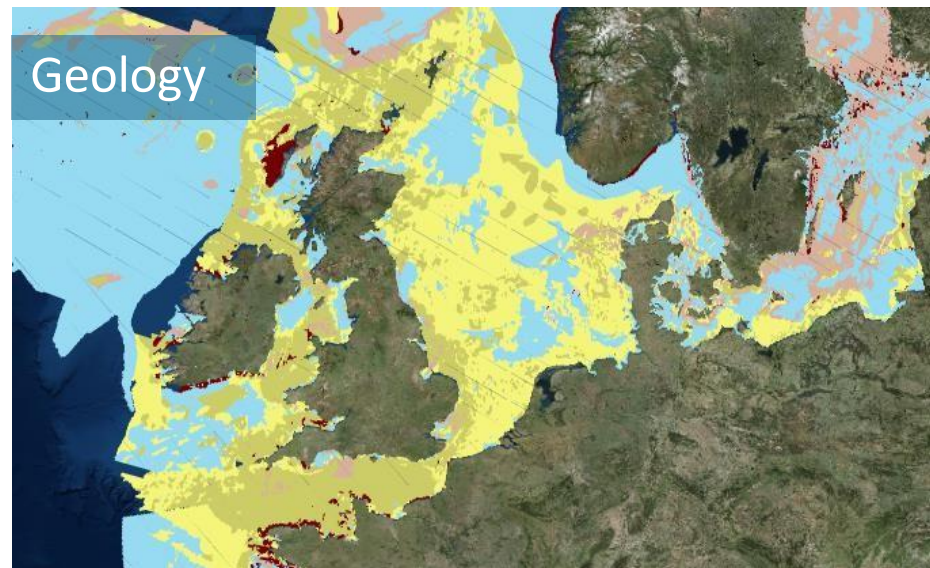
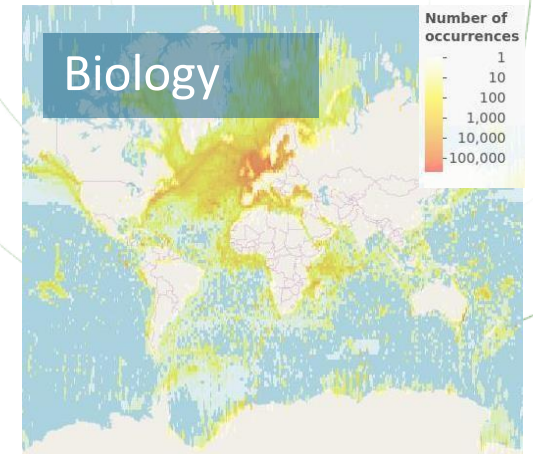
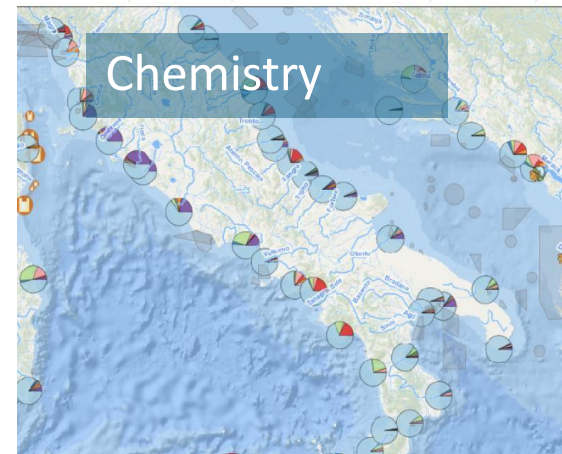
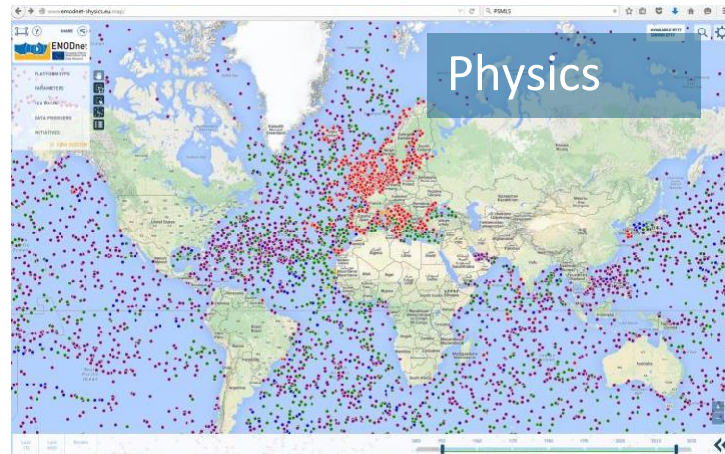
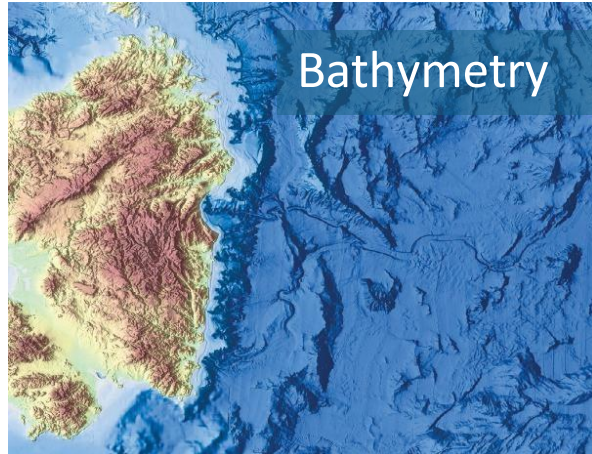
Implemented by a **network of > 120 organisations** working in synergy with national, regional and European marine data infrastructures

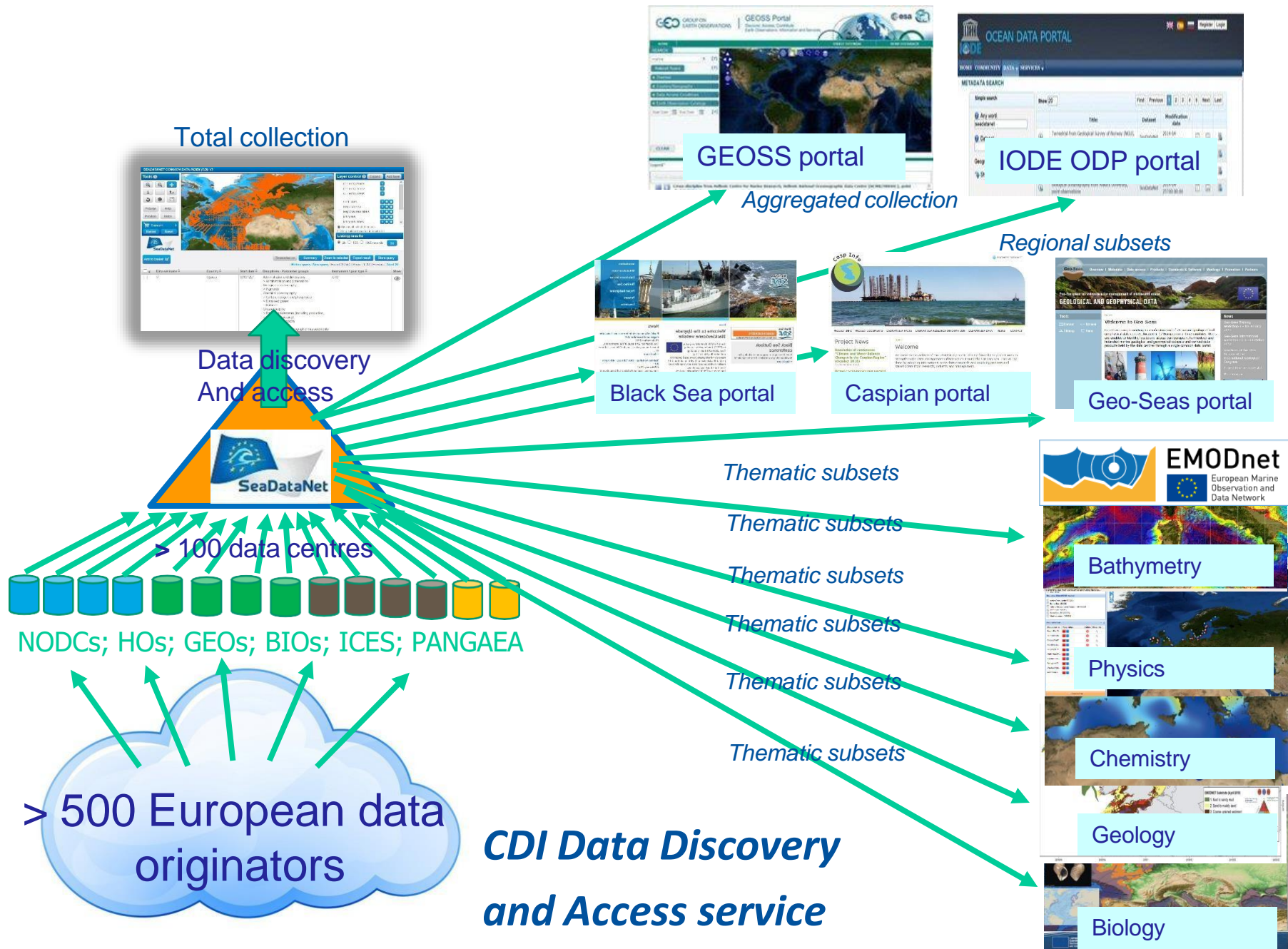
EMODnet added value

- EMODnet provides **pan-European data layers and data products with standardised and harmonised data and metadata** offered via **data services and web services**
- In accordance with the European spatial data standards INSPIRE and the FAIR data principles
- Aggregated, harmonised multi-parameter data collections
- Integrated data products
- Centralised map viewer service
- Central catalogue for data products
- Open and free downloads with CC BY 4.0 licence
- Web services, e.g. OGC WMS, WFS, CSW services, ERDDAP and other APIs



EMODnet – 7 thematic areas and networks



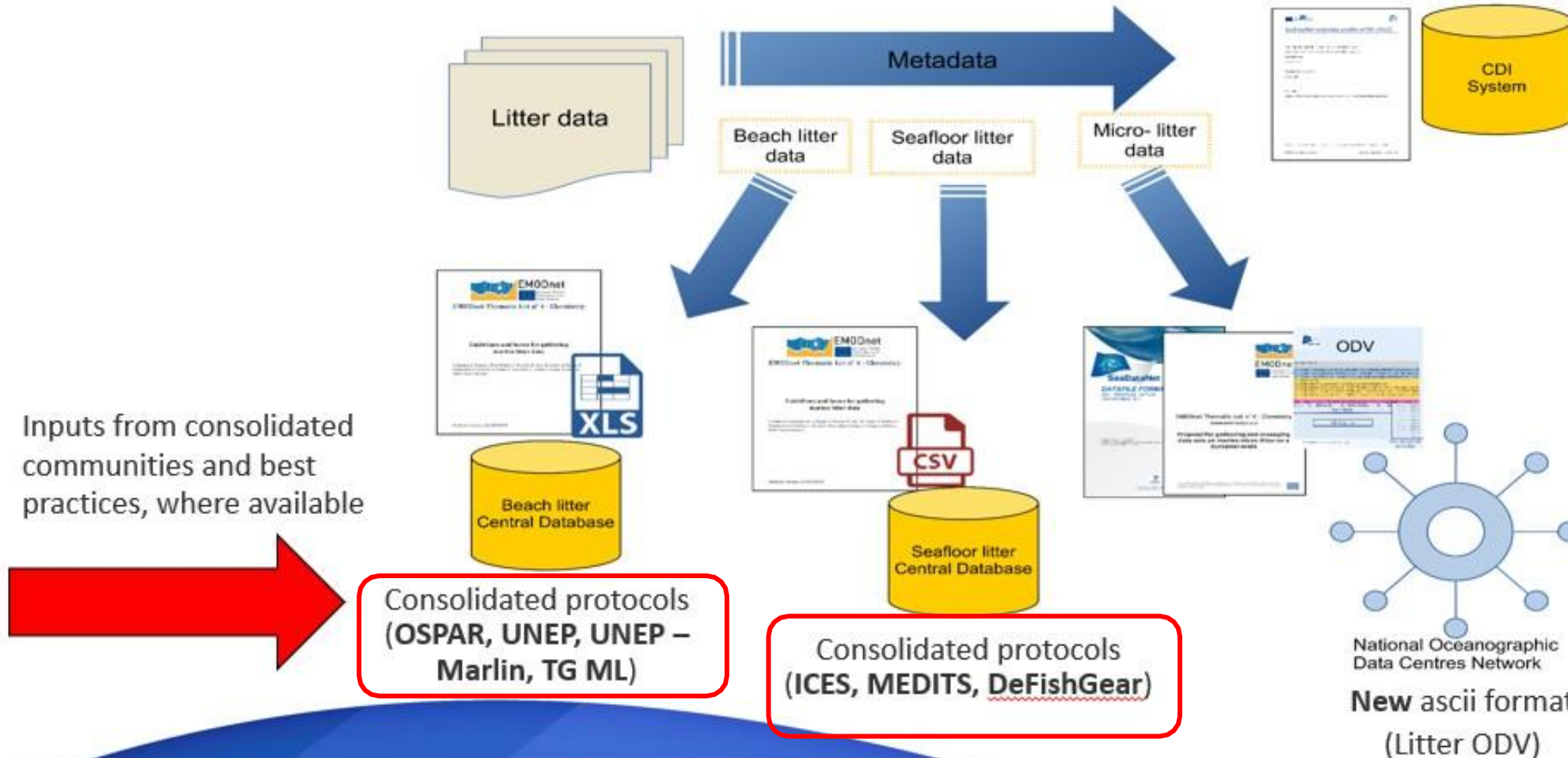


SeaDataNet as driver and contributing to many portals

Not a duplicate but building in synergy with win-win interaction

Another example: marine litter data management

Consolidated workflows and data sources, agreed formats and guidelines

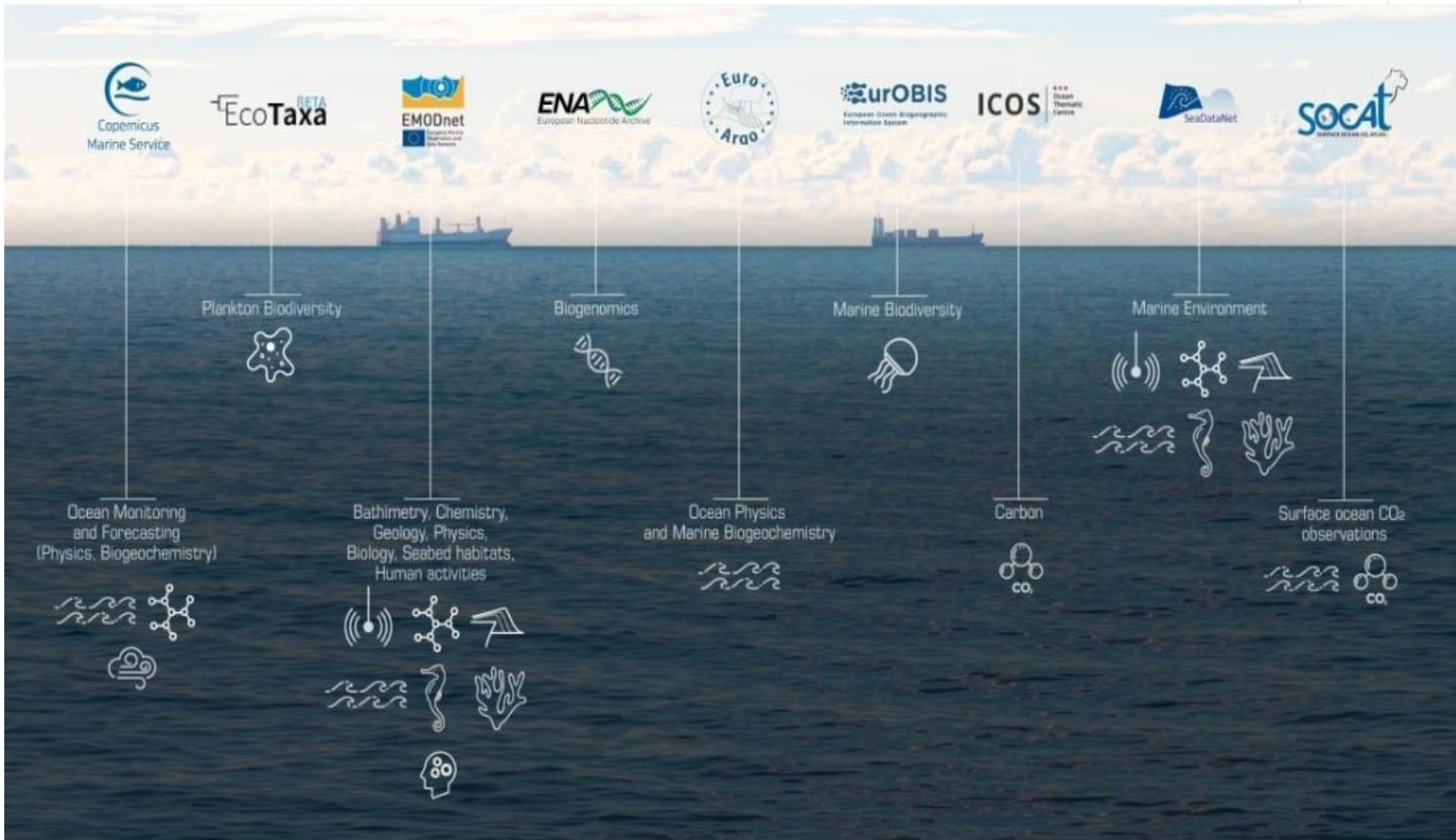


Adapted from Partescano et al., 2021. <https://doi.org/10.1016/j.marpolbul.2021.112965>

Blue-Cloud: Your Open Science platform for collaborative marine research



 Blue-Cloud **federates** these infrastructures to create a trusted virtual space where scientists can access the ocean data, tools, services and research outputs they need **to perform research** in a more efficient way



Is Data Management so expensive?

- 🌐 DG MARE assess the cost of collecting data (twice)
- 🌐 EU defined seven indicators and estimated the **cost of not having FAIR research data**:
 - time spent,
 - cost of storage,
 - licence costs,
 - research retraction,
 - double funding,
 - interdisciplinarity and
 - potential economic growth.
- 🌐 The annual cost of not having FAIR research data costs the European economy at least €10.2bn every year.



Marine Data Centre Management Plan

Elenco delle RI marine di ITINERIS e delle persone e istituzioni di riferimento



Franco Coren (OGS)



**Giorgio Riccobene, Emidio Giorgio,
Salvatore Viola (INFN-LNS)**



Giordano Giorgi (ISPRA)



**Caterina Bergami (CNR-ISMAR),
Antonella Petrocelli (CNR-IRSA)**



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ISMAR), Donata Canu (OGS)**



**Elena Mauri (OGS), Giulio
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Organeli (CNR-ISMAR)**



**Maurizio Azzaro, Federico Giglio,
Francesco Filiciotto, Stefano
Miserocchi (CNR-ISP)**



**Michele Giani, Giuseppe Civitarese
(OGS), Carolina Cantoni (CNR-ISMAR)**



**Marcello Magaldi, Mauro Caccavale,
(CNR-ISMAR), Fabio Brunetti (OGS),
Cosimo Solidoro (OGS)**



**Katrin Schroeder,
Anna Vetrano (CNR-ISMAR)
Franco Coren (OGS)**

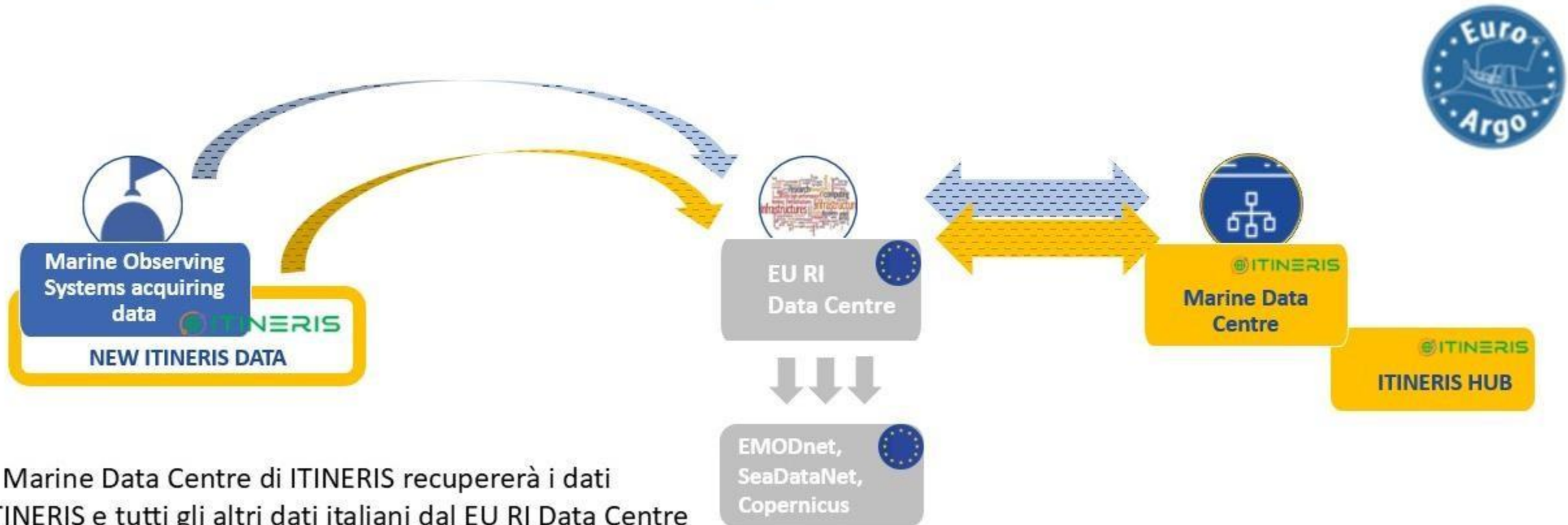


**Laura Beranzoli, Davide Embriaco, (INGV),
Roberto Bozzano (CNR-IAS),
Vanessa Cardin (OGS)**

- 11 marine infrastructures
- 4 solutions depending on the **maturity** of the marine RI
- different solutions shall be implemented **simultaneously**

Scenario 1

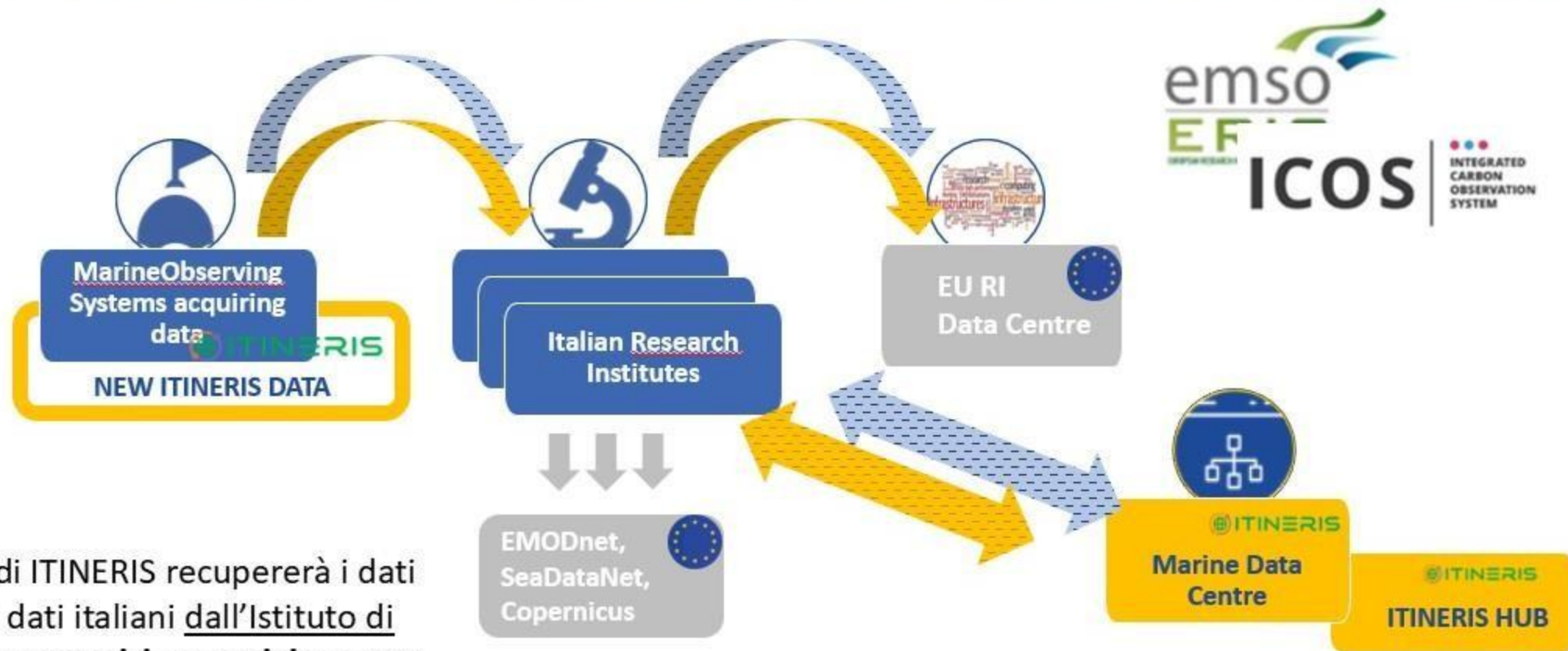
Scenario 1: Infrastrutture di Ricerca europee mature senza un centro dati italiano



Il Marine Data Centre di ITINERIS recupererà i dati ITINERIS e tutti gli altri dati italiani dal EU RI Data Centre attraverso **servizi operativi** e **senza duplicare** i dati.

Scenario 2

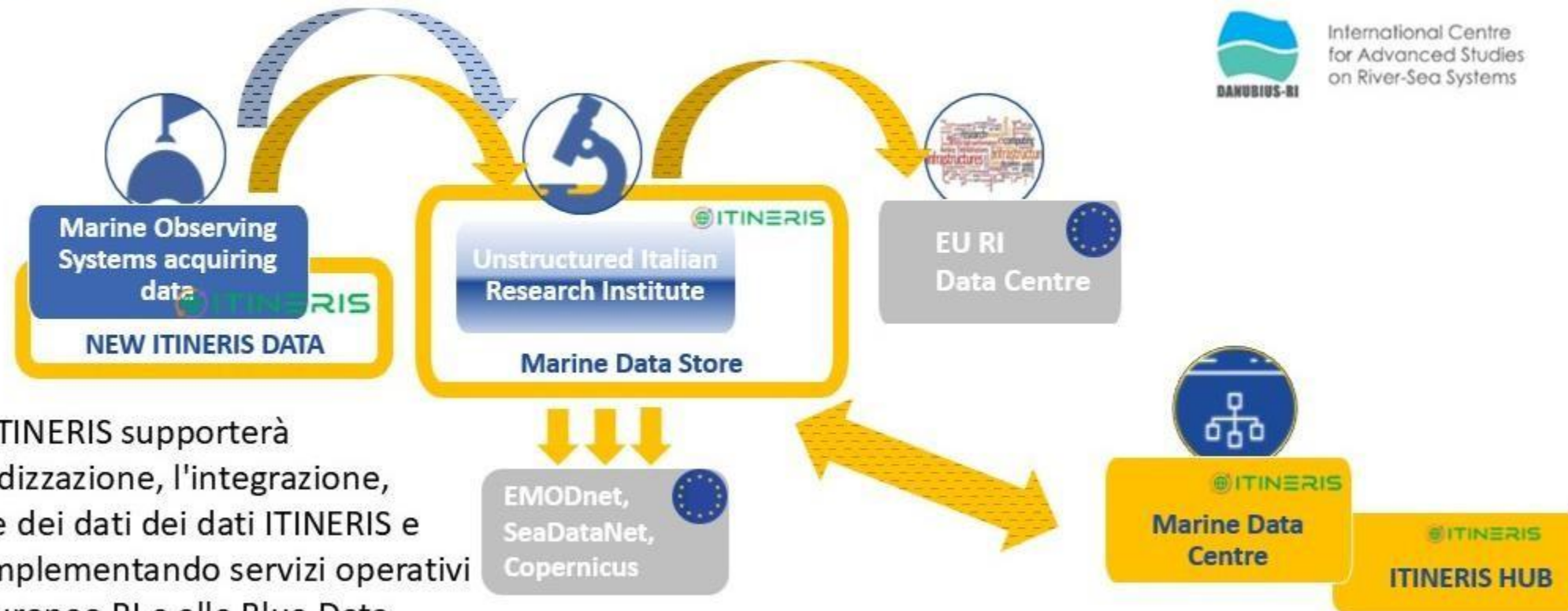
Scenario 2: con servizi di accesso ai dati Italiani che condividono i dati con EU RI Data Centre



Il Marine Data Centre di ITINERIS recupererà i dati ITINERIS e tutti gli altri dati italiani dall'Istituto di ricerca Italiano attraverso **servizi operativi e senza duplicare** i dati.

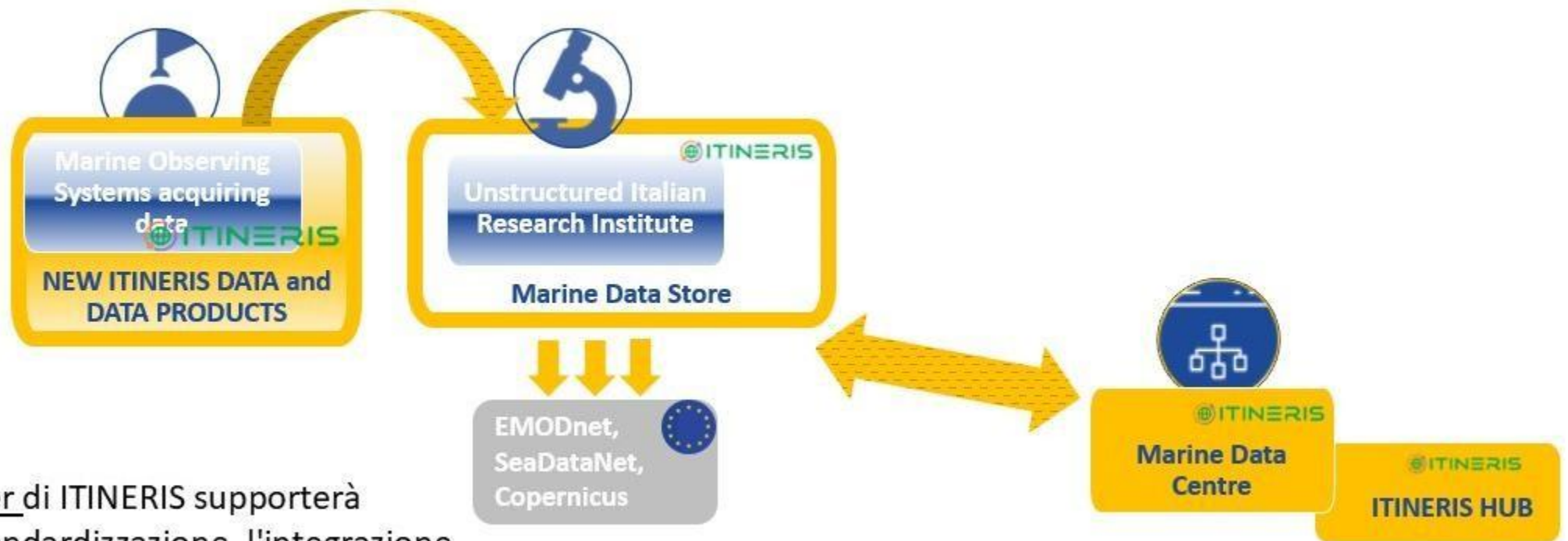
Scenario 3

Scenario 3: senza servizi di accesso ai dati Italiani (unstructured) che condividono i dati con EU RI Data Centre



Il Marine Data Centre di ITINERIS supporterà l'archiviazione, la standardizzazione, l'integrazione, l'accesso e la condivisione dei dati dei dati ITINERIS e tutti gli altri dati italiani implementando servizi operativi collegati al Data Center europeo RI e alle Blue Data Infrastructure, segundo gli standard UE consolidati.

Scenario 4: nuovi dati e prodotti ITINERIS



Il Marine Data Center di ITINERIS supporterà l'archiviazione, la standardizzazione, l'integrazione, l'accesso e la condivisione dei dati e dei prodotti ITINERIS

The IT-IOOS metadata catalogue for data and facilities



- 🌐 The Marine Data Portal will use CKAN to organize and display metadata
- 🌐 The Marine Data Portal will use ERDDAP to access data
- 🌐 CKAN harvests metadata on ERDDAP or allows manual compilation

- 🌐 The metadata fields of the IT-IOOS catalogue are derived from the EDIOS catalogue and the CDI, using controlled vocabularies.
- 🌐 The IT-IOOS metadata catalogue lists all ITINERIS datasets and shall include:
 - The metadata of the **sub-system**,
 - The metadata of the **facility** or observation platform,
 - The metadata of the **dataset**.

Metadata of the Sub-System

<i>ITINERIS Metadata</i>	<i>Description or SeaDataNet reference (EDIOS & vocabs)</i>	<i>Mandatory / Optional</i>
RI name	Name of the Subsystem or Research Infrastructure, free text	M
RI acronym	Free text	M
RI Coordinating organization	Coordinating institute, EDMO reference	M
RI Coordinating person	Principal Investigator (Name/Names, free text)	M
RI Start date	Program Start date	M
RI Geographical coverage	Sea-areas C19 - SEAVOX SALT AND FRESH WATER BODY GAZETTEER	M
RI Abstract	Abstract	O

Metadata of the Facility or Observation Platform

<i>ITINERIS Metadata</i>	<i>Description or SeaDataNet reference (EDIOS & vocabs)</i>	<i>Mandatory / Optional</i>
Operating facility name	Platform Name, free text	M
Type of platform (RV, float, offshore structure, fixed benthic node, ...)	Platform class L06 - SEAVOX PLATFORM CATEGORIES	M
Organization owning the facility		M
Organization or institute managing the facility		M
Facility <u>reference person</u>		M

ITINERIS Metadata	Description or SeaDataNet reference (CDI & vocabs)	Mandatory / Optional
Dataset Name or Resource title*	Original title of the dataset, free text	M
Dataset originator or Organization*	EDMO reference	M
Dataset originator, person	Free text	M
Type of device (meteorological packages, sediment traps, Ocean models, ...)	Instrument class L05 - SEADATANET DEVICE CATEGORIES (Preferred label) https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=L05	M
Instrument (RM Young 32500, Sea-Bird SBE 911 CTD..)	Instrument code L22 - SEAVOX DEVICE CATALOGUE (Preferred label) https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=L22	O
Discipline	P08 - SeaDataNet Parameter Disciplines (Preferred label) https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=P08	M
Parameters group	P03 - SeaDataNet Agreed Parameter Groups (Preferred label) https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=P03	M
Discovery parameter	List of variables, P02 - SEADATANET PARAMETER DISCOVERY VOCABULARY (Preferred label) https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=P02	M
Temporal extent	Dataset Date and Time or time domain - Start date	M
Data type (NRT/DMT)		M
Spatial extent	Dataset Latitude, longitude or spatial domain - Geographic coverage (bounding box)	M
Coordinate reference system	Coordinate reference system	M
Data licence	Data Access Restriction, L08 - Data Access Restriction (default CC-BY-4.0) (Alt label)	M

Metadata of the Dataset



	https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=L08	
QC procedures	L12 - SEADATANET PARAMETER QUALITY CONTROL PROCEDURES (Alt label) https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=L12	M
Funding source (e.g. PNRR-ITINERIS)	Project in EDMERP reference	M
Endpoint or Sources*	Endpoint of Data and Resources (Upload or Link)*	M
Resource type*	Web service, Geospatial dataset, Map viewer, ...	O
Original file format		O
Resource Name*	File name	O
Resource Description*		O
DOI		O
Related EDMED dataset		O
Related EDIOS dataset		O
Visibility	Set by the catalogue Administrator (Public/Private)	Internal
State	Set by the catalogue Administrator (active/hidden=deleted)	Internal

*CKAN name for the field

What's next in the training

- 🌐 Practical information on how approaching a Data Management Plan (DMP) compilation
- 🌐 Basic features of the SeaDataNet format for marine data and metadata
- 🌐 Data validation process with practical implementation
- 🌐 Protocols for data access and ERDDAP
- 🌐 How to contribute to ITINERIS marine hub



THANKS!

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”

