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# Third Federation Workshop

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5-6 November 2025, Brussels [Belgium]



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# **Blue-Cloud as an EOSC thematic node in support of the European Digital Twin of the Ocean programme**

Opening session

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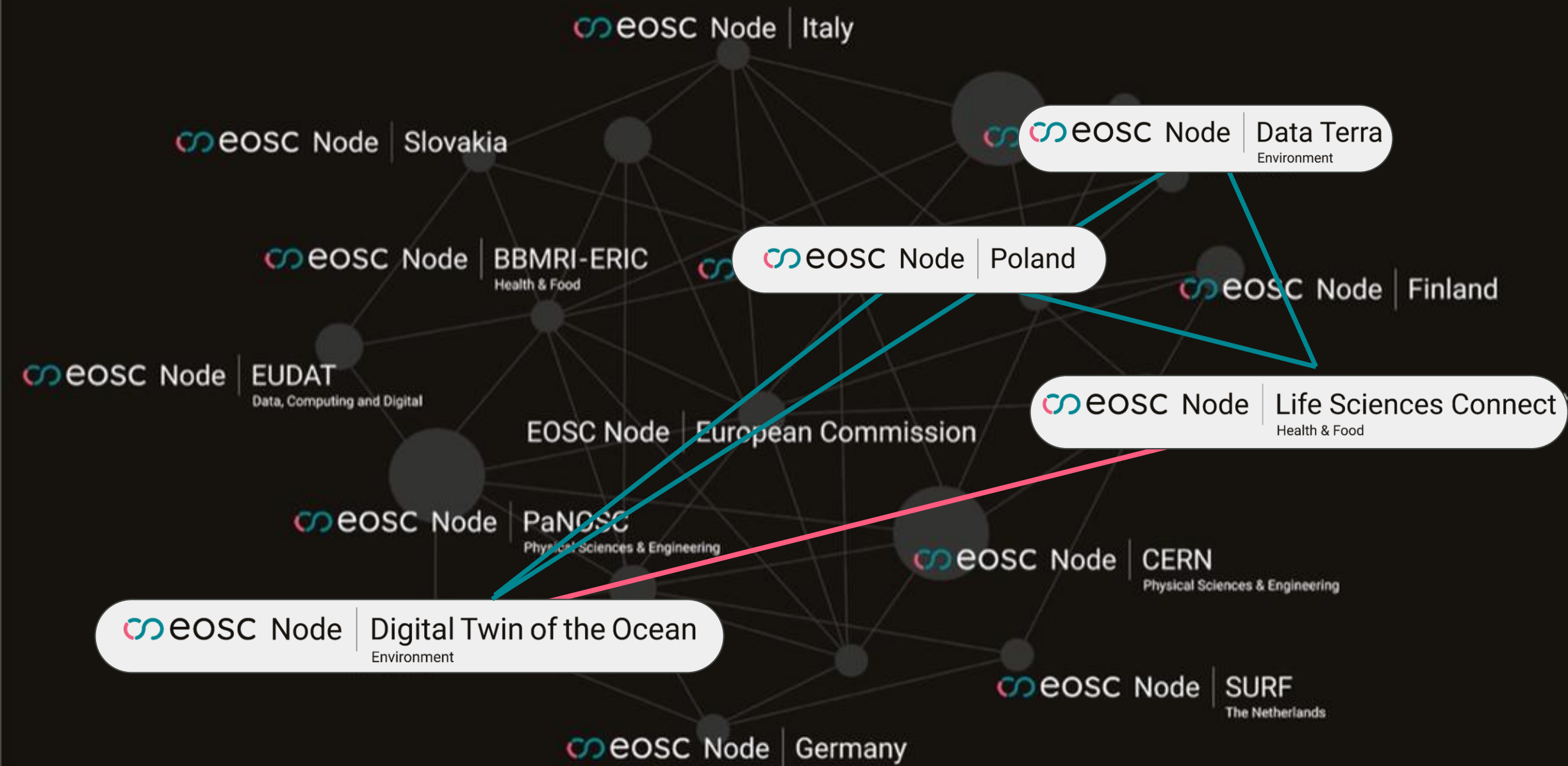


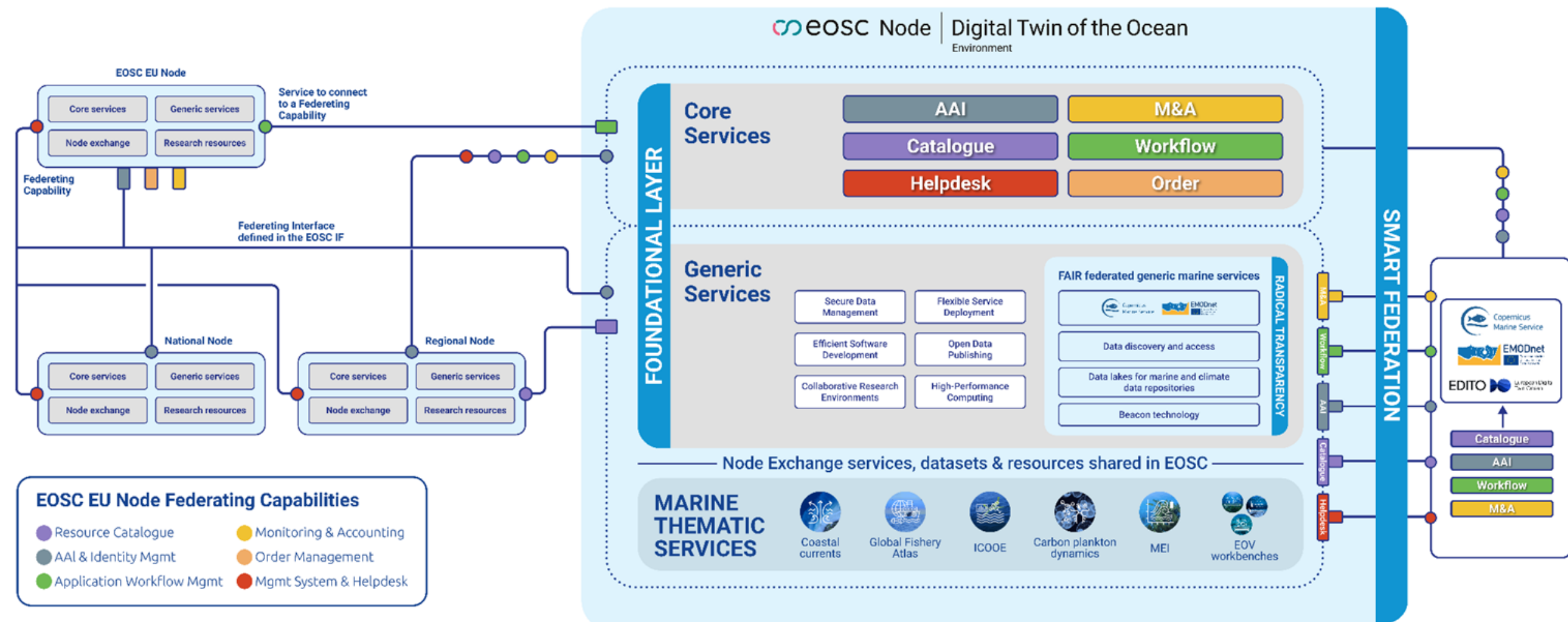
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# Blue-Cloud 2026 as a candidate node for the EOSC Federation

Pasquale Pagano,  
Blue-Cloud2026 Project Coordinator

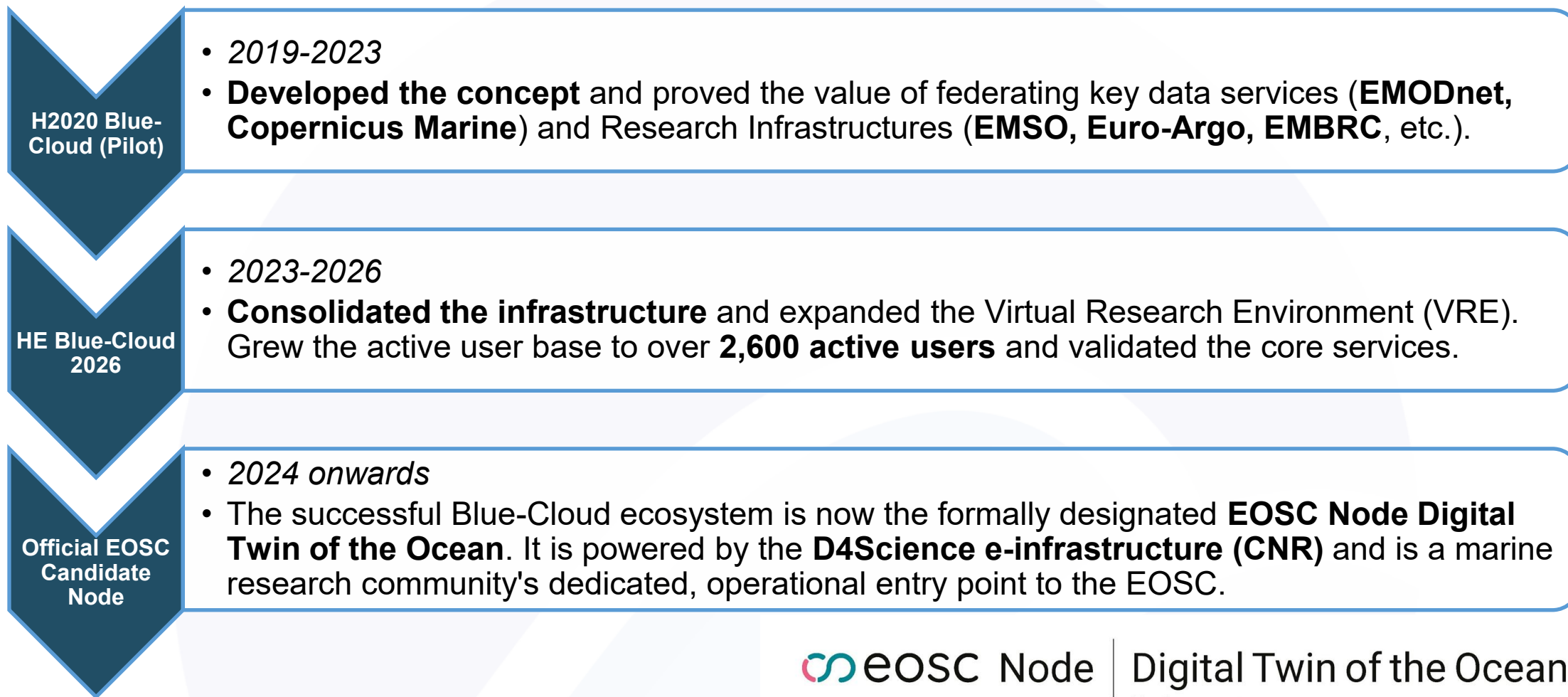
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Our Node is the **evolution of a proven ecosystem** built on six years of strategic investment and strong community engagement.





## The Challenge for Marine Researchers

- **Scattered & Incompatible Data:** Critical data is spread across numerous, disconnected infrastructures, making integration a complex and time-consuming task.
- **Isolated Tools & Workflows:** Powerful analytical tools and workflows are often locked within specific communities, hindering collaboration and preventing cross-disciplinary research.
- **Difficult Access to Computing:** Researchers lack a unified way to access the large-scale computing and storage resources necessary to process vast ocean datasets.
- **Lack of Trust & Transparency:** It is difficult to track data provenance, making it challenging to verify results and build reproducible scientific workflows.



Research is slower, less collaborative, and limited in scope



The Ocean doesn't work in silos — Why should we?" — *Nicolas Segebarth, DG RTD*

## The European Mandate: Unifying Digital Ecosystems

- **EOSC Federation:** The horizontal, trusted **System of Systems** for all European Research.
- **EU Mission: "Restore our Ocean and Waters"** – The clear, policy-driven societal objective.
- **European DTO / EDITO:** The official, operational infrastructure for marine science.

## The Challenge

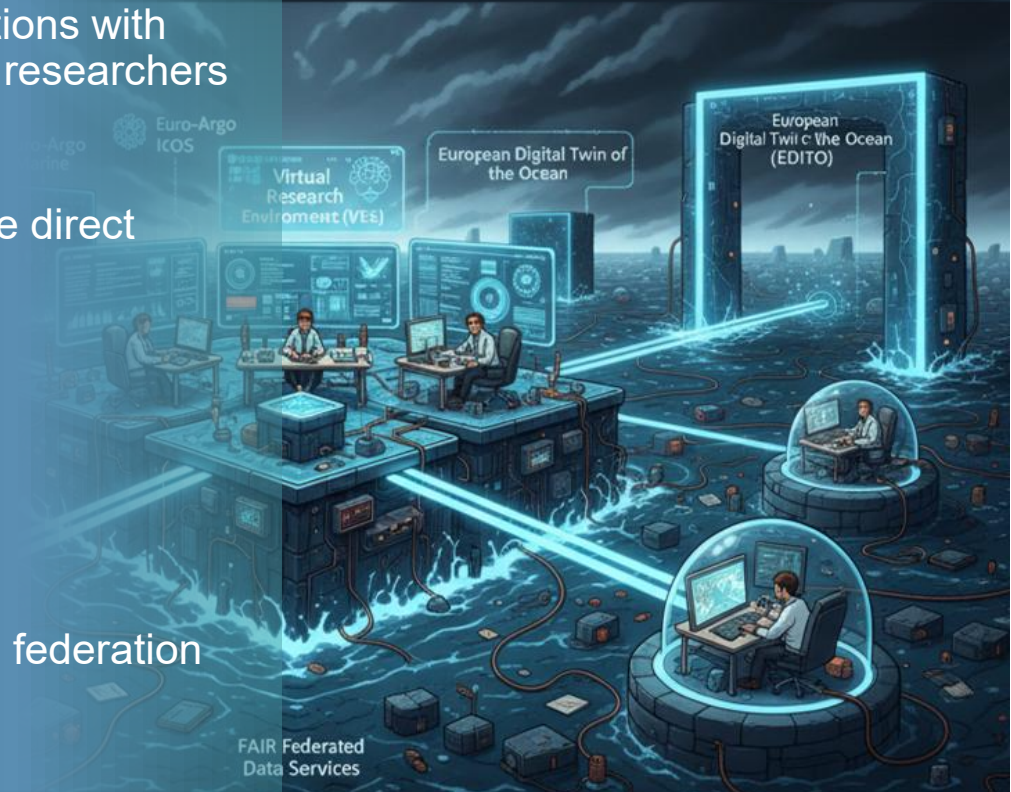
- Ensuring these powerful strategic pillars are technically and operationally connected to prevent new, larger silos between the DTO Core and the long-tail scientific community.

## Our Position

- The **EOSC Node Digital Twin of the Ocean** is the strategic and operational bridge. It promotes dedicated mechanisms to federate marine research capacity into the EOSC ecosystem.

## A Thematic Node for Empowered Researchers: Blue-Cloud transforms marine research by providing an integrated environment built on EOSC principles

- **FAIR Federated Data Services:** We provide harmonised data collections with advanced subsetting, semantic enrichment, and provenance tracking, so researchers get exactly the data they need with full trust.
- **Integrated Virtual Research Environment (VRE):** Researchers have direct access to a suite of powerful tools within our Virtual Labs, including:
  - Interactive computing (Jupyter Notebooks, RStudio).
  - Reproducible workflows (CCP, Galaxy).
  - Containerization and application management pipelines.
- **EOSC-Ready Capabilities:**
  - Federated AAI: Full integration and alignment with EOSC AAI.
  - Resource Catalogue: Our service catalogue is structured for immediate federation with the EOSC Exchange (EEN).
  - Operations: Professional, FitSM-aligned Helpdesk and Monitoring.



Researchers are empowered with trusted, interoperable tools and seamless access to data



We are the **EOSC-facing research and collaboration component** that enables the wider Digital Twin of the Ocean ecosystem.

### Strategic Integration via Interoperability

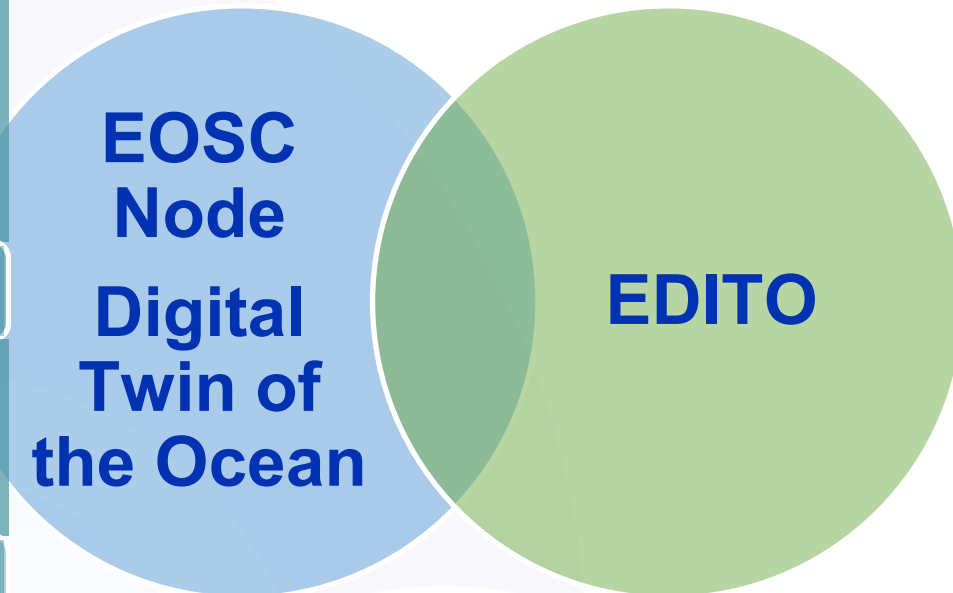
- **Smart Federation:** bi-directional integration between our **VRE** and the authoritative **EDITO** platform (the DTO Core), mutually exposing functionalities via common APIs.
- **Radical Transparency:** machine-actionable metadata and service descriptions, ensuring data from all sources (long-tail RIs) is genuinely **FAIR** and seamlessly exchangeable across the federated network.

### Alignment with the DTO Roadmap

- **EDITO Exploitation:** utilise the advanced capabilities of the **Virtual Ocean Model Lab (VOML)** being developed by the **EDITO-Model Lab** project.
- **Sustainability:** integration into the long-term **EDITO Programme**, ensuring a stable future for the marine contribution to EOSC.

### Strategic Objectives for the EU

- **Fosters True Interoperability:** Establishes a federated infrastructure and seamless access to the authoritative **EDITO** ecosystem.
- **Creates a Robust Infrastructure:** Ensures effective operation and scalability of a trusted and secure federated system.
- **Ensures Long-Term Sustainability:** Guarantees that the Node's assets contribute to the lasting **DTO Programme**.



## Real-World Cross-Disciplinary Use Case

- A researcher can now seamlessly combine aggregated in-situ and satellite data from key European services like **EMODnet** and **Copernicus Marine** with specialised observation data from Research Infrastructures like **Euro-Argo**, carbon data from **ICOS**, and deep-sea data from **EMSO**.
- They can process this integrated dataset using interoperable workflows in a Blue-Cloud Virtual Lab, with the results **directly contributing to the European Digital Twin of the Ocean (EDITO)** and being shared openly via **EOSC**.

## A Blueprint for Other Thematic Communities

- Our approach serves as a **proven model** for how other scientific domains can federate their specific services and data into **the EOSC ecosystem**, extending impact well beyond the marine community.

Makes complex,  
cross-domain  
science simple

The EOSC Federation accelerates scientific discovery and generates tangible societal impact





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# Thank you!

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