Proposal template Part B: technical description

Title of the Proposal: **A federated European FAIR and Open Research Ecosystem for oceans, seas, coastal and inland waters**

Acronym: **Blue-Cloud 2026**

Blue-Cloud 2026
A federated European FAIR and Open Research Ecosystem for oceans, seas, coastal and inland waters

No.	Participant name (role)	Short-name	Country	No.	Participant name (role)	Short-name	Country
1	Trust-IT Srl	Trust-IT	IT	21	Hellenic Centre for Marine Research	HCMR	GR
2	COMMpla Srl (*AE of Trust-IT*)	COMMpla	IT	22	ETT	ETT	IT
3	Mariene Informatie Services MARIS BV	MARIS	NL	23	European Multidisciplinary Seafloor and Warer Column Observatory (ERIC)	EMSO-ERIC	IT
4	CONSIGLIO NAZIONALE DELLE RICERCHE	CNR	IT	24	Alfred-Wegener-Institut	AWI	DE
5	Nubisware (*AE of CNR*)	Nubis	IT	25	University of Liège	ULiege	BE
6	Institut Français de Recherche pour l'Exploitation de la Mer	Ifremer	FR	26	Stichting EGI	EGI	NL
7	Seascape Belgium	SSBE	BE	27	Istituto Nazionale di Geofisica e Vulcanologia	INGV	IT
8	Mercator Ocean International	MOI	FR	28	Consorcio para la construccion, equipamiento y explotacion del Sistema de Observacion Costero de las Illes Balears	SOCIB	ES
9	Vlaams Instituut voor de Zee vzw	VLIZ	BE	29	European Global Ocean Observing System	EuroGOOS	BE
10	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici - Fondazione CMCC	CMCC	IT	30	Swedish Meteorological and Hydrological Institute	SMHI	SE
11	European Molecular Biology Laboratory	EMBL	DE	31	European Marine Biological Resource Centre	EMBRC	FR
12	Royal Netherlands Meteorological Institute	KNMI	NL	32	Instituto Hidrografico	IH	PT
13	Cineca Consorzio Interuniversitario	CINECA	IT	33	Swiss Federal Institute of Technology	ETHZ	CH
14	National Infrastructures For Research And Technology – GRNET S.A.	GRNET	GR	34	SIOS Svalbard AS	SIOS	NO
15	Sorbonne Université	SU	FR	35	Institute of Oceanology Polish Academy of Sceinces (*AE of SIOS*)	IOPAN	PL
16	University of Amsterdam	UVA	NL	36	Stiftelsen Nansen Senter for Miljo og Fjernmaling (*AE of SIOS*)	NERSC	NO
17	Foundation for Research and Technology - Hellas	FORTH	GR	37	STIFTELSEN Technology for Ocean Foundation	HUB Ocean	NO
18	French National Research Institutefor Sustainable Development	IRD	FR	38	IEEE France Section	IEEE	FR
19	National Oceanography Centre - British Oceanographic Data Centre	NOC-BODC	UK	39	Société coopérative ARL , à capital variable, OceanScope	OceanScope	FR
20	Istituto nazionale di Oceanografia e di Geofisica Sperimentale	OGS	IT	40	SCOP ARL POKAPOK	POKAPOK	FR

Abstract

Blue-Cloud 2026 builds upon the pilot Blue-Cloud project which established a ***pilot cyber platform***, providing researchers access to multi-disciplinary datasets from observations, analytical services, and computing facilities essential for **blue science**. Core services delivered are the federated **Data Discovery & Access Service (DD&AS)**, the **Virtual Research Environment (VRE)** and **Virtual Labs**. Blue-Cloud 2026 aims at a further evolution of its pilot ecosystem into a **Federated European Ecosystem** to deliver FAIR & Open data, analytical services, instrumental for deepening research of oceans, EU seas, coastal & inland waters. It develops a thematic marine extension to EOSC for open web-based science, & serves needs of the EU Blue Economy, Marine Environment and Marine Knowledge agendas. Blue-Cloud 2026 in **42 months** covers activities at a growing number of federated **environmental RIs** to improve & optimise services for uptake of new data sets from a **multitude of data originators** and for discovery and access to their structured data collections. The advanced ecosystem will provide a core data service for the **Digital Twin of the Ocean,** mobilising and making available major additional data resources as validated and harmonised in-situ data by means of **Data Lakes.** The modular architecture of the VRE is scalable & sustainable, fit for **connecting additional e-infrastructures**, integrating more **blue analytical services**, configuring more **Virtual Labs**, and targeting broader (groups of) **users**.

Blue-Cloud 2026 main KERs: A) **FAIR compliant DD&AS;** B) **Open Science VRE federating multiple e-Infrastructures;** C) **3 EOV WorkBenches;** D) **5 Virtual Labs;** E) **Blue Strategic Roadmap;** F) **DTO Task Force**. Blue-Cloud 2026 is co-ordinated by the same organisations **Trust-IT & MARIS**, counting on the same core team of partners **CNR, Ifremer, MOI, Seascape Belgium, VLIZ**; overall it mobilises a solid, multidisciplinary, & committed team of 40 partners from 13 EU countries.

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Glossary

Item	Description	Item	Description
AE	Affiliated Entity	**KPI**	Key Performance Indicator
AP	Associated Partner	**MSFD**	Marine Strategy Framework Directive
BDI	Blue Data Infrastructure	**PD**	Person-Day
DD&AS	Data Discovery & Access Service	**RIs**	Research Infrastructures
DMP	Data Management Plan	**SEO**	Search Engine Optimisation
DTO	Digital Twin of the Ocean	**SLA**	Service Level Agreement
EOSC	European Open Science Cloud	**SMART**	Specific, measurable, achievable, realistic, timed and targeted
EOV	Essential Ocean Variable	**UX**	User Experience
ESEB	External Stakeholder Expert Board	**TL**	Task Leader
FAIR	Findable Accessible Interoperable Reusable	**VLab**	Virtual Lab
GA	General Assembly	**VRE**	Virtual Research Environment
GBIF	Global Biodiversity Information Facility	**WFD**	Water Framework Directive
IPRs	Intellectual Property Rights	**WP**	WorkPackage
KERs	Key Exploitable Results	**WPL**	WorkPackage Leader

1. Excellence

Blue-Cloud 2026 further integrates and grows the recognised ***pilot Blue-Cloud ecosystem*** into EOSC, providing researchers access to multidisciplinary datasets from observations (both in-situ and earth observations) and model outputs, analytical tools/services, and computing facilities essential for key blue science use cases. Blue-Cloud 2026 **directly builds upon the Blue-Cloud project [Oct 2019-Sep 2022]** and it evolves its pilot Blue-Cloud ecosystem into a **Federated EU Ecosystem** that delivers FAIR, Open data and analytical services, instrumental for deepening research of oceans, European seas, coastal and inland waters. It also advances and expands the Blue-Cloud core services, comprising the federated **Data Discovery & Access Service (DD&AS)**, the **Virtual Research Environment (VRE)** and **Virtual Labs (VLabs)**. Ultimately, a **thematic marine EOSC** for open web-based science serving the EU Blue Economy, Marine Environment and Marine Knowledge agendas, and related EU missions and destinations will be established.

WHAT: The leading principle of the Blue-Cloud is to federate services from RIs and e-infrastructures to provide researchers open access to data, algorithms, and computing resources. **Blue-Cloud 2026** in its **42-month, ambitious workplan** includes activities at a range of aquatic **environmental RIs** to improve and optimise their services for uptake of new data sets from a **multitude of data originators,** and for discovery and access of their structured data collections, by means of web services. As a result, the RIs will be able to reach out to more potential data originators, mobilising and canalising their data resources, while also operating more streamlined services for sharing their collated and structured data resources for wider use, underpinning EOSC principles. This is in line with ESFRI's roadmap where *"blue RIs will have to work synergistically to meet their end-user needs"*. Federated Blue-Cloud services made available to researchers for discovery and access of data resources (DD&AS), and for building, running, and sharing of analytical processes (VRE), will be expanded and optimised, by deploying Data Lakes, and smart use of multiple e-infrastructures (e.g., EUDAT, D4Science, EGI & WEkEO, CMEMS-DIAS) for orchestrating complex and data intensive computations, by means of digital **WorkBenches**. The advanced Blue-Cloud 2026 ecosystem will provide a major core data service, underpinning the EU **Digital Twin of the Ocean (DTO)** as planned in the EU Destination Earth initiative. It will mobilise and make available for DTO major additional data resources in addition to those managed by CMEMS and EMODnet in cooperation with federated RIs.

WHY: Oceans, seas, coastal and inland waters are vital for our societies and the future of our planet, and **challenges in the aquatic sciences domain that may be addressed with better and broader use of existing data resources and wider application of web-based analytical services, including services for Big Data analysis in support of multidisciplinary and collaborative research.** Aquatic bodies are home to diverse ecosystems and habitats, provide a wealth of resources, strongly regulate climate, and offer many resources for economic opportunities. The combination of long-term global change and multiple local stressors affects ecosystems in unpredictable ways to a point of no return with significant socio-economic impact. Therefore, a better understanding of the dynamics and complex geochemical interactions is key to allow a sustainable use, conservation and implementation of mitigation, and/or restoration plans for these essential ecosystems.

HOW: The modular architecture of the Blue-Cloud VRE is scalable and sustainable, being fit for **connecting additional e-infrastructures**, implementing and integrating more and advanced **blue analytical services**, configuring more dedicated **VLabs**, and targeting broader (groups of) **users**. New ways will be explored for adopting additional **cloud storage**, **cloud computing**, **deep learning** and **neural networks** for supporting **big data processes** for **validation**, **extraction**, **interpolation** and **products generation**. A number of data intensive WorkBenches for selected **Essential Ocean Variables** (EOVs) will be developed and validated. Data scientists will be empowered with new classes of algorithms such as **AI** and **Machine learning**, partly to be arranged by synergising with services under development in related HORIZON projects in support of healthy oceans, seas, coastal and inland waters, viz.: EGI-ACE (WebODV analytics engine), iMAGINE (AI applications), FAIR-EASE (Machine Learning techniques). This analytical framework, well powered by computing resources and well provided with data resources, will serve the community to undertake world-class research concerning major scientific challenges in the aquatic domain.

WHO: Blue-Cloud 2026 is co-ordinated by the same organisations of its predecessor, **Trust-IT & MARIS**, counting on the same core team of partners **CNR, Ifremer, MOI, Seascape Belgium, VLIZ** and mobilising overall a solid, multidisciplinary, & committed team of 40 partners from 13 EU countries, adding 22 additional partners, representatives of research institutes, research infrastructures and e-infrastructures.

A synthesis of the Blue-Cloud 2026 initiative is reported in the figure below.

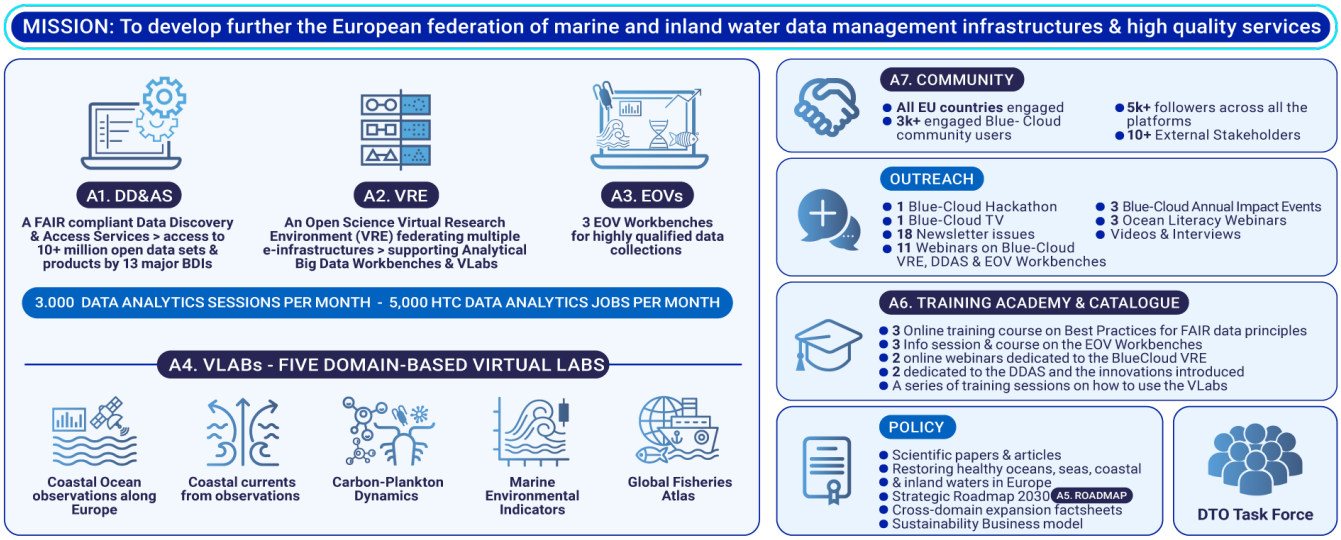

Figure 1 – Blue-Cloud 2026 in a nutshell (A1 through A7 are the main Assets delivered by the Project)

1.1. Objectives and ambition

1.1.1. How does Blue-Cloud 2026 fit into the EU Strategies for Healthy oceans, seas, coastal and inland waters, and EOSC?

Over the past decades, Europe already has developed an impressive capability for aquatic environmental observation, data-handling and sharing, modelling and forecasting, second to none in the world. This builds upon national environmental observation and monitoring networks and programs, complemented with EU infrastructures such as the Copernicus satellite observation programme and related thematic services, the European Marine Observation and Data Network (EMODnet), as well as a range of environmental European Research Infrastructures and major R&D projects. This way, an expanding European capacity is provided for collecting, managing, and processing of in-situ and remote sensing data, while federating and interacting with national, regional, and global activities and initiatives. Research infrastructures, including the EOSC, and e-infrastructures are crucial enablers of research and technological innovation and drivers of multidisciplinary and data-intensive science. By means of EOSC, Europe should benefit from an integrated, inter-operable and effective ecosystem of these infrastructures to facilitate and accelerate fundamental knowledge creation and technology deployment in support of Open Science and European technology leadership. The INFRAEOSC destination aims to develop the EOSC in a more cohesive and structured manner so that it becomes a fully operational enabling ecosystem for the whole research data lifecycle.

Oceanographic and marine data include a very wide range of measurements and variables, originating from a broad, multidisciplinary spectrum of projects and programs. These data are collected by several thousands of research institutes, governmental organisations, and private companies. Various heterogeneous observing sensors are installed on research vessels, submarines, aircraft, and moorings, drifting buoys, gliders, floats, fixed platforms, and satellites. The sensors measure physical, chemical, biological, geological and geophysical parameters, with further data resulting from the analysis of water, biological, and sediment samples for a wide variety of parameters. Increasingly, it has become important to provide discovery and access to multidisciplinary and aggregated datasets in an interoperable or harmonised manner and to provide analytical frameworks for better understanding of the aquatic system, serving the large array of existing and potential applications and carry out cross-domain analyses and processing of data. The principles of "capture once – use many times" and achieving 'FAIRness' are major targets for managing and serving the wealth of marine and ocean data sets to the existing and potential user community.

***Blue-Cloud 2026's overall Objective is**: To **develop further the European federation of marine and inland water data management infrastructures and its services** with increased FAIRness, advanced analytical capabilities, and higher quality data provision, by expanding the federated approach of Blue-Cloud, involving more aquatic data stakeholders, and interacting with EOSC developments, in support of the EU Green Deal, UN SDG, EU Destination Earth, and the EU Mission Starfish on healthy oceans, seas, coastal and inland waters.*

Since October 2019, the pilot Blue-Cloud project (www.blue-cloud.org) is well underway as part of '**The Future of Seas and Oceans Flagship Initiative**' of the EU H2020 programme. It combines both the interests of EOSC and the blue research communities. It is undertaken by leading European ocean and marine data and knowledge initiatives such as EMODnet and Copernicus Marine Environmental Monitoring Service (CMEMS), together with leading aquatic environmental research infrastructures such as SeaDataNet, EurOBIS, Euro-Argo, ELIXIR-ENA, SOCAT, EcoTaxa, and ICOS-Ocean (qualified as Blue Data Infrastructures (BDIs)), and major e-infrastructures, namely EUDAT, D4Science, and WEkEO (CMEMS DIAS). The pilot Blue-Cloud project is delivering:

- **A Blue-Cloud Data Discovery & Access service (DD&AS):** a "beta release" federation of key European Blue Data Infrastructures to facilitate users in finding and retrieving multi-disciplinary datasets in a common and efficient way.
- **Blue-Cloud Virtual Research Environment (VRE):** facilitates collaborative research offering computing, storage, analytical, and generic services to be orchestrated with a large variety of data resources by researchers for constructing, hosting and operating analytical workflows for specific applications;
- **Blue-Cloud Virtual Labs:** five VLabs have been developed by Blue-Cloud scientific experts as pilot open-science demonstrators of complex ocean related challenges. Each VLab combines application services and makes use of selected datasets as input for delivering data products and/or dedicated services.

The pilot Blue-Cloud confirmed that the EU marine community is aware of this potential and the role it can play in accelerating knowledge and science-based solutions to aquatic challenges. Also, the draft Blue-Cloud Strategic Roadmap to 2030 (1.0) underpins that more efforts are required towards lowering barriers and building confidence in sustainability. **It motivates the Blue-Cloud 2026 consortium to build more momentum for Open Science in the aquatic domain, capitalising on Blue-Cloud's digital assets, and further evolving these for integration and wider user uptake via EOSC and other key EU initiatives, such as DTO.**
The **target Stakeholder Groups (SGs)** of Blue-Cloud 2026 and their motivation for engagement are sketched below.

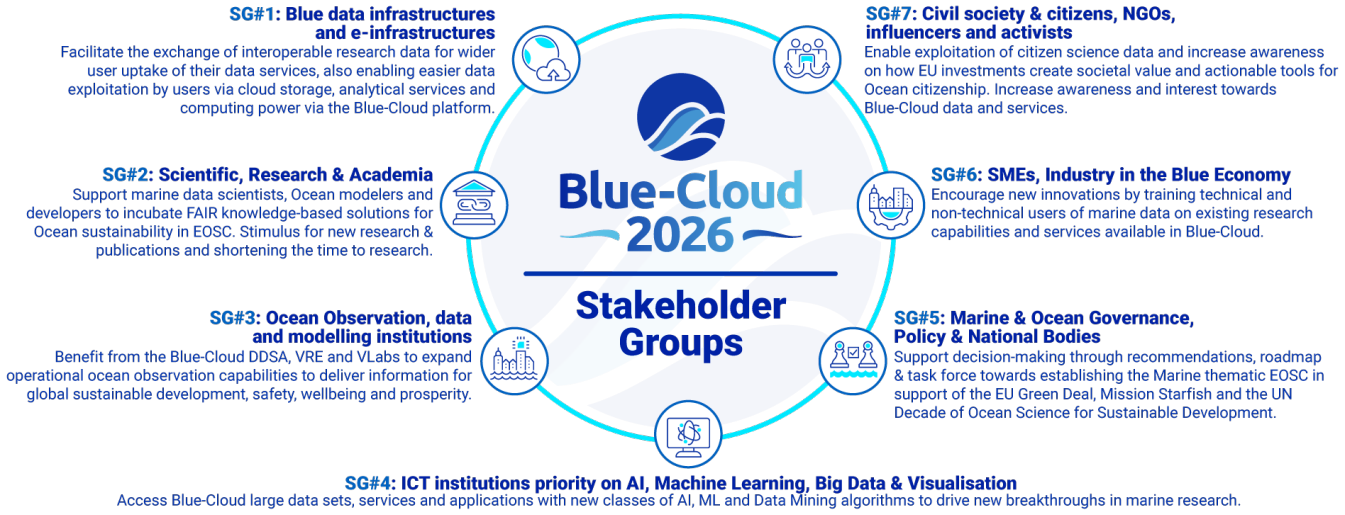

Figure 2 – Blue-Cloud 2026 Stakeholder Groups (SGs) and motivation for engagement

1.1.2. Specific Objectives

This section introduces the objectives of Blue Cloud 2026 and outlines the baseline towards their achievement, correlates them with the project's tasks and deliverables, while also presents dedicated KPIs to monitor their progress.

O1: To expand and optimise the Blue-Cloud Data Discovery & Access service (DD&AS) and to federate additional Blue Data Infrastructures (BDIs).
The objective looks to **deploy semantic brokering**, **harmonising the functionality of web services** as operated by each BDI for discovery and access of managed data resources, developing and equipping BDIs with **sub-setting and extracting services** to be used for compiling **data lakes** for optimising access to specific data types, this way, improving FAIRness of the **DD&AS** as well as **web services of each of the federated BDIs**.
Means of achievement & pertinence to call topics: To meet O1, a dedicated WP2 aligns the priorities of the call text both on EOSC cooperation and FAIR services, specifically on "*accelerating research and innovation under this mission area through better access, management, interoperability, reuse and citation of digital information, and providing* users with a FAIR service for discovery and access. It capitalises on having on board a significant and increasing number of Blue Data Infrastructures (T2.2) *(see figure 3 and 4)*. It makes available the Blue-Cloud DD&AS (T2.1/D2.1) via the EOSC Marketplace which will help users to select Blue-Cloud data collections and then to access DD&AS to drill down further at a granular level. The objective deploys Blue-Cloud Data Lakes (T2.3/D2.4) with harmonised content for selected data types while tuning Data Lakes developments with Digital Twin of the Ocean (DTO) developments (T2.4/D2.5). **KPIs***: 14 Blue Data Infrastructures federated via DD&AS, >400 registered users from >25 countries, user satisfaction of the data aggregation> 95, TRL of service going from TRL7 to TRL8.*
O2: To expand and further develop the functionalities of the Blue-Cloud Virtual Research Environment by federating more analytical services and more e-infrastructures

The objective looks to expand and further develop the functionalities of the Blue-Cloud Virtual Research Environment by federating more analytical services, as earlier developed by BDIs and/or (being) established as part of related RTD and EOSC projects, and by federating and making active use of more e-infrastructures to enlarge and raise the VRE capabilities for configuring and running Virtual Labs for specific aquatic challenges.

Means of achievement & pertinence to call topics: O2 will be met through the Blue-Cloud VRE platform elaborated in WP5 via the expansion of federating multiple e-infrastructures and integrating more analytical services, also in cooperation with other EOSC projects (e.g. EGI-ACE, iMAGINE, FAIR-EASE). The pertinence to the call topics will be covered in (T5.3/D5.6) & (T5.4). *Special attention shall be put on aspects of* ***data harmonisation, data quality assurance, integration of data collection, data privacy and security, big-data analysis and machine learning methods, data and model validation,*** *as well as on the socio-economic dimension of the use.* Liaison with (T2.4) DTO task force for tuning Blue-Cloud data lakes with DTO developments contributes here, in coordination with T7.1 as part of a sustained community dialogue.
KPIs*: total users in the Blue-Cloud Virtual Research Environment > 3.000*; ***Number of data analytics sessions per month > 2,000,Sessions' peak to manage per month > 5,000; Number of HTC data analytics jobs per month > 5,000; Data analytics jobs' peak to manage per month > 25,000; Common Services Availability per year (uptime) > 99.995 %. TRL of VRE going from TRL7 to TRL8***).

O3: To stimulate further uptake and utilisation of the Blue-Cloud VRE services and capabilities for developing Virtual Labs by Blue Data Infrastructures

The objective looks to advance existing and develop new Virtual Labs utilising the increasing Blue-Cloud VRE services and capabilities and to engage with other marine RIs such as JERICO-RI, and other marine RTD projects, promoting awareness among different groups of users, establishing more interaction and feedback on performance and relevance of Blue-Cloud services, deploying synergies, and strengthening the user services of BDIs via an increased and operational cloud processing capacity.

Means of achievement & pertinence to call topics: O3 aims to roll-out the ***cross-domain, strategic use cases*** via WP4 with a set of varied topics under the VLabs: a) **ICOOE: Unlocking the potential for integration of Coastal Ocean Observations along Europe (T4.2); b) Coastal currents from observations (T4.3); c) Carbon-Plankton Dynamics (T4.4); d) Marine Environmental Indicators (T4.4); e) Global Fisheries Atlas (T4.5).** Each VLab will undergo the service development phase, testing & dissemination and user support. VLabs become available in the EOSC portal & integrated with EOSC core services. Aligned with call topics around EOSC partnerships, use cases will demonstrate value of sharing FAIR & open research data, and fostering the creation of user environments.
KPIs: ***Number of use-case scenarios supported by the prototype implementation >5 VLabs Implementation guidelines, technical requirements, VLabs user Handbook downloaded >200 times.***

O4: To develop and validate new Blue-Cloud analytical WorkBenches for data intensive processes

The objective looks to develop, validate, and document new Blue-Cloud analytical Big Data **WorkBenches,** which can be adopted by EMODnet, CMEMS, and selected RIs for producing at a regular interval a set of harmonised and validated **data collections** for a selection of **Essential Ocean Variables (EOVs)** in physics, chemistry, and biology, highly relevant for analysing the state of the environment and numerical simulations of the planned DTO, forecasting its evolution and possible impacts of measures; testing and optimising these workflows, related provenance management, and storage facilities.

Means of achievement & pertinence to call topics: The analytical WorkBenches will be developed in WP3, responding to the call topics in developing **cross-domain, strategic use cases** of direct relevance to the Digital Twin of the Ocean, and mission area of healthy oceans, seas, coastal and inland waters. It will address three Essential Ocean Variable (EOVs): 1. Physical: temperature and salinity (T3.2); 2. eutrophication: nutrients, chlorophyll, oxygen (T3.3); and 3. Ecological: imaging and digital sequence information about plankton taxonomy, functions and biomass (T3.4). Sources will be multidisciplinary & will be derived, fit for integration, from selected research & data infrastructures that provide validated & structured data collections (e.g. EMODnet, Copernicus, SeaDataNet, WOD).
KPIs: >10 ***Open aggregated and harmonised EOV datasets 20TB of data handled in parallel, Common tools (notebooks, models, containers) available to 1000+ total users, Portable prototypes for operational services and data infrastructures.***

O5: To develop and publish a range of online courses and educational guidance documents

The objective looks to gather, prepare, and publish **guidance** documents and training materials, aimed at informing and training original data providers on how to make best use of RIs and other data repositories in the European marine landscape for long term stewardship and for providing access of their original data sets for wider use, increasing the FAIRness of data submissions and potentially expanding the RI networks of structural data providers. In addition, providing online modules on training in the use of the Blue-Cloud 2026 data services, VLabs, and VRE.

Means of achievement & pertinence to call topics: The O5 will be achieved in WP6 by gathering documentation

from BDIs on standards and services, and preparing various training modules around FAIR Practices, and use of BDIs and Blue-Cloud platform and services. The publishing will be done making use of Ocean Best Practices (OBPS), IODE OceanTeacher, and EuroGOOS channels. This is aligned with the pertinence of the call topics on promoting the importance and uptake of *Open and FAIR data principles*.
KPIs: ***Blue-Cloud Training Academy, >200 materials available in the online Training catalogue, >500 trained participants.***

O6: To ensure long-term EOSC integration, alignment and growth of the EU digital ecosystem required to support research of Oceans, seas, coastal & inland waters via sustained mechanisms for community dialogue

O6 will be rolled out by WP7 to provide an Exploitation Plan, long-term strategic roadmap and policy recommendations for the discovery and exploitation of Blue-Cloud's digital commons, assets, and services by users in EOSC, including defining pathways and mechanisms for long-term community dialogue and coordinated action beyond the project end. (T7.1/D7.1, D7.2) & T7.2/D7.3).

Means of achievement & pertinence to call topics: Through gathering lessons learned from use cases and user-driven events (e.g., hackathon), creating a DTO Task Force, interacting with key EU stakeholders via surveys, workshops and targeted meetings (e.g., with EMODnet and Copernicus Marine Service as sustained EU data services, EOSC Partnership, Sustainable Blue Economy Partnership and key representatives of targeted SGs) WP7 will contribute to formulate and implement a sustainable Exploitation Plan and roadmap for the Blue-Cloud 2026 key exploitable results (KERs) and their further evolution and exploitation through EOSC and (potentially) EU DTO. It will continue the process of interacting with stakeholders for updating Blue Cloud Strategic Roadmap (D7.4) towards the successfully delivery of its Vision & Mission 2030.
KPIs: ***Blue-Cloud Roadmap, sustainability strategy, service exploitation plan, capitalisation and uptake of KERs by DestinE, EU DTO, Green Deal Data Space (GDDS). 1 long-term Strategic Roadmap to guide the community towards a shared Vision & Mission 2030. +120 stakeholders engaged and informed for uptake of results.***

O7: Wide communication, scientific dissemination and vertical exploitation of scientific results & outputs.

Blue cloud 2026 will capitalise its existing services and developed community achieved in the past 3 years and conduct further research in certain scientific domains and emerging technologies in the blue economy fields on data Discovery from federated multiple e-infrastructures, VRE, Virtual Labs & EOVs. A dedicated Communication, Dissemination, Outreach and Education Plan organised around SMART campaigns (Ocean Literacy; Exploitable Results; Training; Synergies, EOSC & DTO), will ensure the wide spread of the research outcomes to the international research and scientific community as well as the engagement of private sector stakeholders towards maximising awareness around Blue-Cloud 2026. Furthermore, liaison activities with other EU funded international projects, a series of impact & policy events, a Training Academy (including one hackathon), to the dedicated **SGs** enhances dissemination and exploitation of the results.

Means of achievement & pertinence to call topics: Blue Cloud 2026 aims to disseminate the project goals and results to the interested, defined SGs in WP6 & (T6.1/D6.1) & (T6.3/D6.3), with an impact monitoring (T6.4) to support scientific & societal impacts of results. Synergies and contributing to HE EOSC Partnership (T6.3/D6.2)) and other relevant partnerships related to restoring healthy oceans, seas, coastal and inland waters.
KPIs: ***1 hackathon, 12 Online training courses, Catalogue of FAIR-related training materials from Marine BDIs, Scientific papers/publication >10, Restoring healthy oceans EU Roadmap, 10+ ESEB member regularly engageds, >3,000 engaged Blue community, 3 Annual Impact events, DTO Task Force, 3 Policy & DTO Task Force workshops, N. of synergies with external initiatives >10 projects communities, >5 Online cross-domain factsheets for cross-domain expansion.***

1.1.2.1. Technology Readiness Levels (TRLs) of Blue-Cloud 2026

The Technology Readiness Level (TRL) of the **Data Discovery & Access Service (DD&AS)** should increase from the **current average TRL7** (system prototype demonstration in operational environment) **towards TRL8** (system complete and qualified), by giving further attention for robustness of services, setting up an availability and performance monitoring system of all services. Furthermore, semantic interoperability should be deployed using **semantic mapping and brokerage at central level**, taking into account different vocabularies in use by the BDIs. Data sub-setting web services at each of the BDIs should be deployed for dynamically feeding a number of **central Data Lakes** with harmonised data collections for selected parameters, much needed for several applications hosted in the Blue-Cloud VRE and the DTO. The TRL of the **Blue-Cloud VRE** should also be increased from current **TRL7** to **TRL8**, which requires further integration of the core D4Science platform with other e-infrastructures (EUDAT, EGI, WEkEO) for orchestrating analytical workflows, adding Single-Sign-On (SSO) and expanding monitoring and accounting services to all e-infrastructure components. Fault tolerant components with redundancy for each core service will guarantee consistently high levels of traffic and processing demands and will sustain the federation of marine and inland water data management infrastructures and services made accessible through the Blue-Cloud VRE.

1.2. Methodology

The Blue Cloud initiative is relevant in the context of major EU data and knowledge initiatives with a marine focus: **EMODnet** (European Marine Observation and Data Network), **Copernicus** (The European Earth Observation Programme), **EuroGOOS** (European Global Ocean Observing System), **ESFRI** (European Strategy Forum on Research Infrastructures), and the new **EOOS** (European Ocean Observing System). Furthermore, it is an implementation as part of the **European Open Science Cloud (EOSC),** sharing and using key features and principles of EOSC to develop and shape a more integrated European aquatic data management landscape.
The following image depicts the **components and features of the Blue-Cloud 2026 architecture** that will be deployed. This will be further detailed in the following sections.

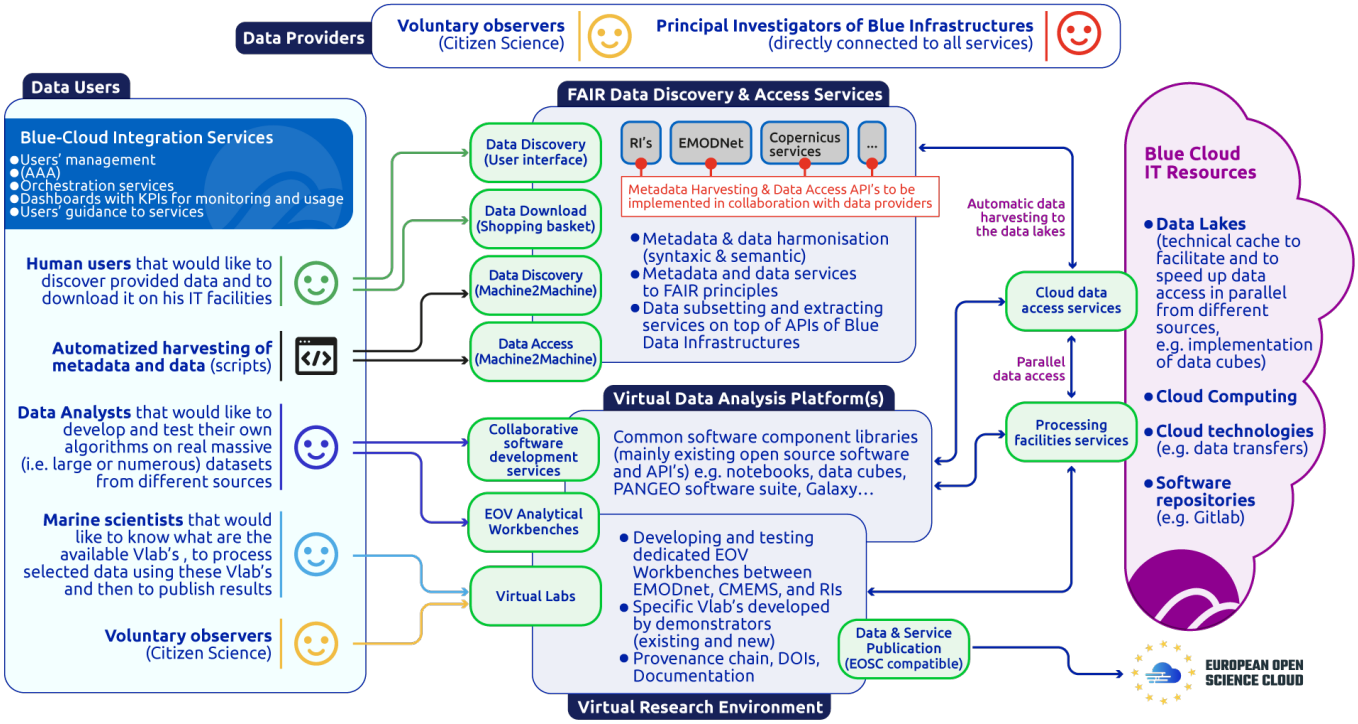

Figure 3 – Schematic overview of Blue-Cloud 2026 ecosystem of data and analytical services

The Blue-Cloud 2026 initiative is aimed at further expanding the Blue-Cloud thematic self-standing cloud (at www.blue-cloud.org), but also through EOSC services. The Blue-Cloud concerns direct cooperation and engagement between the blue thematic community and e-infrastructures (such as EUDAT, D4Science, EGI, and WEkEO), whereby the requirements and perspectives of the blue thematic community are leading and are determined by developing, deploying, and operating the Virtual use cases, consisting of VLabs and WorkBenches. This way, more dedicated services are developed, complementing EOSC CORE services and provide blue thematic functionality, making EOSC more attractive and fit for purpose of the blue community.
The **ambition** of the Blue-Cloud 2026 is to achieve a further evolution of the current Blue-Cloud pilot ecosystem into a **Federated European Ecosystem which provides FAIR and Open data and analytical services, which are instrumental for deepening research of oceans, European seas, coastal and inland waters.** Therefore, several activities will be aimed at expanding and optimising the functionality of Blue-Cloud core services, namely the **Blue-Cloud Data Discovery & Access Service (DD&AS)** and the **Blue-Cloud Virtual Research Environment (VRE)**.

Blue-Cloud 2026 is expected to start as soon as the predecessor Blue-Cloud is completed. At the moment, completion is planned in September 2022,. In case of a short no-cost extension of Blue-Cloud, the beginning of activities with Blue-Cloud 2026 could **easily be synchronised**. In all cases no duplication of resources will be encountered.

The Blue-Cloud 2026 project is built around the concept that the **aquatic environmental research infrastructures and their scientific communities** will be major contributors to the development, improvement, and validation of the Blue-Cloud ecosystem of services, both as providers of data and data services as well as developers and users of analytical workflows for complex aquatic scientific challenges. This will be implemented by **developing, deploying, testing, documenting, and demonstrating a series of scientific use-cases of major relevance for healthy oceans, seas, coastal and inland waters**, the **VLabs** and the **WorkBenches**. These use cases will be deployed at the Blue Cloud VRE and their data input will be largely arranged by interaction with the discovery and access component. Users can also ingest datasets from other external sources as well as their own data sources. The data input could be in-situ data, earth observation data, and model outputs. The analytical services can be various algorithms together with generic services, for instance for sub setting, pre-processing, publishing, and viewing data and data products. The design and further development of the use cases will set user requirements towards the data services and technical

architecture of the Blue-Cloud ecosystem. The use cases will also contribute to validating, refining and optimising the Blue-Cloud services.

The Blue-Cloud 2026 project will be undertaken by research and industry organisations that are operating leading European marine data initiatives and research infrastructures. Existing Blue-Cloud infrastructures are: EMODnet (Chemistry, Bathymetry, Biology), CMEMS (Copernicus), SeaDataNet, EurOBIS, Euro-Argo, Argo GDAC, ICOS-Marine, SOCAT, EMBL (ELIXIR-ENA), EcoTaxa. New infrastructures, joining and expanding Blue-Cloud 2026, are: EMSO, EMBRC, SIOS, EMODnet-Physics, and JERICO-CORE. Existing Blue-Cloud e-infrastructures are: EUDAT, D4Science, while EGI and WEkEO (CMEMS-DIAS) will increase their roles in Blue-Cloud 2026 bringing in additional analytical services next to computing resources. The aquatic data infrastructures manage well organised and European wide networks of data originators, supporting structured maintenance of their data provision to users with new collected data and derived data products. Scientific excellence is covered in the Blue Cloud consortium for marine biodiversity, fisheries, physical oceanography, chemistry, meteorology, biogenomics, biogeochemistry, bathymetry, and carbon cycle. The e-infrastructures are on board for providing a federated platform for the Blue-Cloud VRE and for arranging close interaction and practical integration with EOSC developments.

1.2.1. Blue Cloud Data Discovery and Access Service (DD&AS)

The DD&AS provides users with an easy and FAIR service for discovery and access to multi-disciplinary data sets and data products managed and provided by leading Blue Data Infrastructures (BDIs). The federation facilitates sharing of datasets as input for analytical and visualisation services and applications, that are hosted and further developed as VLabs and WorkBenches in the Blue-Cloud VRE. The new and upgraded VLabs might set additional requirements and will provide feedback for further optimising the DD&AS. It was developed and is operated by MARIS together with CNR (IIA) and CINECA (EUDAT), interacting with web services operated by the BDIs. The figure below gives an overview of the currently federated BDIs and their data resources.

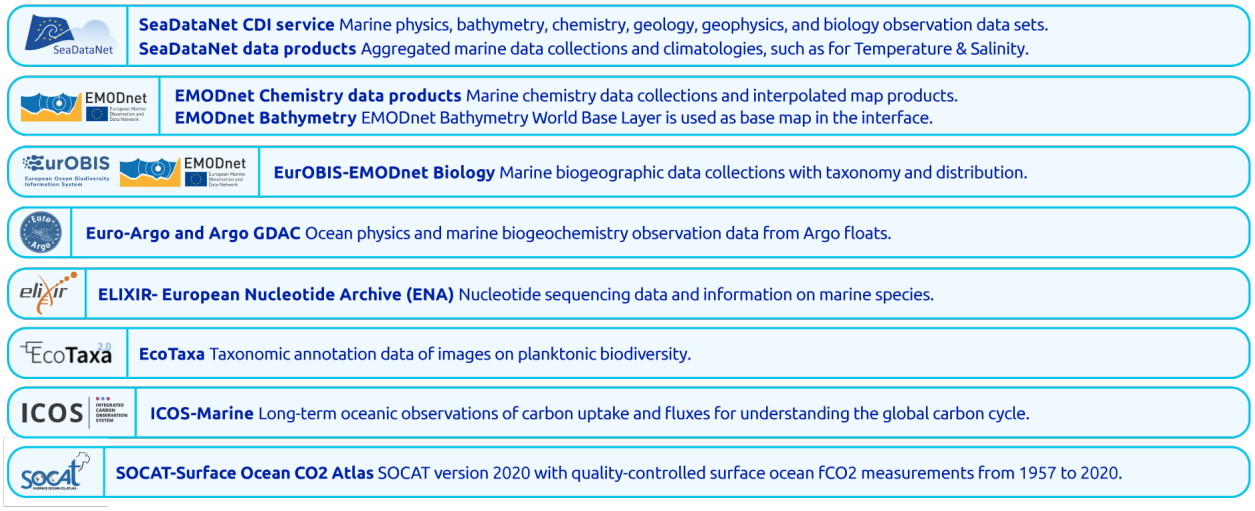

Figure 4 – Current Blue Data Infrastructures (BDIs) federated in the DD&AS

The DD&AS works with **brokerage services both at metadata and data level**. Discovery and selection are done in a two-step approach - from data collections using a common metadata profile, to detailed records using extended metadata profiles- and fully based on web services (such as OGC-CSW, OAI-PMH, ERDDAP, DCAT, and dedicated APIs), as published and maintained by connected BDIs. For the **first step - collection level** - the GEODAB Brokerage mechanism (developed by CNR (IIA)) is used, harmonising individual outputs of BDI discovery web services to a common syntactic metadata model (ISO19115 – 19139). The **second step** drills down within identified collections to get more specific data, using free search, geographic and temporal criteria, but this time at granule level, and including additional BDI-specific search criteria.Users are able to download and store the retrieved data collections on their own machines or in a Data Lake in the Blue-Cloud VRE. The two-step approach is effective to go from coarse to fine and to determine at an early stage which of the BDIs might have interesting datasets.

For instance, the SeaDataNet CDI service gives at first level circa 800 CDI aggregated records, which at second level represent more than 2.5 million individual observation datasets for physics, chemistry, geology, biology, geotechnics, and bathymetry, which can be downloaded. Retrieved data sets are downloaded via a central shopping basket mechanism, in combination with a data brokerage service and temporary storage in the EUDAT cloud. Datasets can be downloaded together with metadata by all users via GUI and by VRE users via machine-to-machine. The data brokerage interacts with web services at BDIs.

The shopping mechanism is based on the shared experience and services of MARIS, IFREMER, and EUDAT from developing and managing the SeaDataNet CDI service, from which selected services were adapted. The DD&AS is available by means of a GUI, while level 1 – the collections catalogue – is also published as OGC CSW service, which is e.g., used for sharing the Blue-Cloud collection records with the EUDAT B2FIND data catalogue service at

the EOSC Marketplace. This way, EOSC users can find relevant Blue-Cloud data collections and are then directed to the Blue-Cloud DD&AS for further down drilling and actual download of datasets at granule level.
As part of Blue-Cloud 2026, the DD&AS will be elaborated in a number of ways:

- **Optimising and refining current web services at BDIs and DD&AS federation principles for even richer output:** overall review of FAIRness of current services and formulating and deploying developments at each of the BDIs for increasing the FAIRness of their metadata and data services at source, where feasible, and possibly in dialogue with their connected data originators.
- Achieving **semantic interoperability** for common metadata tags, such as parameters, instruments, platforms, sea regions, etc: Each BDI is using own vocabularies for several metadata tags. A semantic brokerage service component will be developed and integrated into the DD&AS. This will be led by NOC-BODC who is operating the NERC Vocabulary Server (NVS) and has accumulated a wealth of experience over the past 20 years in addressing this challenge. NVS provides access to machine-interpretable standardised lists of terms that cover a broad spectrum of concept types and disciplines of relevance to the oceanographic and wider earth science community. The NVS vocabularies are widely used on a global scale and its web services are constantly monitored in order to deliver the highest possible reliability. NVS underpins SeaDataNet and major components of EMODnet and as such, its content has grown consistently. The concepts and taxonomies of NVS follow the W3C SKOS specification and are served for both human and machine access. It offers enhanced machine-to-machine delivery by providing Linked Data in different serialisations including JSON-LD, turtle, Ntriples, and more, aligning NVS with the FAIR semantics. Whenever possible, NVS uses the Linked Data approach to connect with terminologies used in other domains. As part of the ENVRIFAIR EOV demonstrator, NOC-BODC has demonstrated the use of "smart mapping" to discover diverse datasets by applying semantic reasoning. This pilot semantic broker service will be further extended to increase the **thematic coverage of datasets and give access to a greater range of FAIR semantic artefacts and repositories**, also using smart mappings. This will greatly facilitate cross-domain data discovery, and integration. It will address connection to Essential Variables concepts such as GOOS EOVs (Ocean), GCOS ECVs (Climate), GEOBON EBV (Biodiversity), but also other forms of data discovery and aggregation. These will be selected based on the direct relevance to the connected BDIs, the Blue-Cloud Data Lakes development, and Blue-Cloud VLabs. It will also integrate the RDA I-ADOPT framework connections, enabling multidirectional interoperability between data resources, services and scientific use cases right down to the measurement level.
- **Adding sub-setting and extracting services to the DD&AS by means of APIs at BDIs**: Currently, the DD&AS supports discovery and download of predefined data objects, while several applications might require specific extracts and slices of data. Also, repositories like WEkEO (CMEMS DIAS) are managing big datasets for which sub-setting and slicing is more appropriate as otherwise very large files are downloaded, which might be updated and increased regularly as results of model runs. The DD&AS will be expanded with configuring indexing, sub-setting and extracting services at each of the BDIs at data level. Common requirements will be formulated together with BDIs; new APIs will be developed or existing APIs will be adapted, where required to facilitate the compilation of Blue-Cloud 'Data Lakes' for specific data types.
- **Defining, developing, and operating Blue-Cloud Data Lakes:** Data Lakes will function as 'harmonised buffers' of observation data as combined from multiple BDIs and also from major international repositories like the NOAA World Ocean Database (WOD) and others. Data Lakes will improve data access both in terms of data harmonisation and of technical efficiency of data access. The ability to copy and store data files in a Data Lake and also to link and access distributed (externally-located) data in an efficient way will serve the Blue-Cloud VRE and its VLabs. It will also be very relevant towards the exchange with other initiatives such as the Digital Twin of the Ocean (DTO). Data access for applications can be improved by moving analysis services closer to the Data Lakes when developing and operating the data intensive WorkBenches. Moreover, data structures might be adopted that are adapted to parallel access of subsets. Firstly, Blue-Cloud 2026 BDIs and IT experts from the e-infrastructures and DD&AS will conceptualise the best ways for configuring and ingesting the Data Lakes in the given landscape of BDIs and prevailing IT concepts. . This will also be done, tuning with the DTO preparations as part of the Grant recently awarded to MOI and VLIZ, for developing an 'EU Public Infrastructure for the European Digital Twin Ocean'. Possible solutions will be considered such as the Pangeo software library, widely used by Space Agencies, and adapted to in-situ data analysis (WEkEO and EGI) and others like X-array, Parquet, Arrow, and noSQL databases. There will be synergy with the FAIR-EASE project, starting in September 2022, and also exploring environmental Data Lakes solutions. Data Lakes could be updated daily using standard queries and deliveries. The resulting Blue-Cloud Data Lakes will arrange an efficient and regular machine-to-machine exchange with analytical applications in the Blue-Cloud VRE, related infrastructures, and DTO.
- **Expanding the coverage of the DD&AS with additional BDIs:** additional BDIs - will be connected to the DD&AS federated services, for discovery & access and sub-setting functions. For all new BDIs, existing web services for discovery and retrieval of fixed objects will be tested, evaluating the need for possible amendments

to fit the DD&AS overall concept. Furthermore, the new BDIs will also be engaged in the FAIRness reviews and the configuration of APIs for the sub-setting functionalities as part of feeding into the Data Lakes.

Figure 5 – Blue Data Infrastructures (BDIs) to be added to the DD&AS federation

1.2.2. Blue Cloud Virtual Research Environment (VRE)

The Blue Cloud Virtual Research Environment (VRE) provides an Open Science platform for collaborative marine research, using a wide variety of datasets and analytical tools, complemented by generic services such as sub-setting, pre-processing, harmonising, publishing and visualisation. For each Virtual Lab and each Worbench, accounts of researchers will be configured at the VRE. Each will enact a family of analytical workflows which consist of a series of applications and make use of selected datasets as input. The multi-disciplinary datasets can be retrieved from the BDIs using the Blue Cloud DD&AS and its Data Lakes, and external resources. Outputs, such as data products, data collections, maps, notebooks, software applications, and services can be documented with DOIs for citation, provenance for reproducibility, and published in the Blue-Cloud Catalogue. All methods and services in this Catalogue are exchanged with the EOSC Portal Catalogue & Marketplace.

The Blue-Cloud VRE is organised as a multi-site digital infrastructure with a central hub and peripheral sites. The central hub is located at the D4Science data centre, operated by CNR. It is responsible for the four common services: 1) Identity and Access Management (IAM) Service, 2) the Information System (IS), 3) the Resource Manager (RM), and 4) the persistent, fault-tolerant and replicated Storage Manager (SM). The peripheral sites host most of the computing resources and the tailored storage devices that offer low-latency and efficient storage solutions for supporting large and complex data analytics processes. Overall, it offers an aggregated shared capacity of 3,650 CPU cores with 13.7 TB RAM and 0.6 PB persistent storage and will power the Blue-Cloud 2026 VRE at the beginning of the project. They will be then expanded with additional sites, each with a minimum capacity of 256 CPU cores with 512 GB RAM and 10 TB persistent storage to enlarge the overall computing capacities and enable distribution of the load, fault tolerance, advanced resilience and exclusive assignment of resources to the data and computing intensive WorkBenches for EOVs. By exploiting those digital resources, services will be able to join and leave the VRE according to the provisioning policies specified at the service integration time. This “system of systems” will give a good grade of autonomy at the site level (independence and evolution), openness (join and leave; dynamic reconfiguration); distribution (interdependence and interoperability) which makes it easier to define policies for the addition of new site providers to the VRE. All physical resources of the infrastructure will be manageable through a single platform for both hardware and software layers, which will simplify the RI management, enhance scaling of the VRE deployment, and reduce the total cost of ownership.

Most of this physical architecture is invisible to the final users, which will see and access the resources from a single and unified access point (i.e., the Blue-Cloud Gateway). The Analytics Computing Framework - i.e., the Kubernetes clusters, used to deliver Jupyter Notebooks via the JupyterLab web-based interactive development environment, RShiny and RStudio applications, the Docker Swarm clusters used to operate containerised applications, the computing clusters used to support high-throughput computing (HTC) tasks, and the worker clusters used to support map-reduce jobs - will be located in several sites to ensure scalability, reliability and fault-tolerance.

As part of Blue-Cloud 2026 project, the **VRE** will be elaborated in a number of ways:

→ **Further evolution of the 4 VRE common services and operation**: IAM, IS, RM, and SM components will be evolved to better serve the needs of the enlarged community and to deliver them a high-quality operation. IAM will join Identity Federation of the EGI Check-in service in support of Single Sign On (SSO) for the users at the integrated VRE platform. IS and RM will manage new resources, computing and services, joining the Blue-Cloud VRE for enlarging its overall capacities and capabilities. SM will offer more tailored configurations for analytical services.

→ **Enhancing the computing facilities:** The Analytics Computing Framework will support HTC on (Docker and Linux) containerised applications. This will improve the portability of the application and its reproducibility in other infrastructures, isolation of application packages, increased security, and reduced operational costs. The JupyterHub component will be enhanced for deployment over multiple Kubernetes clusters to ensure high scalability.

→ **Expanding the VRE by federating multiple e-infrastructures**: the VREpowered by D4Science, will federate

resources and services, namely provided by EGI, WEkEO, EUDAT, and JERICO-CORE. It will provide a return on investment for each provider joining the Blue-Cloud VRE since compliance with the EU Regulation (as for GDPR), security, monitoring, accounting, user management, fault management, and alerting management will be granted by the VRE with no cost for the provider of the digital resources. In turn, the provider will be acknowledged by the users in all products and services generated by exploiting the provider's resources. This seamless expansion will support orchestrating workflows, with algorithms and computing resources, divided over and running at the different e-infrastructures. This way, it will also open the connectivity to applications in new EU projects such as iMAGINE (AI applications for marine domain), and EGI-ACE (applications for ocean use cases).

→ **Expanding the monitoring of availability and usage of the integrated VRE platform:** the initial Blue-Cloud VRE monitoring system, empowering central dashboards of uptime and users and uses of all services will be expanded towards the newly developed services and the additional e-infrastructures.

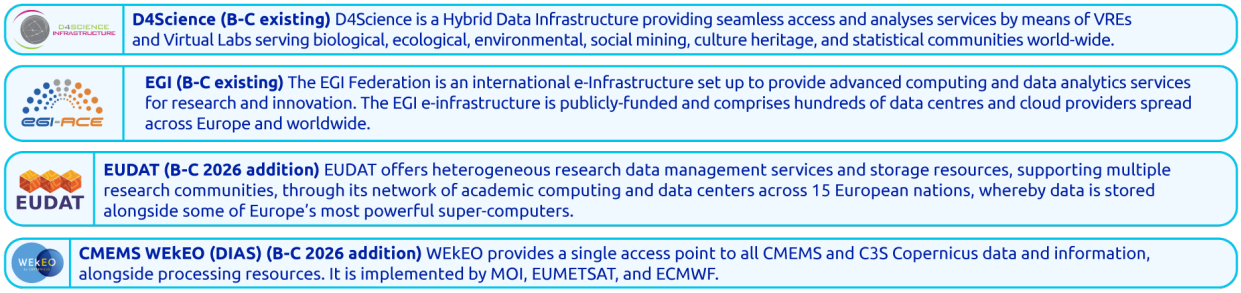

Figure 6 – E-infrastructures powering the Blue-Cloud 2026 Virtual Research Environment (VRE)

Finally, **an EOSC Blue Task Force for Blue-Cloud integration with EOSC core services** will be formed (T2.4) to ensure the compliance of the Blue-Cloud technical framework with the EOSC principles for service management, including Service Level Agreement (SLA), Operation Level Agreement (OLA), incident and service request management, service availability and continuity management.

1.2.3. Blue Cloud real-life Use Cases – Virtual Labs (VLabs) and EOV WorkBenches

VLIZ will coordinate the development of **5 Blue-Cloud VLabs** by teams of scientific domain experts. Researchers will work closely together with the Blue-Cloud 2026 technical team to describe VLab workflows and technical requirements, and to implement them in the VRE. Figure 7 below shows the links between the VLabs and selected data infrastructures federated by Blue-Cloud.

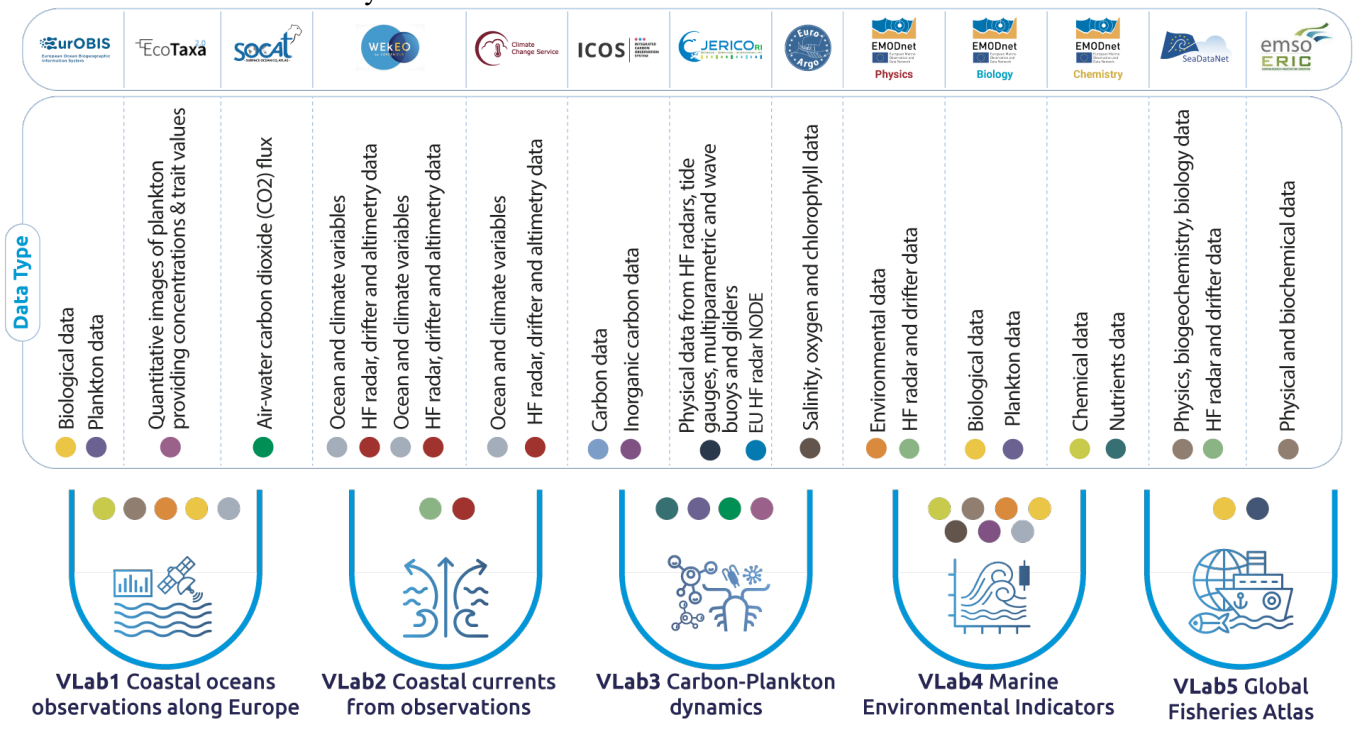

Figure 7 – The Blue-Cloud 2026 VLabs data spaces

The VLabs will be developed in the first 2 years. Existing services will be employed from the start, while additional functionalities will be added over time. Year 3 will be dedicated to promoting the VLabs at different events, and in synergy with other initiatives demonstrating Blue-Cloud's potential to researchers and decision makers. Their feedback will provide input for a longer-term expansion and evolution of Blue-Cloud (T6.4). After development and release, the VLabs will be made available to researchers within the consortium and beyond, so that other researchers

can experiment with them, providing feedback and learning how the Blue-Cloud VRE and its services and resources could be used for developing additional VLabs. More details on dissemination activities can be found in Section 2. The **5 VLabs** to be deployed at the Blue-Cloud VRE platform deliver multi-disciplinary research products for coastal ocean observations, currents, plankton, marine environmental indicators, and fisheries. They bring innovation in understanding marine ecosystems, and supporting aspects of healthy oceans, seas, coastal and inland waters and Blue Economy. 3 VLabs will be upgrades of existing Blue-Cloud releases, while 2 are new.

VLab #1: ICOOE – Unlocking the potential for integration of Coastal Ocean observations along Europe **Partners involved: IH (Lead), SOCIB, IEEE (Contributors)**	
Ambition & Scope	Many types of ocean data are available from a variety of sources, but they are not all coordinated or interoperable. Integration of diverse datasets needs to be addressed and demonstrated to facilitate creation of an effective knowledge base for application & policy decisions.
Beyond SotA / Innovation	Solving the current issue linked to integrating coastal ocean data from diverse sources. Data from JERICO-RI will be combined with other available data to get unprecedented insights on key processes affecting Europe's coastal ocean environments. Integrated exploration of datasets will take place based on statistics, structuring variability, correlation analysis, combined interactive state-of-the-art visualisations and advanced processing and post-processing. This will facilitate the understanding of ocean state and variability.
How Blue Cloud 2026 achieves Innovation	Advanced data products and interactive visualisations will be built for 3 Thematic Services (TSs): **TS1 "transboundary processes and connectivity along the European margins"** focusing on processes such as biological connectivity, contaminants spread, and influence of river outflows; **TS2 "Extreme Events"** focusing on coastal impacts of major storms, and **TS3 "Ocean glider"** showing the added value of repeated glider sections. Implementation will benefit from JERICO-Coastal Ocean Resource Environment (JERICO-CORE) developments. Its functionalities (API, web services, client libraries, tools, ...) will be significantly expanded.

VLab #2: Coastal currents from observations **Partners involved: GHER-Liège (Lead), CMCC (Contributor)**	
Ambition & Scope	At present, different current measurements (HF radar data, geostrophic currents from altimetry data and drifter data) are not integrated in common data streams. The spatial and temporal coverages of such datasets are quite varied. New current data products based on those measurements need to be generated to improve the coverage and accuracy of the combined datasets.
Beyond SotA / Innovation	Provision of an innovative service that generates integrated ocean surface current maps from High Frequency (HF) radar, drifter data and geostrophic currents from satellite altimetry data using the DIVAnd (Data Interpolating Variational Analysis in n dimensions) method.
How Blue Cloud 2026 achieves Innovation	The workflow is based on the open-source code DIVAnd. This methodology helps to integrate **radial** (only a single velocity component is measured as it is the case for HF radar data) and **total currents** (both velocity components are measured as it is the case for drifters).The method will be made available as a series of Jupyter notebooks corresponding to the different steps (data extraction, merging of the datasets, validation and visualization). As an application of the surface currents, the derived product will be used to initialise the oil spill forecasting model (MEDSLIK-II) described in Liubartseva et al. (2016) to simulate the dispersion of an oil spill accident.

VLab #3: Carbon-Plankton Dynamics **Partners involved: VLIZ (Lead), OGS (Contributor)**	
Ambition & Scope	The NPZD (Nutrient-Phytoplankton-Zooplankton-Detritus) VLab was developed in the pilot Blue-Cloud project based on near real-time data of phyto- & zoo-plankton abundances and environmental parameters and tested and validated for the southern part of the North Sea. The current version of the model does accurately predict phyto- & zoo-plankton biomass based on the abiotic conditions provided. Phytoplankton (as Chl-a) in the NPZD model runs in nitrogen units. However, this model does not integrate any different data than the ones used to predict NPZD biomass.
Beyond SotA / Innovation	This NPZD model integrates additional data from other regions, and includes a carbon sequestration component. It will optimise biogeochemical models to investigate physical-biological interactions and obtain insights about the influence of human interventions on the functioning of the ecosystem.
How Blue Cloud 2026 achieves Innovation	The model will be converted to run in carbon units, allowing to integrate carbon information (carbonate system concentrations and fluxes from ICOS Belgium stations BE-SOOP-Simon Stevin & BE-FOS-Thornton Buoy) to understand better the interactions between nutrients availability, primary /secondary productivity, organic matter degradation and exchanges with atmosphere and rivers. The model will be applied with data from other marine regions outside the original study area MIRAMARE in the Northern Adriatic Sea.

VLab #4: Marine Environmental Indicators Partners involved: CMCC (Lead), OGS, INGV, KNMI (Contributors)	
Ambition & Scope	This VLab will allow users to monitor and assess the environmental status of marine areas and support the decision-making process for the ocean management. Multiple data sources will be exploited in a unique data analysis service, which will allow the online computation of indicators..
Beyond SotA / Innovation	Functionalities developed in the pilot Blue-Cloud will be improved, including new data sources (physics, biogeochemistry, biology, chemical data) and new algorithms. The tool will calculate online metocean information and indicators on the environmental quality of the Mediterranean Sea and Global Ocean, using input from BDIs, also improving uncertainty evaluation.
How Blue Cloud 2026 achieves Innovation	A set of metocean environmental indicators will be defined according to available datasets from BDIs. For each indicator, an analysis and production workflow will be implemented, or further developed and tested, applying big data analysis methods on the multi-disciplinary data sets.

VLab #5: Global Fisheries Atlas Partners involved: IRD (Lead), FORT, CNR (Contributors)	
Ambition & Scope	The Global Record of Stocks and Fisheries (GRSF) and the Fisheries Atlas (FA) VLabs developed in pilot Blue-Cloud are already operational. GRSF is a knowledge management VLab dealing with best practices by implementing Semantic Web technologies. FA is a spatial data management VLab, complying with OGC standards to manage syntactic interoperability. The VLabs will be extended to capture fisheries data and environmental parameters on a global scale.
Beyond SotA / Innovation	The GFA VLab will provide a **single and FAIR-compliant entry point** for end users to discover, access and understand the **state of stocks and fisheries worldwide**. GFA will combine GRSF and FA ,thereby integrating and harmonising new datasets relevant for fisheries variables.
How Blue-Cloud 2026 achieves Innovation	The current R-based data workflow will be strengthened to become more robust and more generic. Extensive use of OGC standards for spatial (meta)data management will foster data discovery, interoperability, and reuse. Standard data formats and access protocols will be used to disseminate new datasets and DOIs will be assigned to ensure their long-term availability and citation. Semantic interoperability will be facilitated by knowledge management technologies.

Table 1 – The 5 Blue-Cloud 2026 Virtual Labs (VLabs)

Another set of use cases are **three big data processing WorkBenches.** These will facilitate to generate validated and harmonised data collections for selected Essential Ocean Variables (EOV) for **physics** (Temperature & Salinity), **chemistry** (Nutrients, Chlorophyll, Oxygen), and **biology** (plankton biomass and diversity). These tasks are computationally intensive and currently performed on small chunks of data, each handled by a different expert. The challenge is to develop **cloud-based WorkBenches**, using big data technologies, data lakes, and specialised cloud-based software tools (e.g. WebODV, DIVAnd, Machine Learning based models), by which data validation, integration, and removing duplicates could be done more efficiently and collaboratively. The Blue-Cloud WorkBenches will be validated for selected oceanic regions and documented and published as GitHub resources which can be adopted and scaled up for generating much larger (e.g. global) data products. The Blue-Cloud 2026 environment will act as incubator for developing, testing, and publishing these cloud-based analytical workflows, which will be very relevant for the evolution of European operational services such as those in EMODnet and CMEMS (Copernicus), and for the future Digital Twin of the Ocean (DTO). To achieve this, efficient and smart use will be made of the planned expansion of the Blue-Cloud VRE, federating additional computing, storage, and algorithmic resources from EUDAT, WEkEO, EGI, and JERICO-CORE next to those already existing at D4Science as part of the pilot Blue-Cloud VRE. The development of the three EOV WorkBenches will involve scientific experts from EMODnet, CMEMS, and selected BDIs, together with Blue-Cloud technical experts. Qualified datasets from multiple sources, such as the Blue-Cloud BDIs, Data Lakes and selected international resources will be used. The processes might set new FAIR requirements for the data streams. Finding solutions will contribute to improving the overall FAIRness of the services of Blue-Cloud and BDIs.

Title	EOV WorkBench for physics: temperature and salinity Partners: INGV, Ifremer, Pokapok, Oceanscope, HCMR
Ambition & Scope	This WorkBench will implement a cloud-based workflow to generate harmonised, validated and customisable EOV data collections for temperature and salinity, integrating datasets released from different EU and non-EU data infrastructures for the test region of the Mediterranean Sea. The optimised workflow will allow to rapidly/systematically derive and upgrade integrated data collections and generate gridded climatologies. The WorkBench will deliver the data products (data collections and climatologies) and the cloud-based workflow in Open Access to users and big data infrastructures for uptake.

Title	EOV WorkBench for physics: temperature and salinity Partners: INGV, Ifremer, Pokapok, Oceanscope, HCMR
Present situation	• Set of validated temperature and salinity datasets are available from the main marine data infrastructures (Copernicus, SeaDataNet, World Ocean Database). • Mediterranean Sea gridded climatology from SeaDataCloud project obtained with DIVAnd tool integrating for the first time Copernicus and SeaDataNet data using ODV tool. • WebODV tool not ready to import all the input datasets and to map the different metadata into a common framework before their integration. • The integration process generates duplicates of different kinds that are not handled automatically.
How	The definition and implementation of an efficient production workflow will merge multi-source data sets to obtain an integrated and most complete dataset for the Mediterranean Sea to derive gridded climatologies. The existing tools ODV and DIVAnd will be improved to match the processing scope, but the analysis of other existing tools and solutions will be conducted to automatize all the processing phases (mainly the duplicates issue) and further enhance the final workflow efficiency.
Expected impacts	• Data from the main existing marine infrastructures will allow rapid and easy integration through the WorkBench to generate updated added-value data products, maximising their temporal and spatial coverage and increasing their accuracy. • The implemented operational WorkBench will be transferable to any marine big data infrastructures to further advance the quality of derived products and applications including generation/update of ocean climatologies and monitoring indicators. • The metadata analysis of the multi-source input data will allow feedback to the marine data infrastructures about their FAIRness, data interoperability, information on detected data anomalies.

Title	EOV workbench for eutrophication: chlorophyll, nutrients, oxygen Partners: OGS, Ifremer, Pokapok, SMHI
Ambition & Scope	Providing a toolbox, workbench, configurable by the user, to build customizable datasets from different combinations of corrections or QC procedures and to compute various statistical parameters to assess the consistency of observed and derived quantities.
Present situation	Several datasets in different data infrastructures with their own QC/QA synchronised manually.
How	• Definition and implementation of an efficient production workflow that will merge multi-source datasets to obtain an integrated and most complete dataset for the North East Atlantic; • Comparison of EMODnet chemistry and Copernicus marine in-situ QC methods to provide a set of procedures depending on regions and/or user's aims; • Testing the statistical parameters to i) evaluate the consistency of the initial input dataset and ii) to compare the data selection obtained after applying different QC strategies.
Expected impacts	• Highly qualified EOV datasets for eutrophication variables useful to a large community of users; • Tools and workflow available to qualify automatically and easily datasets from any region and transferable on any big data infrastructure; • Prototype using the capacity of big data technologies in the enhanced operational services.

Title	WorkBench for ecosystem-level EOVs Partners: ETHZ, SU, EMBL
Ambition & Scope	This WorkBench will improve the availability, quality and interoperability of large collections of plankton observations based on traditional counts, quantitative imaging and genomic methods available from the EMODnet/EurOBIS and ELIXIR data infrastructures. It will develop a generic modelling pipeline in Blue-Cloud 2026 to generate high-quality interpolated maps of the global distribution of these plankton entities. Il will provide a sustainable pipeline for production of ecosystem level EOVs following clear QA/QC steps and according to best practices in habitat modelling.
Present situation	• Limited availability of QA/QC'd, harmonised and interoperable biological information from traditional, imaging and genomics data streams; • Lack of generic approaches and pipelines to model ecosystem-level EOVs using different data types, spatio-temporal scales, and environmental predictors; • Lack of community standards and best practices about the generation and quality assessment of biogeographic data using modelling and machine learning.
How	Selected curation and analytical pipelines (EMBL, SU) will generate QA/QC and interoperable data tables about the occurrence and/or abundance and/or biomass of taxonomic entities (organisms) and functional entities (plankton functional types, morphological traits, functional proteins or metabolic

	pathways). A modelling pipeline (developed by ETHZ and SU) will combine plankton data from existing databases (OBIS) and the new MGnify and EcoTaxa pipelines with environmental climatologies available from data infrastructures, such as Copernicus and NOAA (World Ocean Atlas). A dashboard will monitor the progress of the modelling pipeline at each analytical step, report the quality assessment metrics, and visualise/inspect modelling results.
Expected impacts	The collection of marine ecological data is increasing at an exponential rate. Gigabytes of new data are generated every day, and their integration across methods and scales is imperative in order to take full advantage of their potential and further our understanding of marine ecosystem structures and functions. By transforming this data into knowledge, we address policy and societal challenges associated with the description, preservation and restoration of marine diversity. More specifically, the proposed WorkBench will generate global distributions of EOVs that are tailored to assess the potential vulnerability of marine ecosystems to anthropogenic climate change.

Table 2 – The three Blue-Cloud 2026 EOV WorkBench use cases

1.2.4. Blue-Cloud Training Academy on FAIR data

Blue-Cloud 2026 will also put training and capacity building under the spotlight, as it is essential to improve the quantity, quality, accessibility, interoperability, and usability of marine information for decision making, enabling new opportunities in the maritime sectors, for the benefit of citizens. These drivers and goals set the requirements for an improved ocean data management. To meet these needs, the EuroGOOS Data Management, Exchange, and Quality (DATAMEQ), has been operating for over 10 years, to guide EuroGOOS in situ data management considering the existing systems, propose solutions to unlock data for operational and research purposes, and deliver standards matching the FAIR data principles. Capitalising on national and European projects and programmes, in situ data FAIRness has significantly advanced in some domains. This includes better harmonisation, interoperability, and integration of data and metadata services at regional or observing networks level. DATAMEQ has helped to improve common reference vocabularies, transfer knowledge and best practices among initiatives, and define recommendations for data providers. However, the latest DATAMEQ survey has shown that more training and capacity development on FAIR data is needed in ocean science.
Blue-Cloud 2026's efforts on training are described in detail in section 2.2.2.1.

1.2.5. Related projects and activities

The positioning of Blue-Cloud 2026 demonstrates a major synergy at **European level**, as the Blue-Cloud already federates leading European blue data infrastructures, such as CMEMS, EMODnet, and several RIs and e-infrastructures. In Blue-Cloud 2026, these federations will be significantly expanded and advanced, see Table 3 below.

Table 3 – Related projects and activities

This way, there will also be relations with many ongoing projects in which those infrastructures are involved, as well as more solid collaboration with international initiatives in marine science and beyond. **Synergies will be put in place**, as part of WP6 activities, **with a range of ongoing or soon to be started H2020 & Horizon Europe projects**. Moreover, technical alignments envisioned in WP5 and WP2 with initiatives in the EOSC and Destination Earth ecosystems, in which several members of the Blue-Cloud 2026 consortium are involved, will be carried out. Some relevant examples of these can be found in the table below. Collaborations will be established with the new batch of projects funded under the "Transparent & Accessible Seas and Oceans: Towards a Digital Twin of the Ocean" topic.

1.2.6. Inter-disciplinary approach

Interdisciplinarity is fully embedded in the basics and methodology of the Blue-Cloud 2026 project. Aquatic data include a wide range of observations and derived variables, originating from a multidisciplinary spectrum of operators from research institutes, governmental organisations, and private companies. Such a context requires by its very nature an interdisciplinary consortium, In Blue-Cloud 2026, experts in physical, biological, and biogeochemical data, will apply ecological and molecular research in aquatic ecosystems, working side by side with data scientists, computer engineers, and programmers. In particular VLabs 1-3 will investigate the influence of the river inputs on coastal areas in their research. The Blue-Cloud 2026 project structure itself will ensure that a natural collaboration arises among the disciplines as they must necessarily work together to achieve common approaches, integration of services at the Blue-Cloud DD&AS and VRE, and meaningful analytics.
The further development of the Blue-Cloud DD&AS, providing federated discovery and access by downloading and sub-setting from multiple BDIs, each with their specific types of aquatic datasets and data products, will give interdisciplinary challenges. Thereby, differences in use of vocabularies should be overcome by semantic brokering, which will require mappings between the vocabularies, involving multiple domain experts. In addition, the Blue-Cloud VRE as an integrated platform for combining different data sources, algorithms, and computing resources is configured for supporting multi-disciplinary and inter-disciplinary research as needed for establishing the planned use cases and supporting the development of solutions for many other aquatic challenges in the near future as part of the open Blue-Cloud invitation to external researchers.
The inter-disciplinary communication process in the project will be further coordinated and stimulated by having a Scientific and Technical Committee (STC), chaired by the Blue-Cloud Technical Coordinator, that will bring together, at different project stages, all partners that are involved in the Work Packages WP2 (Data access - DD&AS), WP3 (EOV WorkBenches), WP4 (VLabs), and WP5 (Analytics platform - VRE). This way, the STC will strengthen the project inter-disciplinarity next to the overall project management activities and individual WP management.

1.2.7. Do not significant harm

The research and innovation activities of the project do no support or carry out activities that make a significant harm to any of the six environmental objectives as defined by the EC in Article 17 of the EU Taxonomy Regulation.

1.2.8. Gender dimension

The services (data, applications, compute, support, training) and any of the research and innovation content do not have any gender-specific characteristics and therefore gender dimension does not apply.

1.2.9. Open Science

In Blue-Cloud 2026, open science will be promoted and pursued as a high priority, and deployed as follows:
Open Data: The Blue-Cloud DD&AS activities, including the establishing of Data lakes, concern making aquatic datasets from multiple BDIs discoverable and accessible for both internal and external users. Its online services will provide open access to a range of existing aquatic data repositories, which are managed and maintained by the various BDIs, and federated as part of the Blue-CloudThe contents of the DD&AS will be regularly exchanged with the B2FIND Data Catalogue service at the EOSC Marketplace to reach out to potential EOSC users.
Open Analytical services: The Blue-Cloud VRE will host a range of analytical software services, which will be documented as services in the Blue-Cloud catalogue. They will be described with metadata, which will allow users to easily browse through the available services and find their ways for interacting with the services. These metadata entries will also be shared with the EOSC Services Catalogue, inviting EOSC researchers to come onboard. As such, the analytical tools will be readily available to both internal and external users that will exploit the open accessible documentation and training material to make optimal use of these for their scientific challenges.
Open Access: Besides providing open access to the Blue-Cloud VRE platform, the project will provide user support in the form of training material, technical guidance, and a support desk for researchers who wish to make use of the VRE services. Documentation and training material will be prepared and made available as part of the Training Academy in cooperation with the Ocean Best Practices System (OBPS) international initiative co-sponsored by the Global Ocean Observing System (GOOS) and the International Oceanographic Data and Information Exchange (IODE). Submitting Blue-Cloud Best Practices to OBPS will allow to reach a global community. Moreover, training materials will also be distributed globally as part of IODE's Ocean Teacher programme (OTGA). Staff at CNR will run a support desk for VRE questions, MARIS will run a support desk for DD&AS questions, while other questions such as about BDIs and their services will be directed to the appropriate Blue-Cloud contacts.
Open Knowledge: Analytical results and applied work flows from the development and running of the VLabs and WorkBenches will be documented with metadata in the Blue-Cloud catalogue and as such made available for users, internally and externally, as part of open knowledge sharing. This approach will strengthen the transfer and uptake by internal and external researchers, and will enhance transparency. The public Blue-Cloud project deliverables will also be shared via the Blue-Cloud catalogue and in OpenAIRE Zenodo.
Open Provenance: every process hosted by the Blue-Cloud VRE will be equipped with an actionable unique identifier that can be used for citation and access purposes making the as-a-Service standard-based approach

(processes are exposed by the standard OGC Web Processing Service) a reality for any provided process (e.g. scripts, compiled programs, algorithms, computing methods) written in any programming language (e.g. R, Java, Fortran, Python). The automatic production of a detailed provenance record (by the PROV-O standard format) for every analytics task executed by the Blue-Cloud VRE will allow a user to reproduce and repeat the task and to share it by enabling effective collaboration among users.

1.2.10. Data Management Plan

The formulation of a Data Management Plan (DMP) as part of WP1 is foreseen in an early stage of the project (D1.2 "Data Management Plan", M03), following the Horizon Europe FAIR DMP template. An analysis will be made of the different types of datasets in the project, both original versus processed and generated, and their recommended data management solutions, interacting with use case owners & technical developers of the Blue-Cloud key services. The DD&AS activities in WP2 are dedicated to establishing a federated discovery and access, both by downloading fixed data objects as well as sub-setting and downloading data slices, to aquatic data resources, managed by a range of BDIs. The activities include a FAIRness assessment of existing BDI and Blue-Cloud services and are aimed at further improving and optimising FAIRness of those services, for instance by adding semantic interoperability, thus improving metadata of input datasets and associated services at the Blue-Cloud and individual BDIs.
Another part of the DMP concerns the handling of output datasets, i.e. the results from analyses and computations from the various use cases. These results and their processing steps will be documented with metadata in the Blue-Cloud Catalogue that will allow users, internally and externally, to review and re-run VRE processes. The methodology and standards adopted will be described in the DMP. DOIs might be used for specific results, which also will be shared with other external repositories, such as OpenAire, EOSC, and others. The latest Creative Commons licence will be associated with the data and research output.
Lastly, Blue Cloud 2026 will deal with personal information concerning all project participants, end-users of the various pilots/use-cases/demonstrators, members of ESEB and citizen scientists and other community members engaged via events, outreach initiatives, the blue-cloud.org portal, and via social media. All information will be kept confidential under the privacy statement and terms & conditions that will be implemented on the operational website www.blue-cloud.org (Trust-IT Srl will be Data Controller and all the Consortium Partners will be Data Processors).

2. Impact

Blue-Cloud 2026 will **intensify the work around collaborative Open Science in marine research** and provide solid cross-disciplinary assets in support of the EU Mission Ocean of a sustainable Blue Economy. It develops a **thematic marine extension to EOSC for open web-based science**, & serves needs of the EU Blue Economy, Marine Environment and Marine Knowledge agendas. It participates to the evolution of the Digital Twin of the Ocean, fostering harmonisation between key elements of the EU Digital Strategy and in contributing to key policy discussions. Advancing within the UN Decade of Ocean Science for Sustainable Development, Blue-Cloud 2026 will strengthen its position as a trend-setter and influencing actor and its assets will support progress in key areas of the Sustainable Development Goals, especially ***SDG2*** *(Zero Hunger)*, ***SDG13*** *(Climate Action)* and ***SDG14*** (Life Below Water).

2.1. Project's pathways towards impact

Blue-Cloud 2026's strategy for ensuring broad pathways to impact consists of: a) involving **leading partners in ocean science and ICT** for guaranteeing sustainability, b) linking to leading EU Blue Data Infrastructures, serving as channels **to promote uptake of project assets among thematic communities**; c) **providing assets with a lasting legacy** in the context of the Ocean Decade, and future efforts in marine research; d) providing wider societal involvement on critical issues under the Ocean Literacy umbrella.

2.1.1. Unique contributions in relation to the specific topic of the call, and wider impacts

The table below summarises the main impacts of Blue-Cloud 2026 vis-à-vis the outcomes expected by the EOSC-01-03 Call Topic, strongly positioning this proposal from a scientific, technological and societal point of view.

Expected Outcomes from HORIZON-INFRA-2022-EOSC-01-03 call topic
SEAMLESS INTERACTIONS BETWEEN EOSC, OPERATIONAL DATASPACES OR ENVIRONMENTS *(e.g. EMODnet, Copernicus Marine Service, Global Ocean Observation System (GOOS), etc.), researchers & other stakeholders contributing to restoring healthy oceans, seas, coastal and inland waters to store, share, access, analyse & process research data & other research digital objects from their own discipline, across RIs, disciplines, national borders.*
Outcome #1 ***Blue-Cloud 2026 DD&AS federating unprecedented amount of Blue Data Infrastructures (BDIs)*** *- Technological:* A common interface where users can employ AAI login credentials **for discovery and retrieval of data sets and data products** from federated BDIs, with facilities for mapping, viewing locations of data sets,

Expected Outcomes from HORIZON-INFRA-2022-EOSC-01-03 call topic
users may compose and submit mixed shopping baskets requesting data sets from multiple BDIs. Roll-out of BDIs into **EOSC provider onboarding programme & related dashboard**. *Outcome #2* ***Blue-Cloud 2026 virtual data analysis platforms*** *- Technological:* The platforms (VLabs), based on cloud technologies using big data tools, include common SW components & libraries and will allow collaborative SW development services and online data analyses. Cloud (parallel) data access and processing facilities services available thanks to the **Blue-Cloud 2026 IT resources (data lake, cloud computing, cloud technologies, software repositories)** will allow data analysis on very large data volume with a high level performance. VLabs demonstrate their capabilities due to **cloud & big data technologies**, not possible with traditional ones. *Outcome #3* ***Revamped Blue-Cloud Virtual Research Environment (VRE)*** *- Technological:* Blue-Cloud VRE *(powered by D4Science & EGI)* will be expanded by federating multiple e-infrastructures *(WEkEO, EUDAT, JERICO-CORE)* in support of Analytical Big Data WorkBenches and VLabs. Enhanced integration in EOSC ecosystem for marine researchers with AAI credentials to exploit an expanding DB of datasets/services.
Wider impacts *Blue-Cloud federated data space is available through EOSC Core service and its BDIs are onboarded as EOSC providers. Service costs, maintenance and operation model of the Blue-Data Federation are detailed and available for EOSC sustainability model as a sample for other data federations. Economies of scale are met for storage, resources, tech support and assistance and AAI federation.* ***Target stakeholder group(s): SG#1, SG#2, SG#3, SG#4, SG#5, SG#6***
OPEN AND FAIR DATA IS THE NEW NORM FOR RESEARCH CONTRIBUTING TO RESTORING HEALTHY OCEANS, SEAS, COASTAL AND INLAND WATERS
Outcome #4 ***Blue-Cloud Data Federation*** *- Scientific:* Creation of the widest federation of 14 EU BDIs combining different fields of marine science, allowing cross-disciplinary research in support of restoring our ocean and seas. *Outcome #5* ***Training and trained communities*** *- Scientific:* Blue-Cloud Training Academy draws on successful experiences i.e.: EuroGOOS, contribute to **capacity building on long term data stewardship,** sharing of FAIR data. FAIR principles uptake across sectors of marine science within the Blue-Cloud 2026 framework.
Wider impacts*:* Training supports reuse of open data by citizen scientists & marine science enthusiasts, and contribute to the promotion of ocean literacy ***Target stakeholder group(s): SG#1, SG#2, SG#3, SG#6, SG#7.***
EU-WIDE SHARING OF RESEARCH DATA RELEVANT TO THIS AREA IS SHOWN TO BE A CRITICAL MECHANISM TO FACILITATE OCEAN AND WATER RESTORATION ACROSS MS & AC*;*
Outcome #6 ***Virtual Labs as demonstrators*** *- Scientific:* VLabs demonstrate the value of Blue-Cloud 2026 by developing innovative data products or tools using the VRE and its services, integrated in Blue-Cloud VRE, and interact with the other components (*semantics, data lakes, Workbenches*) making use of its analytical services. Being able to harmonise different data types from different BDIs, producing scientific results is a common goal. *Outcome #7* ***VLab 1: "ICOOE: Unlocking the potential for integration of Coastal Ocean observations along Europe*** *- Scientific:* 3 Thematic Services will widely expand users' ability to access and integrate observations collected along Europe's coastal ocean, building new knowledge on key scientific and societal questions and challenges, supporting researchers, Blue Economy actors, environmental managers and crisis response, addressing specific needs and strongly encouraging users to involve their own observations and tools. *Outcome #8* ***VLab 2: "Coastal currents from observations"*** *- Scientific:* This VLab provides an easy to reproduce and well documented workflow based entirely on **portable open-source software** to derive integrated ocean currents from different measurement platforms. Users have access to a preconfigured working environment where the example use case can be easily reproduced and adapted to other domains, allowing to apply it to other datasets. *Outcome #9* ***VLab 3: "Carbon-Plankton dynamics*** *- Scientific:* Expansion of the Nutrient-Phytoplankton-Zooplankton-Detritus (NPZD) model with a module about carbon sequestration potential will allow for the integration of carbon flux observations to quantify region-specific potential for sequestering carbon, **i.e., the blue carbon**. Tools produced visualise productivity patterns, carbon fluxes, carbon sequestration potential, and plankton dynamics. They inform policy makers on the potential impact of altered human activities on the biogeochemical functioning of the ecosystem. *Outcome #10* ***VLab 4: "Marine Environmental Indicators"*** *- Scientific:* This VLab will support users in the MSFD and Blue Economy. The web application allows seamless exploitation of products/data from existing infrastructures (*CMEMS, C3S, EMODnet, etc.*) inside an online analysis and distribution service, offering flexible & performing capacity to generate new added-value products in big marine data, from Regional to Global scope. *Outcome #11* ***VLab 6: "Global Fisheries Atlas"*** *- Scientific:* Global FAIR fisheries data for researchers & general public. For some important fisheries (e.g., Tuna), data will be made available with DOIS, FAIR services and dedicated Atlases for the general public. Further develop SotA technologies for FAIR knowledge management in GRSF (Semantic Web), R-based, ISO/OGC compliant fisheries data management of the Fisheries Atlas.

Expected Outcomes from HORIZON-INFRA-2022-EOSC-01-03 call topic
Outcome #12 ***A set of workbenches tested for different usages, generating harmonised Essential Ocean Variables in physics, chemistry and biology*** *- Scientific*: The workbenches will provide harmonised and consistent EOVs datasets for the rapid and systematic generation of the best derived data products. Very large volumes of data from various sources will be integrated thanks to data lakes and big data technologies.
Wider impacts*:* Use cases and WorkBenches cover a wide range of topics related to marine ecosystems and data types (*physical, biological, chemical, in-situ and remote data, etc.*) which are relevant also beyond ocean science. Results will contribute to key int'l challenges, including UN SDGs *Life Below Water*, *Climate Action*, *Zero Hunger*. ***Target stakeholder group(s) SG#1, SG#2, SG#3, SG#4, SG#5, SG#6***
EOSC GROWS INTO A TRUSTED RESEARCH AND INNOVATION DATA SPACE & SERVICE PLATFORM IN EUROPE THAT SUPPORTS THE INTERDISCIPLINARY RESEARCH COMMUNITY INVOLVED IN THIS MISSION AREA
Outcome #13 ***Blue-Cloud as an EOSC thematic cloud*** *- Technological:* Blue-Cloud 2026 will provide the thematic marine extension to EOSC for **ocean science community** (complementing efforts such as ENVRI FAIR). *Outcome #14* ***Community of users and practitioners*** *- Scientific:* The Blue-Cloud 2026 **user community** will be further expanded due to a range of interactive activities & a communication strategy with campaigns (See 2.2.2)
Wider impacts*:* EOSC gains visibility in the marine science community, one of the longest standing, richest domains for data in EU research. Increased level of trust in EOSC services in the marine community, contributing to wider uptake across the board. Conversely, Blue-Cloud increases visibility via EOSC. ***Target stakeholder group(s) SG#1, SG#2, SG#3, SG#5, SG#7***
CONTRIBUTE TO THE HORIZON EUROPE EOSC PARTNERSHIP AND OTHER RELEVANT PARTNERSHIPS RELATED TO RESTORING HEALTHY OCEANS, SEAS, COASTAL AND INLAND WATERS.
Outcome #15 ***Alignment of policies, administrative and interoperability principles guiding the integration of the European digital geospatial ecosystem required to support the objective of restoring healthy oceans, seas, coastal and inland waters into EOSC*** *- Societal:* Blue-Cloud 2026 will catalyse a sustained, long-term dialogue towards evolving a collaborative community of practice to be grounded around long-term EU marine data infrastructures (CMEMS, EMODnet) and RIs, but also open and inclusive to reflect the complexity of the EU Marine Knowledge Value Chain and key, emerging initiatives (*i.e., EU DTO, EU Green Deal Data Space, DestinE*). The results will contribute guidance and draw policy recommendations with research-to-market oriented initiatives, such as the Sustainable Blue Economy Partnership and FAO Blue Transformation priority program. *Outcome #16* ***Technical interface with DTO*** *- Technological:* A dedicated Task Force works on alignment with the Digital Twin Ocean, responding to the need for a more **integrated digital landscape for ocean science**.
Wider impacts*:* Through the implementation of this action, the value of environmental (Ocean, seas, coastal and inland waters) observations will be greatly enhanced, accelerating their transformation by the wider EOSC community into actionable intelligence enabling digital solutions in support of the EU Green Deal, contributing to wider impacts pursued by Horizon Europe (ie: ensuring food and nutrition security, climate neutrality). ***Target stakeholder group(s) SG#1, SG#2, SG#3, SG#5, SG#6***

Table 4 – Specific contributions of Blue-Cloud 2026 to the expected outcomes and scope of the Call Topic

2.1.2. Overcoming barriers for impact

The project has the goal of creating significant societal, scientific and industrial impacts, with some being achievable within the lifecycle of the project (the short-term ones /expected outcomes), and others (the long-term ones/ expected impacts) after mass adoption of the project tools and technologies and services. Combined with the fact that Blue-Cloud 2026 has a clear view and role on delivering marine and maritime research and innovation, and being an essential player for achieving the EU's ambition to become climate-neutral by 2050. Moreover, the project will evolve its results and enter the market as a prominent **FAIR by design, data facilitator for marine data accessibility and exploitability**, there are a number of factors which need to be considered by the consortium for the sustainability of the platform. Apart from the pre-identified risks (section 3.1e) there exist a few barriers which could hinder the achievement of these impacts. The most important of them are presented in the form of the following PEST analysis.

P - Political factors	E - Economic factors
• **Lack of coordination between policy actors, BDIs, research infrastructures, and other relevant entities** → The consortium will set up an External Stakeholder Expert Board (ESEB) and a DTO Task Force specifically to facilitate this dialogue and accompany the development of Blue-Cloud 2026. • **Difficulty for uptake in specific communities due to lack of skills or language barriers** → The Training Academy will ensure that relevant training materials are produced under CC BY Licence and shared with local or domain-specific actors who	• **Lack of computing resources for external users** → WP5 can rely on a strong network of IT infrastructures across Europe, which can eventually come into play should there be need for more resources. Extra cloud resources have been budgeted for peaks (i.e. Hackathon). • **Need for cost-effective digital solutions in research and the blue economy** → The Blue-Cloud framework will be free at the point of use, providing quality data and services to researchers and professionals in the blue economy.

can eventually translate and/or use them to promote Blue-Cloud uptake in specific communities, e.g. aquaculture. • **National/European regulation that hinders innovation**→ the select ESEB members have influential ties & direct channels to national or EU governments.	• **Inadequate financing** →Blue-Cloud 2026 will tap into the EC's BlueInvest platform , the EATip and the Nor-Shipping Conference for customised support, visibility, access to investors and investment-readiness advice.
S - Social factors	**T - Technological factors**
• **Public attention about climate change, marine pollution, and other ocean issues might waver** → The Ocean Literacy campaign will ensure key global challenges linked to the ocean remain part of public discourse, not only in academia but also in society. This will be done through articles, multimedia content, Blue-Cloud TV, dynamic social media presence. • **Lack of citizen's engagement** → specific target activities tailored for **SG#7** will bridge this gap. The COS4Cloud citizen observatories are represented in the ESEB. • **Trust in an advanced and sustainable blue economy** → Blue-Cloud 2026 services can help blue economy actors operating in food, energy, transport and other sectors consolidate their reputation. A data-driven sustainable development is crucial for the entire sector and society at large. • **Difficulty of adoption of sustainable services due to citizen's habits & cultural barriers** → Blue-Cloud Training Academy is aligned with the launch in 2022, under the EU Maritime, Aquaculture and Fisheries Fund, of proposals on **blue careers** and a specific call for proposals on women aiming at increasing women's representation in the workforce and raising their profile in the formal governance of the blue economy, which Blue-Cloud 2026 will prioritise.	• **Delays or change of priorities or processes for the DTO** → Blue-Cloud has a dedicated liaison and a "DTO Task Force". At the same time, it aims to be perfectly operational without the full integration with DTO, in case the evolution of the latter happens to proceed at a different pace. • **Delays in an effective EOSC roll-out** → Blue-Cloud representatives will take part in relevant EOSC discussions. The Blue-Cloud framework will employ existing EOSC core services such as the federated AAI, and the relevant ones that become available during the project lifetime. Blue-Cloud services are going to be onboarded into the EOSC Catalogue. 2 ESEB members are active representative of EOSC. • **Incompatibility between parts of systems (lack of standards or poor compliance evaluation procedures)** → Blue-Cloud 2026 use cases make use already of global standardisation (ie: ISO, OGC, UN Global Compact etc). WP2 sets aside time to work on best practices around harmonising existing standards and requirements gathering for potentially new or revised standards.

Table 5 – How the Consortium will overcome barriers to impact creation

2.1.3. Scale & significance of the project's contributions to the expected outcomes & impacts

The impacts generated by Blue-Cloud 2026 have a relevant scale from a EU point of view, as summarised below.

Impact	Assumptions	Scale	Significance
1. DD&AS **Blue-Cloud as access point of EU-wide marine & aquatic Open Access data resources**	Unprecedented amount of marine and aquatic datasets, data products offered to users via a unique entry point due to the largest Blue Data Federation in EOSC. Data are FAIR compliant and Open Access. BDIs are onboarded as EOSC providers.	**Large** 10M+ Datasets **14 Data providers** federated following semantic based rules & recognised standards EU/ int'l level (ISO/OGC).	**High** Better & broader use existing data resources, web-based services for multidisciplinary & collaborative research unique in the EOSC landscape.
2. VRE **3000+ users active on EOSC Thematic Open Science VRE**	Shared capacity of 3,650 CPU cores with 13.7 TB RAM & 0.6 PB persistent storage accessible via Blue-Cloud online gateway. Rich set of digital services for data access, management & analytics for for free **3000+ expected users.**	**Large** 1k expected sessions per month; (incl. 5K Sessions' peaks PM); 5K HTC data analytics jobs per month (incl. 25K Data analytics job peaks PM)	**High** The Blue-Cloud VRE will be integrated in the EOSC Core services, thus being available to 7M+ of researchers in Europe.
3. VLabs **Thematic Virtual Labs at disposal of specialised marine scientists**	VLabs work as real-life demonstrators of research products for plankton, fisheries, currents, river inputs, and marine environmental indicators, are innovative, relevant for understanding and modelling the future of marine ecosystems.	**Large** VLabs will be open to any new researchers wanting to test & adapt the labs to their research needs & develop additional VLabs. The Hackathon supports many newcomers in doing so.	**High** The VLabs cover a wide variety of domains in the marine field from the coastal and open ocean ecosystems, including biological observations: from plankton to fisheries, physical observations: such as ocean currents, etc.
4. EOVs **Blue-Cloud 2026 workbenches**	The existing gap in EOVs in physics, chemistry and biology will be shortened, with 3 WorkBenches that generate new data series that	**Large** While selected & validated, the EOV WorkBenches will be published in Open	**High** The synergy between the Fisheries Atlas and the Global record of Stocks and Fisheries will meet the

Impact	Assumptions	Scale	Significance
as incubator for the future DTO	will remain at the disposal of EU operational services such as EMODnet and Copernicus.	Access to be adopted and scaled up for generating much larger data products.	growing expectations for FAIR services.

Table 6 – Scale and significance of the project's contributions to the expected outcomes and impacts

2.2. Measures to maximise impact

2.2.1. Draft plan for dissemination, exploitation, and communication

A co-ordinated, efficient and effective 42-month Communication, Dissemination, Outreach and Education Strategy is based on the SMART approach, with specific communication and exploitation campaigns for raising awareness of the project, its measurable results, the overall scientific benefits, impacts, and measures for reaching end-users and other stakeholders. The overall strategic goal is to **support engagement, impact creation and, ultimately, successful exploitation and sustainability** through regular outreach and tailored messages to the specific target groups. The following strategic elements characterise the Blue-Cloud 2026 Communication, Dissemination, Outreach and Education Plan:

1) Blue-Cloud2026 **assets**: the DD&AS, the VRE, 3 EOV Workbenches, 5 Virtual Labs, the Blue-Cloud Roadmap to 2030, the Training Academy, the Blue-Cloud 2026 Community.
2) The **public web portal**, online at www.blue-cloud.org since Month 1 in its revamped version.
3) **Four Outreach campaigns orchestrate the overall strategy for dissemination, exploitation, and communication**, providing the perfect mix of activities to converge diluted and clear messages, tailored to the needs and expectations of each target group.
4) **Marketing materials** produced regularly to provide the communication backbone of the Blue-Cloud 2026 initiative, delivering a clear message, modulated to the various Stakeholder Groups.

The 4 specialised campaigns that will be carried out from M01 through M42 are: Campaign 1: "Project communication & Ocean Literacy"; Campaign 2: "KERs dissemination, uptake & accessibility"; Campaign 3: "Training & education"; Campaign 4: "Synergies, EOSC & DTO". Employing a campaign-based approach will bring relevant benefits, in terms of both engagement and impact, from constant monitoring and consequent adjusting of the actions, to efficiency of the resources spent. A conservative budget for up to 20, focused marketing & comms pay-per-click initiatives to corroborate the 4 aforementioned campaigns has been set aside, see Sec. 3.1.10. Those actions shall be suitably complemented by activities sustaining the **joint & individual exploitation plans** from all consortia. A preliminary **timeline** encompassing the main dissemination, exploitation, and comms activities is reported below.

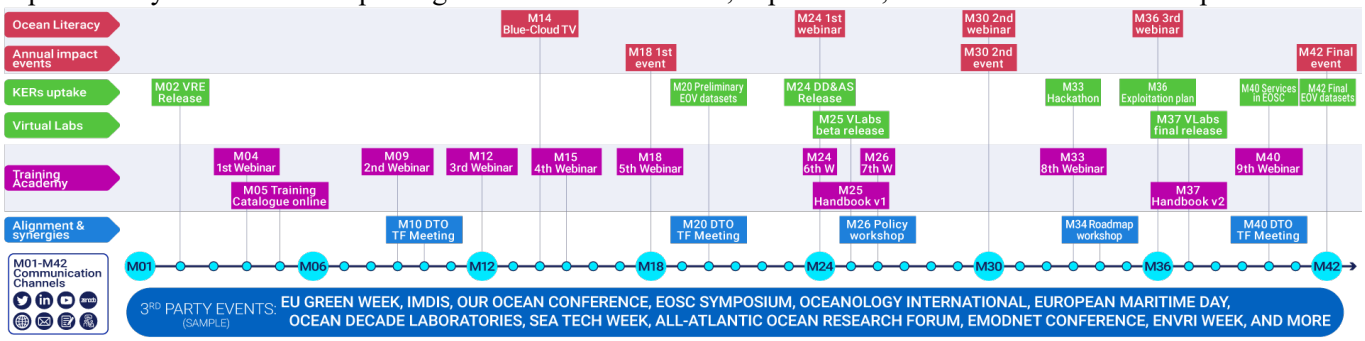

Figure 8 – Timeline of the Communication, Dissemination, Outreach, and Education Strategy

2.2.2. Dissemination and communication measures to maximise impact

Blue-Cloud 2026 will implement a 42-month communication strategy coordinated under WP6, tackling four major Outreach campaigns which will allow for an **agile implementation and assessment** of the activities across target groups, as well as for an **easy monitoring of the human and technological resources** needed. In the tables below, the campaigns, activities & impact KPIs are indicated.

Campaign #1: Blue-Cloud 2026 project communication & Ocean Literacy - **Purpose**: Ensure project's assets & results are communicated via its official channels with a consistent identity **Target stakeholders**: All stakeholders		
Tactic	**Function**	**KPIs**
Project branding	Build on the existing Blue-Cloud visual identity, consolidating awareness among relevant communities. Specific messaging will be tailored to target key audiences, using call-to-actions and branded communications. Promotional material designed and distributed	
	Measures: project branding package with logos, templates, and collaterals available	1 kit
	Blue-Data providers digital factsheets, eInfrastructure digital factsheets	12, 5
	Roll-up banners, posters	3, 8

	Number of printed copies & online downloads of flyers, Roadmap & policy briefings	5000	
Tactic	**Function**	**M12**	**M42**
Project public website	SEO-Driven Website showcasing project's assets, outputs and events, where all marketing activities are coordinated for a user-centric experience (UX). Achieving strong engagement through conversion-rate optimisation (CRO). All website analytics will be gathered on a customised dashboard, and tracked monthly. ***Measure: # sessions per month***.	>1k	>3k
Social media	The official Twitter, LinkedIn and YouTube channels will serve to engage stakeholders via multimedia campaigns & one-to-one interactions. ***Measure: followers across all platforms***.	3k	>5k
Newsletters	Provide key updates about project activities via email in a reader friendly format. ***Measure: # of newsletters published***.	4	18
Press Releases	Dissemination of newsworthy project results or events to engage relevant media and publishers in both the marine research and open science communities. ***Measure: # of press releases sent***.	1	5
Blue-Cloud TV	Short pitch-style videos and interviews with project partners, ESEB, activists & influencers will be distributed via the Blue-Cloud TV. ***Measure: # of video assets available***	1	>40
Multimedia content	Multimedia content framing Blue-Cloud assets within the wider Ocean Literacy context, encouraging citizen scientists and ocean science enthusiasts to pick up Blue-Cloud services, while strengthening Ocean Literacy in support of a sustainable future. ***Measure: # of video views***	300	1500
Ocean Literacy Webinars	Series of webinars to present projects results to non-technical public and citizens. ***Measure: avg. # participants / webinar organised.***	40	
PPC campaigns	PPC campaigns to broaden stakeholder reach, and increase YouTube subscribers. ***Measure: overall views per sponsored video***	20K	

Campaign #2: Key exploitable results (KERs) Purpose: **Disseminate project results while supporting their exploitation/adoption by stakeholders** Target stakeholders: SG#1, SG#2, SG#3, SG#4, SG #5 SG#6		
Tactic	**Function**	**KPIs**
Third party events	Participation in project relevant and domain specific research community events. ***Measure: active role in # events.***	40
Publications	Delivery of scientific papers & articles for journals and peer-review magazines, to disseminate the new knowledge and scientific/technical innovation produced. ***Measure: number of articles published in Open Access & peer-review magazines and journals***	5
Blue-Cloud Hackathon	Online competition where teams develop new ideas and/or applications addressing challenges that are relevant for the Blue sector, by capitalising on the services, methods and/or outputs generated within the project. ***Measure: number of participants***	120
Dissemin-ation of research results	Engagement with resources deposited in ZENODO will be fostered through targeted dissemination via multiplier channels and EOSC collaboration platforms. A KER template for each relevant output will be filled out and shared on the EC Horizon Results Platform. ***Measure: avg. downloads per individual resource.***	300
Factsheets	Each VLab will also be presented via a downloadable factsheet, featuring its key elements and benefits for stakeholders. These will be created after the first year of the project. ***Measure: Total downloads on Zenodo***	700
Final event	Final event to "pitch" project results to all SGs, in order to promote networking between different players and, consequently, the establishment of synergies. ***Measure: avg. # number of participants.***	300

Campaign #3: Training & Education **Purpose:** Ensure uptake of Blue-Cloud assets and contribute to the promotion of Ocean Literacy **Target stakeholders:** SG#1, SG#2, SG#3, SG#4		
Tactic	**Function**	**KPIs**
Training Academy	Series of online courses on how to make best use of Blue-Cloud services and VLabs, and on how to use and share FAIR data from marine RIs and data repositories ***Measure: avg. # number participants trained in all training sessions via EuroGOOS community, EMODnet ingestion, Ocean Teacher Global Academy and OBPS subscribers***	500
Catalogue of materials	The existing training materials from Blue-Data Infrastructures and from the Blue-Cloud 2026 will be collected and transformed into a structured & searchable online catalogue. ***Measure: # of docs gathered***	200
Webinars	Each of the 5 VLabs and the 3 EOVs WorkBenches will be presented in dedicated webinars over the course of the project. ***Measure: Avg. participants per webinar***	50

Campaign #4: Synergies, EOSC & DTO **Purpose:** Strengthen the dialogue and clustering with related initiatives in Europe and beyond

Target stakeholders: SG#1, SG#3, SG#5		
Tactic	**Function**	**KPIs**
Research Infra-structures collabor-ations	Blue-Cloud will get in contact with relevant initiatives in open science, marine research and blue economy to implement technical and outreach collaboration. These will include EU and global initiatives including the FIRMS fisheries networks, ILIAD system of systems for Earth data challenges applications, the MARIDA datasets for plastic debris observations, the JERICO-CORE Pilot infrastructure, DOORs for integration Black-Sea data, the AANCHOR initiative for collaboration with the Atlantic region, COS4Cloud for citizen science AI technologies. ***Measure 1: # of Collaboration agreement signed***	10
EOSC project align-ments	Cross-project activities will be carried out together with Blue-Cloud and EOSC-related projects to work on joint dissemination and enrich the exchange of information between EOSC infrastructures. ***Measure: # of new Blue-Cloud 2026 services published in the EOSC Marketplace.***	5

Table 7 – The 4 campaigns that will be carried out as part of the Comms, Dissemination, Outreach and Education Strategy

2.2.2.1. Blue-Cloud Training Academy and Training Catalogue of materials

The Training Academy will organise several internal and external training courses **on Best Practices for FAIR data principles (led by EuroGOOS & IEEE).** EuroGOOS will organise training courses, together with IODE-IOC OBPS and IODE Ocean Teacher Global Academy and EMODnet ingestion, aimed at informing and educating data providers and users. The training will focus on how to make best use of existing European RIs and data services for long-term data stewardship and wider use and sharing of FAIR data. Such training will not only help Blue-Cloud 2026 to ensure the provision of FAIR data but also contribute to the promotion and use of FAIR data to fill a broad range of needs. In addition, leveraging the existing Blue-Cloud training materials (webinar recordings, tutorials), a more structured course plan will be organised, (e.g., as combined in an Ocean Teacher Global Academy training). Courses will be delivered as online webinars, with recordings and proceedings made available via the Blue-Cloud public website for further uptake. The courses are indicated in the figure and further detailed below.

Figure 9 – Calendar of the training courses organised by the Blue-Cloud 2026 Training Academy

→ 3 Courses on Best Practices for FAIR data principles (M9, M12, M15) (EuroGOOS, IEEE, MARIS, SSBE);
→ 1 Info session on EOV WorkBenches and 1 webinar presenting the EOV WorkBenches and resulting data products (M24, M40) (IFREMER);
→ 2 Webinars about the Blue-Cloud VRE & another 2 about the DD&AS and the innovations introduced (M04, M12, M18, M26) (CNR, MARIS);
→ 1 info session on the Blue-Cloud VLabs (M06) and a series of training sessions (M26 and M33) on how to use the VLabs and their services (IFREMER, VLIZ) aligned with the Blue-Cloud Hackathon.

2.2.2.2. Stakeholder groups and multiplier channels (non-exhaustive list of examples)

The table below shows a sample of targeted stakeholders and related multiplier networks to maximise engagement.

SG#1 Blue data infrastructures and e-infrastructures: ICOS, GEOSS, EMODnet, EPOS, SeaDataNet, EurOBIS, Euro-Argo, ENA, EuroBioImaging, Copernicus, , ESFRIs, EUDAT, EGI, PRACE, GÉANT.
SG#2 Scientific, Research & Academia: EOSC Association, EOSC Portal, EOSC Future and INFRAEOSC-07 projects, EOSC Task Forces, INFRA-2022-EOSC-01 projects, Research EU Magazine, Journal of Web Engineering, Journal of Web Semantics (JWS), Journal on Digital Libraries (IJDL), Nature, Journal of the World Aquaculture Society, Fisheries and Aquaculture Journal, RDA.
SG#3 Ocean Observation, data and modelling institutions: ESFRI, GOOS, GEOSS, SECOORA, IOOS, National Centers for Environmental information, NEMO Community Ocean Model, European Marine Board, the MARIDA network, ILIAD system of systems and AI application managers and developers
SG#4 ICT institutions priority on AI, Machine Learning, Big Data & Visualisation: Destination Earth, ILIAD Digital Twin of the Ocean, GAIA-X, Ocean ICT, Ocean Tech
SG#5 Marine & Ocean Governance, Policy & National Bodies: GEO Blue Planet, G7 Future of Seas and Oceans Initiative, Ocean Panel Secretariat, EEA, EuroStat, EU Maritime Forum, EC Maritime Affairs.
SG#6 SMEs, Industry in the Blue Economy: EATiP, Waterborne, Marine SouthEast, Corallia Labs Explorer, BlueMed, DigiCirc, BlueInvest. FUGRO, Lobelia

SG#7 Civil society & citizens, NGOs, influencers and activists: EU4Ocean, COS4Cloud, The Ocean Clean Up AIRCENTRE Networking Fridays, One Ocean Foundation, CONNECT.

Table 8 – Multiplier networks and press & media channels utilised

2.2.2.3. Dissemination of results

Dissemination of results is a key objective in this project with a clear pathway from the development of results to targeted dissemination, up to impacts on stakeholder groups. A strong focal point will be the **web platform,** which will include the **Blue-Cloud D4Science Catalogue** for hosting services, datasets, and all outputs coming from the project and Virtual Labs, **and the specific strategies identified in the campaigns under 2.2.2**. Relevant outputs will be fed into **Zenodo**, the Blue-Cloud services within the **EOSC Marketplace**, selected **scientific publications and technical results** will also be presented and submitted to relevant journals of impact factor above 3.0, the **EC Horizon Results Platform** and present at international conferences and events. Training courses will be distributed via **EuroGOOS, EMODnet ingestion, Ocean Teacher Global Academy and OBPS** channels (T6.2). The Blue Cloud Federated Data space should be considered as an **EOSC Horizontal Service**, where we strive for SSO by using federated AAI.

2.2.2.4. Feedback to policy measures

Beyond knowledge transfer, a key objective of Blue-Cloud 2026 is to provide specific input, guidance and recommendations towards policy measures that can catalyse the integration of the European digital geospatial ecosystem required to support the EU Mission "Restore our Ocean and Waters by 2030" into **EOSC**, aligning with wider developments (EU Green Deal Data Space) and more specifically the EU DTO. Presence of representatives of key policy bodies, Horizon Europe (HE) Missions (DGs MARE, RTD, CLIMA, AGRI, MOVE), and policy-driven communities (i.e., Sustainable Blue Economy Partnership) will be secured in 3 policy workshops (WP7). A **DTO Task Force** will be set up to ensure complementarity of Blue-Cloud 2026 with ongoing Digital Ocean initiatives. Lessons learned from the use cases (WP3, WP4), Hackathon (WP6) and stakeholder consultations (WP7) will be captured and used to shape an evolved Blue-Cloud Roadmap to 2030 (*D7.4)*, including policy recommendations and enabling wider dissemination of results.

2.2.3. Project exploitation

All consortia are committed to both joint & individual exploitation. The full exploitation plan will be developed as part of WP7, positioning Blue-Cloud 2026 as a **dynamic environment, incubator of innovative services**.

2.2.3.1. Joint exploitation plan

Blue-Cloud 2026's joint exploitation plan will be built around the main **project assets**, which include:

- The **DD&AS, VRE,** and **VLabs**, for which end-user evaluations and satisfaction levels will be crucial elements to determine the future steps towards wider usage and to ignite commercial exploitation, with a sustainable service offering that will significantly further expand the community.
- The **EOV WorkBenches** will act as incubators for the future DTO and for the evolution of European operational services such as EMODnet and Copernicus. The WorkBenches will be available and expandable to sustainable big data infrastructure to be deployed at SeaDataNet, Copernicus or other data infrastructures.
- The **improved FAIRness** will make data more reusable and accessible to a broader audience, thus increasing the impact of the services and research potential as demonstrated in the VLabs.
- The **Blue-Cloud Training Academy**, equipping current and new generations of data providers and users in European oceanography with **new capacity in the development of a FAIR Digital Ocean and new FAIR Open data and analytical services**, both instrumental for succeeding in the Research partners' mandate of deepening research of the ocean, European seas, coastal and inland waters.
- Exploitation plans for the use cases and domain-oriented analytical services will help all partners to **identify potential users of interest for their business evolution**. Technical and operational requirements and resources needed for wider exploitation at an operational level will feed into the **Blue-Cloud Sustainability Plan**.
- And finally, **a Community of >3000 engaged stakeholders**, representing the bottom level of the Blue-Cloud 2026 value pyramid , which will serve as sounding board of technological feedback for Research and IT providers, open new business pathways via start-ups (i.e. coming out of the hackathon as per previous experience in Blue-Cloud), new ESFRIs created, new HE projects funded, and ultimately act as multiplier of an increased communication to the public of the importance of Open Access FAIR ocean science.

To support the joint exploitation and sustainability path, Blue-Cloud 2026 will maintain a strong engaging lever for increased stakeholder participation via its public website. **Onboarding of Blue-Cloud 2026 services and datasets in the EOSC Marketplace** and integration with EOSC core services will make the **thematic marine EOSC** a reality and serve the needs of an enlarged European Blue Economy, Marine Environment and Marine Knowledge community. This will further expand exploitation potential for Blue-Cloud 2026 assets and create new research & business opportunities for all Partners.

2.2.3.2. Individual exploitation plans

All Blue-Cloud 2026 partners are fully committed to implementing concrete exploitation roadmaps both during and after the project lifecycle, thereby ensuring long-term sustainability of results. The synthesis of individual exploitation plans is represented below. More detail will be produced in D7.3 Blue-Cloud Exploitation Plan.

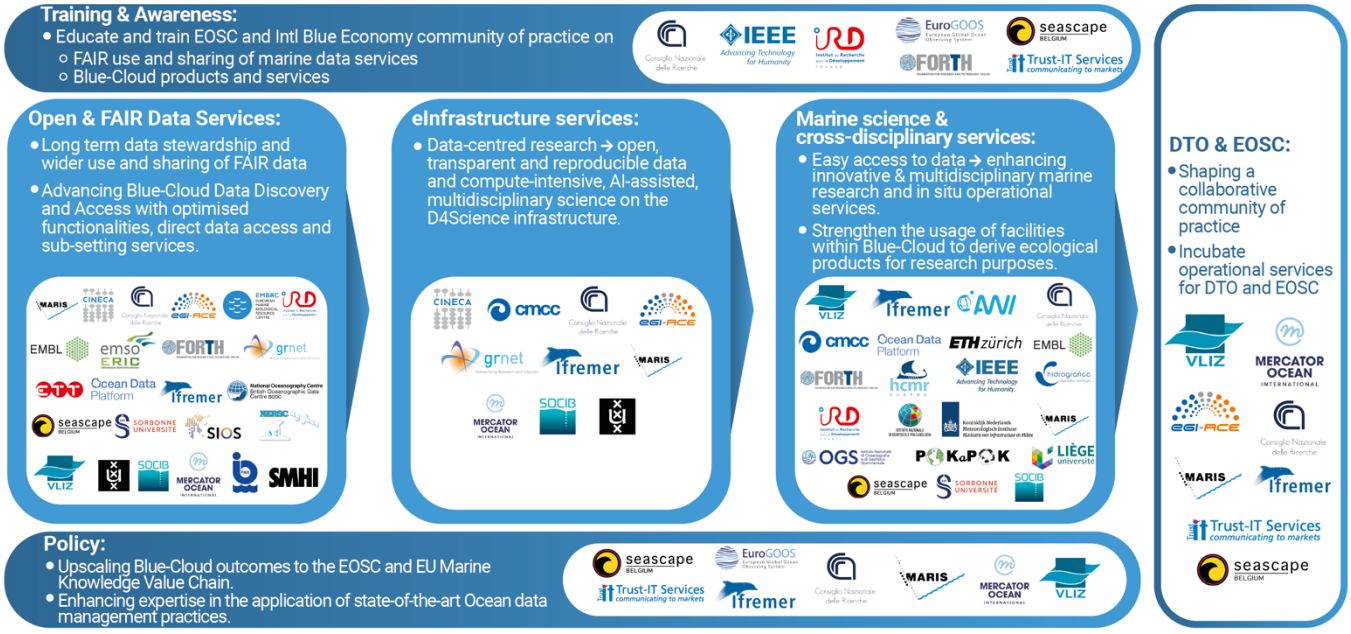

Figure 10 – Synthesis of the individual exploitation plans of the Consortium Partners on the value chain

2.2.4. Management of intellectual property

Blue-Cloud 2026 acknowledges the importance of intellectual property (IP) and its proper treatment. A project Intellectual Property Policy will be drafted by WP1 at the beginning of the project to clarify the rules, principles and recommendations in regards to the IP aspects of the Collaboration, based on the following main principles:

- Each Blue-Cloud 2026 partner owns the IP of outputs they created,
- The consortium will (non-exclusively) manage and exploit the IP for the benefit of the project.

As for licensing, the Policy will envision that, when permitted by the license terms and conditions applied, IP for relevant items will be licensed under an open-source license.

→ **About joint ownerships**. Results are owned by the partner that generates them. Joint ownerships apply if:

a) specific partners have jointly generated a result and
b) it is not possible to establish the respective contribution of each beneficiary or separate them for the purpose of applying for, obtaining or maintaining their protection.

Unless otherwise agreed:

- each of the joint owners shall be entitled to use their jointly owned results for non-commercial research activities on a royalty-free basis, and without requiring the prior consent of the other joint owner(s), and
- each of the joint owners shall be entitled to otherwise Exploit the jointly owned Results and to grant non-exclusive licences to third parties (without any right to sub-license), if the other joint owners are given at least 45 calendar days advance notice; and fair and reasonable compensation.

→ **VRE infrastructure.** The Blue-Cloud VRE exploits computational and storage resources, tools and services managed, operated and provisioned by D4Science.org (www.d4science.org). In particular, by exploiting the Analytics Computing Framework and the Storage Manager Framework, it is noted that the ownership of any intellectual property rights is not in any way transferred to D4Science.org. D4Science.org will not be responsible of any issue regulating intellectual property rights infringement or illegal use of user's data, methods, algorithms, workflows, and any other not mentioned digital resources shared through the Blue-Cloud VRE.

All the improvements, enhancements and modifications to the common services enabling the Blue-Cloud VRE will be released as components of the gCube framework (https://www.gcube-system.org/) licensed with the European Union Public Licence EUPL v1.1 open-source licence.

→ **WorkBenches.** Datasets obtained thanks to the WorkBenches will be CC-BY 4.0 (http://creativecommons.org/licenses/by/4.0/). WorkBenches (tools, workflow, notebook) will be open-source licenses (such as GPL, MIT, ..) and transferable to any other big data infrastructure.

2.3.Summary

A summary of relevant project impact elements is provided in the table below, where also the target groups, the outcomes and the impacts are also indicated.

SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES	TARGET GROUPS	OUTCOMES	IMPACTS
Impact 1: **Seamless interoperability between EOSC and marine dataspaces / environments is needed.**	Data Discovery & Access web services federating Blue Data Infrastructures (BDI); Virtual Data Analysis; Platforms; Virtual Research Environment.	New Blue-Cloud 2026 services integrated in the EOSC Core services and published in the EOSC Marketplace to encourage usage, deeper harmonisation and **interoperability**. Cross-project collaboration with EOSC-related projects and ESFRIs	Blue Data & e-Infrastructures; Researchers; Ocean Obs./data institutions; ICT institutions; National Bodies; SMEs, Industry.	The enhanced integration of Blue-Cloud 2026 with EOSC will enable marine researchers to employ existing EOSC core services such as the federated AAI and exploit an expanding database of datasets and services through seamless common interfaces, unlocking new cloud- and big data-enabled capabilities.	Contributions to addressing critical EU and international challenges including **UN Sustainable Development Goals** such as "Life Below Water", "Climate Action", and "Zero Hunger".
Impact 2: **Marine researchers need to learn to produce and re-use open and FAIR data.**	Creation of the Blue Data Federation; Training and trained communities.	Training Academy series via EuroGOOS, EMODnet, Ocean Teacher Global Academy, OBPS; structured catalogue existing BDIs **training** materials; dedicated webinars on the Virtual Labs and WorkBenches. Blue-Cloud Hackathon.	Blue & e-Infrastructures; Researchers; Ocean Obs./data institutions; ICT institutions; SMEs, Industry; Society; Citizens; NGOs.	Capacity building on long term data stewardship and wider use and sharing of FAIR data will result in uptake of FAIR principles in a broad range of different sectors of marine science.	Support reuse of open data also by citizen scientists and marine science enthusiasts, as well as contribute to the **promotion of ocean literacy**.
Impact 3 **Marine research data needs to be widely shared across Member States and Associated Countries.**	Virtual Labs and use cases for demonstrating Blue-Cloud 2026 and reaching new user communities.	Engagement with resources deposited in ZENODO through targeted **dissemination** using the project's multiplier channels and EOSC collaboration platforms.	Blue & e- Infrastructures; Researchers; Ocean Obs./data institutions; ICT institutions; National Bodies; SMEs, Industry.	The VLabs will demonstrate the power of the Blue-.Cloud 2026 by innovating harmonised data products and tools across domains, using the DD&AS, VRE and its services and the new EOVs.	The wide range of topics covered related to marine ecosystems with techniques such as AI, ML and dynamic models provide tangible results **relevant also beyond ocean science**.
Impact 4 **EOSC needs to grow into becoming the trusted R&I data space.**	Integration of Blue-Cloud 2026 as the EOSC thematic cloud.	Outreach campaigns with a variety of branding and **communications** resources targeting all stakeholders from policy makers down to citizen scientists and society at large.	Blue & e Infrastructures; Researchers; Ocean Obs./data institutions; ICT institutions; Society, NGOs.	Blue-Cloud will provide the thematic entry point to EOSC for the ocean science community. Prominent users from this community will in turn promote Blue-Cloud outputs.	EOSC receives more visibility in the marine science community. The **level of trust in EOSC services will also increase** in the community, contributing to wider uptake across the board.
Impact 5 **The Horizon Europe – EOSC partnership needs to grow and flourish.**	Structured community dialogue for aligning & integrating the various EOSC & Digital Ocean Partnerships .	**Synergy** programme with European (particularly DTO) and international initiatives leading to signed collaboration agreements. Dedicated DTO Task Force, Policy and Roadmap workshops. Engagement with ESEB.	Blue & e Infrastructures; Researchers; Ocean Obs./data institutions; ICT institutions; SMEs, Industry.	Blue-Cloud catalyses a sustained, long-term dialogue towards a collaborative community of practice that successfully brings the European digital ecosystem into EOSC.	The value of environmental observations is greatly enhanced, accelerating their transformation by the EOSC community into actionable digital solutions contributing to Horizon Europe impacts.

3. Quality and efficiency of the implementation

3.1. Work plan and resources

Work package No.	Work Package Title	Lead Participant no.	Lead Participant Short name	Person-months	Start month	End month
WP1	Project management and coordination	1	Trust-IT	70,5	1	42
WP2	FAIR compliant Discovery and Access services for marine domains & beyond	3	MARIS	211	1	42
WP3	Developing and testing analytical Blue Cloud workbenches for generating highly qualified data collections (Essential Ocean Variables, EOV)	5	Ifremer	208,5	1	42
WP4	Blue-Cloud Virtual Labs for demonstrating cross-domain web-based open science	8	VLIZ	194	1	42
WP5	Blue-Cloud VRE platform evolution and integration with EOSC resources and services	4	CNR	140	1	42
WP6	Outreach, engagement, and education	6	SSBE	109,5	1	42
WP7	Exploitation, Roadmap to 2030, and Sustainability	1	Trust-IT	98,9	1	42
			TOTAL P-Ms	1032,4		

WP1 – Project management and coordination (Leader: Trust-IT): WP1 ensures an effective orchestration of the project administrative and financial coordination, including quality, risks and innovation management, and technical coordination. It covers the engagement and coordination of the External Stakeholders Experts Board (ESEB).
WP2 – FAIR compliant Discovery and Access services for marine domains & beyond (Leader: MARIS): WP2 overlooks the Blue-Cloud 2026 Data Federation, serves as input for the Virtual Labs (WP4), WorkBenches (WP3) within the Blue-Cloud VRE (WP5). WP2 facilitates sharing of multi-disciplinary datasets with external users.
WP3 –Blue Cloud WorkBenches for quality assurance & harmonisation of generating highly quality data collections (EOVs) (Leader: Ifremer): WP3 is responsible for building workbenches for the integration and validation of large amounts of in situ datasets from various sources in a synchronised manner. Feeds into DTO.
WP4 – Blue-Cloud Virtual Labs for demonstrating cross-domain web-based open science (Leader: VLIZ): WP4 designs, manage and run the creation of **5 real-life VLabs** offering innovative services in the form of data products and/or analytical tools, demonstrating the added-value of web-based open science as promoted by EOSC.
WP5 – Blue-Cloud VRE platform evolution & integration with EOSC resources & services (Leader: CNR-ISTI): WP5 operates & expands further the functionalities of the **Blue-Cloud VRE** by federating more analytical services and making active use of more e-infrastructures to enlarge and raise the VRE capabilities.
WP6 – Outreach, engagement, and education (Leader: Trust-IT): WP6 delivers and maintains a Communication, Dissemination, Outreach & Education Strategy for the pan-European rollout of the Blue-Cloud 2026 services. Designs & conducts **training & capacity building campaigns**, for easier uptake of the Blue-Cloud 2026 assets.
WP7 - Exploitation, Roadmap to 2030, and Sustainability (Leader: SSBE): WP7 provides an Exploitation Plan, long-term strategic Roadmap, policy recommendations for discovery & exploitation of Blue-Cloud's digital commons, assets, services by users in EOSC, other EU and int'l digital data spaces, creation of a DTO Task Force.
More details on the WorkPackages, their tasks and deliverables are provided in the following sections.

3.1.1. Gantt chart

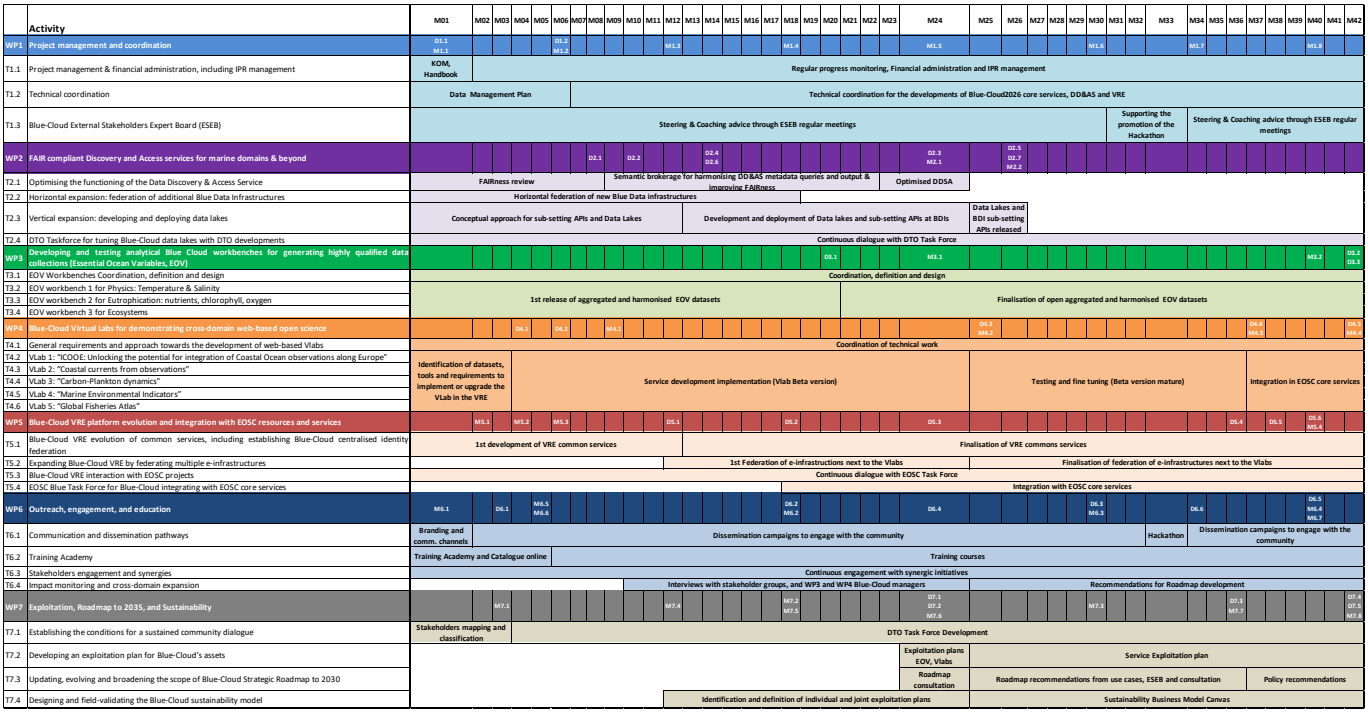

Figure 11 – Gantt chart

3.1.2. Project PERT chart

The PERT of Blue-Cloud 2026 is reported below, identifying critical paths of the project workflow with relevant Milestones as critical events and arrows indicating the dependencies. See also Milestone table in section 3.1.5.

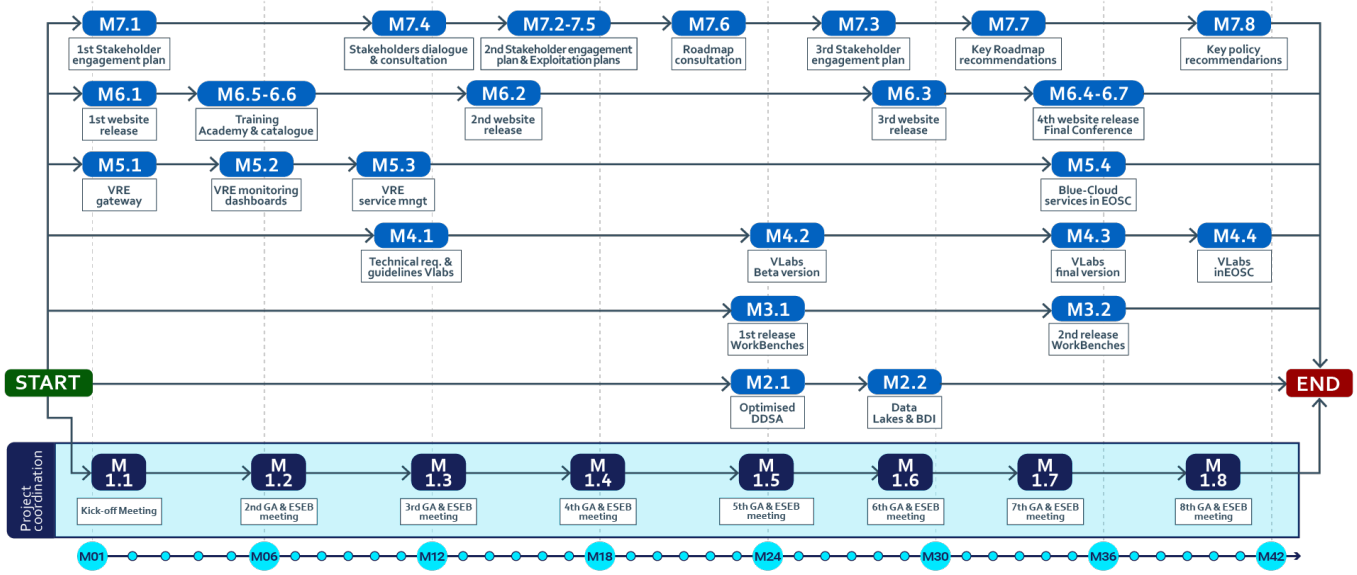

Figure 12 – PERT chart

3.1.3. Description of each Work Package (Table 3.1b)

3.1.3.1. WP1 "Project management and coordination"

Work Package number	**1**
Work Package title	**Project management and coordination**

Objectives: WP1 ensures timely and high-quality results through efficient administrative, technical, and financial coordination. Activities include decision making and conflict resolution; quality assurance and risks & ethics management; It manages and coordinates the **External Stakeholders Experts Board Liaison (ESEB)** to provide strategic guidance and promote the uptake of the results among the relevant channels.

Description of work (WP Leader: Trust-IT)

Task 1.1 [M1-M42] "Project Management & Financial Administration, including IPR management". *Lead: Trust-IT-IT; Partners involved: ALL.*

The task defines and implements the management process for the project and the Consortium, and thereafter lead, coordinate and manage the project and strategic and technical activities across the WPs including: Ensuring the completion of activities according to the timing and financial commitments of the workplan; Administering financial contributions regarding allocation between beneficiaries and activities; Monitoring progress of activities (KPIs), managing risks, defining mitigation measures; Implementing quality assurance plan for project outcomes; organising 5 GA physical meetings (including project KO), 6 as virtual events, to save time, money, and reduce CO2 footprint. Travel budget to 6 face-to-face meetings (& team building). The Coordinator is member of the PM^2 Alliance (www.pm2alliance.eu) and **PM^2 principles** will be followed. A Blue-Cloud 2026 web-platform will be established and procedures and communication flows agreed upon by partners at M1 to be followed throughout.

Task 1.2 [M1-M42] "Technical Coordination". *Lead: MARIS; Partners involved: Trust-IT, CNR, Ifremer, SSBE, MOI, VLIZ, CMCC, EMBL, KNMI, CINECA, GRNET, SU, UVA, FORTH, IRD, NOC-BODC, OGS, HCMR, ETT, EMSO-ERIC, AWI, ULiege, EGI, INGV, SOCIB, EuroGOOS, SMHI, EMBRC, IH, ETHZ, IOPAN, HUB Ocean.*

The task provides coordination and monitoring of technical activities across WP2 - WP5, developments of core services, **DD&AS and VRE**, supporting their use and ensuring their fitness-for-purpose towards the VLabs. Includes: validating technical specifications, checking standards defined are applicable and used. It validates technical deliverables, and provides alternative solutions in case of unexpected technical problems. It provides guidance on innovation management & IPR. The Scientific and Technical committee (STC) supervises technical coordination and meets at least twice a year.

Task 1.3 [M1-M42] "Blue-Cloud External Stakeholders Expert Board (ESEB)". *Lead: Trust-IT, Partners involved: SSBE.*

This task manages the ESEB, which is configured on sector specific expertise, around Oceanography, marine ecology, data & citizen science, policy, ocean research, EOSC, data management to provide competent guidance

to Blue Cloud 2026 and support specific efforts of the project will be managed as part of this task. Each ESEB member will sign a standard ToR. Activities requested from the ESEB members: six-monthly meetings (remotely) and participation to at least 3 remote conferences (1 hour calls); Steering & Coaching advice according to area of expertise. ESEB members will be remunerated for a total of **9 Person-Days (PDs)** day rate of €450 PD. See *Section 3.2.4* for list of members already recruited at proposal submission phase.

KPIs
KPI 1.1 Overall effort deviation: % of deviation between actual vs planned effort. 5% max, at project end [M42].
KPI 1.2 ESEB Engagement": at least 12 engaged & authoritative individuals, targeting 80% attendance rate to the 6-monthly calls envisaged by the project end [M42].

3.1.3.2. WP2 "FAIR compliant Discovery and Access services for marine domains & beyond"

Work Package number	**2**
Work Package title	**FAIR compliant Discovery and Access services for marine domains & beyond**

Objectives: The task expands & optimises the Blue-Cloud Data Discovery & Access service and its FAIRness by a) **harmonising and expanding functionality** of web services as operated by each BDI for discovery and access of managed data resources, and as used in DD&AS, following FAIRness review, b) develop and deploy semantic brokering as part of DD&AS interface, c) federate **additional (BDIs) into DD&AS**, reviewing, and if missing, developing and deploying data sub-setting and extracting services, operated by each BDI, for feeding Blue-Cloud Data Lakes, d) develop and deploy Blue-Cloud Data Lakes with harmonised content for selected data types, tuning Data Lakes developments with Digital Twin of the Ocean (DTO) developments.

Description of work (WP Leader: MARIS)

Task 2.1 [M1-M42] "Optimising the functioning of the Data Discovery & Access Service". *Lead: MARIS; Partners: CNR, IFREMER, CINECA, GRNET, SU, VLIZ, EBI, NOC-BODC, UVA, FORTH, EMSO, EMBRC, SIOS, ETT, IOPAN.*
FAIRness review: an overall review of FAIRness of the current web services, as used in DD&AS from each of the federated BDIs, will be performed and analysed to formulate improvements, analysing the optimisation of the DD&AS central services.
Improving FAIRness of BDI web services and overall DD&AS: each of the BDIs will undertake developments to improve FAIRness of their metadata and data web services, following the earlier review. This will be done by the BDIs, in liaison with their connected data originators/suppliers as expanding richness of metadata might require additional input from the source upwards. BDIs interact with the central DD&AS developers, for optimisation. New developments will be tested and operationally deployed.
Adding semantic brokerage for harmonising DD&AS metadata queries and output: Each BDI is using its own vocabularies for several metadata tags. To improve interoperability, a semantic brokerage service component will be developed by NOC-BODC on the basis of their NERC Vocabulary Server (NVS) and integrated into the DD&AS interface. NVS serves machine-interpretable standardised lists of terms for a broad spectrum, well used in ocean & marine communities. W3C SKOS specification is used and concepts are served as Linked Data (LD) in different serializations including JSON-LD, turtle, Ntriples, aligning NVS with FAIR semantics. Smart mapping will allow to increase semantic interoperability and harmonisation of the DD&AS. Vocabularies to be included, will be selected based on direct relevance to connected BDIs, the Blue-Cloud Data Lakes development, and Blue-Cloud VLabs. It will also integrate the RDA I-ADOPT framework connections.

Task 2.2 [M1-M42] "Horizontal expansion: federation of additional Blue Data Infrastructures". *Lead: MARIS; Partners: CNR (IIA), CINECA, ETT, EMSO, EMBRC, SIOS, SOCIB, SMHI, NERSC, IOPAN.*
Additional BDIs, namely EMSO, EMODnet Physics, EMBRC (EMO-BON) and SIOS, will be connected to the DD&AS federated services, first for discovery and access services in line with Task 2.1, and sub-setting and extraction services in Task 2.3. For each new BDI, an analysis will be undertaken for identifying, documenting, and testing their existing web services for discovery and retrieval of fixed objects, to fit the DD&AS overall concept. Integration will be done in cooperation with operators of BDIs and of central DD&AS components.

Task 2.3 [M1-M42] "Vertical expansion: developing and deploying sub-setting services at BDIs and Blue-Cloud Data Lakes". *Lead: MARIS; Partners: CNR, MOI, IFREMER, NOC-BODC, VLIZ, SU, EBI, SIOS, NERSC, IOPAN, EMBRC, ETT, CINECA, GRNET , UVA, EMSO , EGI, Hub Ocean.*
Conceptual approach for sub-setting APIs and Data Lakes:

The functionality of the DD&AS will be expanded with APIs for indexing, sub-setting and extracting specific data slices from the BDI repositories at data level. These APIs, once established, can function as self-standing BDI services, and will also be used to facilitate the population of Blue-Cloud 'Data Lakes' for specific data types. Such Data Lakes will be of particular use to the WorkBenches, DTO, and other applications. They can be considered as databases, to be populated from BDIs and possible other repositories (e.g. WOD), while associated metadata should be collated following a feasible common syntactic and semantic model. The latter can be achieved by re-using the semantic brokerage and metadata brokerage (DAB) services of the DD&AS.. This will be done in dialogue with users (Work Benches, DTO, others) and considering SotA IT developments and deployments of Data lakes by desk study and exchanges with other projects, e.g. FAIR-EASE, and EOSC related.

Development and deployment of Data lakes and sub-setting APIs at BDIs:

Following common requirements, BDIs will develop and equip their BDIs with sub-setting APIs, or adapt existing APIs. This will be done by each BDI, but in a concerted way, which should give synergetic effects. In parallel, the Data Lakes will be developed and deployed by a central team of developers, following the conceptual design. Thereafter, the various services will be integrated for serving population of the Data Lakes with data sets for selected parameters. This should result in Data lakes with harmonised data and metadata.

Task 2.4 [M1-M42] "DTO Taskforce for tuning Blue-Cloud data lakes with DTO developments". *Lead: MOI; Partners: MARIS, CNR, IFREMER, VLIZ, EGI, SSBE.*

MOI (on behalf of CMEMS) and VLIZ (on behalf of EMODnet) have been awarded a grant to initiate the digital backbone of the European DTO, a public infrastructure to be aligned within the Destination Earth initiative of the Digital Europe Programme and to host existing and new sources of data and modelling capacities for oceans and freshwater. Blue Cloud 2026 will contribute by mobilising and making available major additional data resources next to those already managed by CMEMS and EMODnet. The Blue-Cloud Data Lakes will be instrumental for the planned dynamic data exchanges between the Blue-Cloud ecosystem of federated Blue Data Infrastructures and the DTO under development. A regular dialogue and cooperation between the 2, arranged by means of the DTO Taskforce that will meet regularly and secure synchronisation.

KPIs

KPI 2.1 Number of registered users 400+ [M42].
KPI 2.2 End-user satisfaction >95% (from end-user questionnaire) [M42].
KPI 2.3 Number of active users (on monthly average) 100 [M42].
KPI 2.4 Number of sessions (on daily average) 20 [M42].
KPI 2.5 Number of EU countries represented in the user-base: 25 [M42].

3.1.3.3. WP3 "Developing and testing analytical Blue Cloud WorkBenches for generating highly qualified data collections (Essential Ocean Variables, EOV)"

Work Package number	**3**
Work Package title	**Developing and testing analytical Blue Cloud workbenches for generating highly qualified data collections (Essential Ocean Variables, EOV)**

Objectives: This WP is to build sustained WorkBenches to enable integration and combination of a variety of data for further analysis including quality control (QC). This will be possible due to big data technologies (data lakes, cloud computing, cloud technologies, SW repository) implemented in WP2.

The resulting WorkBenches (TRL5) shall be considered as an incubator for the future DTO and for the evolution of EU operational services such as EMODnet, Copernicus or Global Biodiversity Information Facility (GBIF). They will be expandable on sustainable big data infrastructures, such as EGI at an EU level and GAIA data big data infra at national level or equivalent initiative at national scale. This WP depends on WP2 for data lakes and big data tools, WP5, e-infrastructures deployment, WP7 for uptake, WP4 as VLabs developed may use the WP3 datasets (TRL5; TRL6 by M42). Publication of WP3 tools & datasets to EOSC catalogue through WP5.

Description of work (WP Leader: IFREMER)

Task 3.1 [M1-M42] "Coordination, definition and design". *Lead: Ifremer; Partners: AWI, CMCC, SSBE.*

The task ensures overall coordination of the WP. Design principles, architecture for development, testing & use WorkBenches will be done thanks to WP2 and WP5 (*MARIS, CNR, MOI*). Mapping of vocabulary and semantic for metadata from different sources with collaboration with WP2 (*MARIS, NOC-BODC*).

Some of the tools (ODV, DIVA) used in Tasks 2 and 3 will need either further developments (done by AWI for ODV) or support and interaction with developers (WP4, Uliège for DIVA). Developments of ODV will have to

take account of data lake technologies and large volumes of data the WorkBenches will have to deal with.
The WorkBenches will be technology push & user driven. Interaction with WP4 (*VLiz*), user needs, exploiting the results obtained in coordination with WP7 (SSBE). The web toolkit initiated in Blue Cloud and further developed (WP4) by CMCC will exploit the EOV datasets of the 3 workbenches in phase 2.

Task 3.2 [M1-M42] "EOV workbench for physics: temperature and salinity" *Lead: INGV; Partners: Ifremer, Oceanscope, Pokapok, HCMR.*
Region: Mediterranean Sea (with the objective to go to the Global Ocean at project end)
RIs: SeaDataNet, Euro Argo, EMSO, Jerico-S3, glider; data infrastructures: Copernicus, EMODnet physics, WOD
Methods: ODV, DIVAnd, ISAS, MINMAX
The task will develop and test a cloud-based WorkBench to generate harmonised and validated data collections for temperature and salinity, integrating several datasets released from different EU and non-EU data infrastructures, such as Copernicus Marine Service, SeaDataNet and the NOAA (World Ocean Database). The dataset integration will rely on the interoperability of data infrastructures and metadata information associated to temperature and salinity observations that has to be mapped into a common schema, to be used to identify and handle potential duplicate observations and to be finally associated to the new derived EOV product. The merged dataset will be used to compute gridded climatologies and demonstrate their added value with respect to climatologies obtained from the single input datasets. Developed and tested for the Mediterranean Sea with the objective to further extend it to the global ocean during year 3. By M42, the WorkBench will be available and expandable to sustainable big data infrastructure deployed at SeaDataNet, Copernicus or other data infrastructures.

Task 3.3 [M1-M42] "EOV workbench for eutrophication: chlorophyll, nutrients, oxygen". *Lead: OGS; Partners: Ifremer, Pokapok, SMHI.*
Region: North East Atlantic
RIs: EMSO, EuroArgo, ICOS, Jerico S3, Glider; data infrastructures: Copernicus, EMODnet chemistry, WOD
Methods: ODV, DIVAnd, Copernicus procedures.
The task will aim at generating harmonised and validated EOV data collections for Chlorophyll, nutrients and oxygen integrating several datasets released from different EU and non-EU data infrastructures. Relevant Blue Data Infrastructures, such as Copernicus Marine Service, EMODnet Chemistry and the World Ocean Database will be engaged, together with key EU RIs. IT functionalities and FAIRness of BlueCloud services (WP2 & WP5) will be used for dataset integration and analysis. Interoperability services of the data infrastructures, common vocabularies and brokering services will be needed to allow dataset aggregation and harmonisation.
The information associated with the observations, metadata, will be mapped into a common schema. EMODnet Chemistry and Copernicus Marine Service experts will work together to agree on a set of best quality control procedures based on existing ones (ODV and Copernicus QC procedure). A dedicated protocol will be jointly set out to identify and handle the potential duplicate observations. The WorkBench will be developed & tested for the Northeast Atlantic Sea with the aim of further extending it to the global ocean during the last year of the project. By M42, the workbench will be made available for implementation by other big data infrastructures (as EGI) and made available in the EOSC Exchange.

Task 3.4 [M1-M42] "EOV workbench for ecosystems". *Lead: ETHZ; Partners: SU, EMBL. Region: Global Ocean RIs: EMBRC, Lifewatch, ELIXIR; data infrastructures: EMBL, EMODnet biology, EuroBIS, Copernicus.*
Methods: (1) provenance metadata curation pipeline (*BioSamples* operated by partner EMBL-EBI), (2) metagenomics analysis and QA/QC pipeline (*MGnify* operated by partner EMBL-EBI), (3) image analysis and QA/QC pipeline (*EcoTaxa* operated by partners SU and Ifremer), (4) niche modelling to quality assess and predict the global biogeography of plankton (*habitat modelling* developed by ETHZ & SU).
This task will aggregate and harmonise large collections of plankton observations based on traditional counts, quantitative imaging and genomic methods available from the EMODnet/EurOBIS and ELIXIR data infrastructures. The selected curation and analytical pipelines (BioSamples, MGnify and EcoTaxa) will be improved in order to generate QA/QC and interoperable data tables about the occurrence and/or abundance and/or biomass of taxonomic entities (organisms) and functional entities (plankton functional types, morphological traits, functional proteins or metabolic pathways). A generic modelling pipeline will be developed and operated to generate high quality interpolated maps of the global biogeographic distribution of these plankton entities. Overall, the WorkBench will provide a sustainable pipeline for the production of ecosystem level essential ocean variables (EOVs) following clear QA/QC steps and according to best practices in habitat modelling. This WorkBench will be developed in close collaboration with modelers and data experts involved in HORIZON projects AtlantECO and BiOceans5D for community feedback and validation.

KPIs

KPI 3.1 Volume of data handled in parallel: 20TB [M20].
KPI 3.2 10 preliminary EOV datasets integrated [M20].
KPI 3.3 40 requests of users to use preliminary EOV dataset s[M20].
KPI 3.4 Total users on EOVS: 1000 [M42].
KPI 3.5 Users per single EOVs: 150 [M42].
KPI 3.6 Comments received from user testing: 250 [M42].

3.1.3.4. WP4 "Blue-Cloud VLabs for demonstrating cross-domain web-based open science"

Work Package number	**4**
Work Package title	**Blue-Cloud Virtual Labs for demonstrating cross-domain web-based open science**

Objectives:
Advancement of 3 existing Virtual Labs (VLabs) and development of 2 new VLabs in the Blue-Cloud Virtual Research Environment (VRE). VLabs cover a set of marine multidisciplinary data from Blue Data Infrastructures (BDI) and other marine RIs, like JERICO, and offer innovative services in the form of a data product and/or analytical tools, demonstrating the added-value of web-based open science as promoted by EOSC. Developments include data processing, analytical services, validation of products and publishing of the results, and their provenance, in the Blue Data and EOSC Catalogues. The tasks will be developed in four phases:

- Phase 1 **[M1-M3]**: **Description of the workflows**. Identification of datasets, tools and technical requirements to implement/upgrade the VLabs in the VRE. TRL3.
- Phase 2 **[M3-M24]**: **Implementation.** Beta versions of VLabs developed & implemented in VRE. TRL4-6.
- Phase 3 **[M24-M36]**: **Testing & fine tuning**. Beta version fully matured and integrated in the VRE, making use of VRE services (DD&AS, and other services developed under WP2-3-5). TRL7-8.
- Phase 4 **[M36-M42]**: **Dissemination & user support**: In collaboration with WP6-7, VLabs are presented at different events and exploited by users (e.g. hackathon). Feedback is used for service updates.

Description of work (WP Leader: VLIZ)

Task 4.1 [M1-M42] "WP4 coordination". *Lead: VLIZ; Partners: CNR, MARIS*
Compilation of technical requirements for the implementation of the VLabs, provide guidelines to VLab developers to set up their services in the VRE. Deliverables and milestones coordination and delivery, dissemination and exploitation of results & service (webinars, hackathon).

Task 4.2 [M1-M42] "VLab 1: ICOOE: Unlocking the potential for integration of Coastal Ocean observations along Europe". *Lead: IH; Partners: IEEE, SOCIB.*
Compilation and integration of European Coastal Ocean Data from JERICO and BDIs to generate FAIR data products, providing analytical tools for users to explore data in three thematic services: transboundary processes and connectivity along the European margins, Extreme Events and Ocean glider.
Year 1: TS1 implementation (dataset collection, integrated analysis tools). TS3 implementation: pre-processing toolbox for delivering of OG1.0 datasets from Slocum gliders, implementation of python toolboxes focusing on specific advanced products such as NETcdf, static images. *Year 2:* TS1 implementation (advanced visualization tools) and completion. TS2 implementation (dataset collection, integrated analysis tools). TS3 implementation (integration of WMS capabilities, dynamic visualisations based on WMS of OG1.0 datasets) and completion. *Year 3:* TS1 demonstration (workshops, hackathon, coach users in exploration of service) and fine-tune from user feedback. TS2 implementation (advanced visualisation tools) and completion. TS3 validation of value chain using glider endurance lines of at least one JERICO partner. *Year 4)*: TS2 demonstration, fine-tune from user feedback.

Task 4.3 [M1-M42] "VLab 2: Coastal currents from observations". *Lead: ULiège; Partners: CMCC.*
Development of a workflow that integrates data from different measurement platforms (HF radar, geostrophic currents from satellite altimetry data and drifters) and BDIs to derive integrated ocean currents. Integration of the surface current fields provided to generate a search-and-rescue and oil spill simulation product.
Year 1: Gathering data from different areas from the CMEMS, EMODnet Physics, SeaDataNet and JERICO-S3 data streams to decide the optimal area and time frame to conduct the test. Split the data into an analysis and validation dataset. Perform initial analyses with HF Radar data only and validate the results with drifter data. *Year 2:* Combine the HF Radar data with drifter measurements and geostrophic currents from altimetry data to create an integrated dataset. Derive synthetic drifter trajectories from the analysed currents to facilitate the visualisation and the interpretation of the flow features measured by the different measurement platforms. *Year 3*: Simulation

the dispersion of a hypothetical oil spill based on the integrated surface currents. Migrate the workflow to the Blue Cloud VRE infrastructure, with a focus on reproducibility (on any cloud or on-premise computing infrastructure) include accuracy and completeness of the documentation. The derived data product will be submitted to be the Blue-Cloud & EOSC data catalogue with the necessary metadata. *Year 4)*: fine-tune the setup and to improve the portability in different areas.

Task 4.4 [M1-M42] "VLab 3: Carbon-Plankton dynamics". *Lead: VLIZ; Partners: OGS.*

Expansion of the Nutrient-Phytoplankton-Zooplankton-Detritus (NPZD) model developed in the Blue Cloud Zoo and Phytoplankton EOV VLab with the integration of additional data from other regions, and to include a carbon sequestration component. Combination of carbon and plankton data and the ICOS and LifeWatch RI's harmonisation.

Year 1: Harmonisation of Blue data infrastructures LifeWatch and ICOS stations in the southern part of the North Sea. Integration of data sources: carbonate system concentrations and fluxes combined with plankton and environmental variables. Implementation in the Blue Cloud VRE-VLabs. *Year 2-3:* Conversion of the model to run in carbon units to infer carbon sequestration as part of the detritus state variable. Application and calibration of the model with input data from the Adriatic Sea. *Year 3-4*: Fine tuning the model and scripts to achieve reproducibility. Develop and run what-if scenarios to assess the biogeochemical functioning in case of altered human activities. Data products publication and integration in the Blue Cloud and EOSC catalogue.

Task 4.5 [M1-M42] "VLab 4: Marine Environmental Indicators". *Lead: CMCC; Partners: OGS, INGV, KNMI.*

Expansion of the Blue Cloud Marine Environmental Indicators VLab to develop a web application that allows users to monitor and assess the environmental status of marine areas, by performing online spatio-temporal analysis with the implemented algorithms, for selected environmental variables.

Year 1: Feasibility study to define the new algorithms to be implemented inside the VLab (Virtual Lab) for the computation of metocean characteristics and indicators which can contribute to initiatives such as the Copernicus Marine Ocean State Report or Med-CORDEX. *Year 1 - 2*: Development of the new selected algorithms as Jupyter notebooks and/or production workflow. Development of the user interactive interface for the data analytics and display. Integration in the Blue-Cloud VRE. *Year 3 – 4*: Enhancement of the implementation to improve the interoperability with other services. Dissemination and Exploitation of the service (webinars, hackathon).

Task 4.6 [M1-M42] "VLab 5: Global Fisheries Atlas". *Lead: IRD; Partners: FORTH, CNR.*

Integration of 2 connected fisheries data resources (a) the Global Record of Stocks and Fisheries (GRSF) for fisheries management information, & (b) the Fisheries Atlas (FA) to improve the discovery, access and understanding of the state of stocks and fisheries worldwide, ensuring that the utilised software is at least TRL8. *Year 1*: Inventory of updated datasets and data sources to be integrated in the VLab; such as: Tuna fisheries dataset (fishing efforts, size class, conversion factors, etc), GRSF data, EOVs relevant to ecological modelling, biodiversity data, and others. *Year 2:* Implementation of new data services, workflows, procedures based on the new datasets and data sources. Some indicative cases are: setting up R workflow to manage and publish the new fisheries data by complying with FAIR principles (implementation of ISO / OGC standards by managing data within a spatial data infrastructure), new ETL (extract-transform-load) workflows to support the semantic data integration of new data sources, etc. *Year 1-3*: Semestral publication of new data and datasets through the VLab (map-viewer, catalogue, and APIs) with emphasis on FAIR compliance (new datasets are made open by assigning DOIs). Year 4: Disseminate VLab results including fisheries specific services related to EOVs.

KPIs

KPI4.1 Five VLabs operational [M25].
KPI 4.2 Total users on VLabs 1000 [M42].
KPI 4.3 Users per each VLab 150 [M42].
KPI 4.4 Downloads of Users Handbook 300 [M42].
KPI 4.5 Comments received from users 250 [M42].

3.1.3.5. WP5 "Blue-Cloud VRE platform evolution and integration with EOSC resources and services"

Work Package number	5
Work Package title	**Blue-Cloud VRE platform evolution and integration with EOSC resources and services**

Objectives: Operating, expanding the functionalities of the Blue-Cloud Virtual Research Environment (VRE) by federating more analytical services, as earlier developed by BDIs and/or (being) established as part of related RTD and EOSC projects, and by making active use of more e-infrastructures to enlarge and raise the VRE capabilities for supporting both the Analytical Big Data WorkBenches for EOVs and Vlabs for specific aquatic research challenges.
Liaison with existing and planned EOSC projects which are relevant to Blue Cloud 2026, like EGI-ACE, iMAGINE and FAIR-EASE will improve the technical capabilities of the Blue-Cloud VRE. The onboarding of the Blue-Cloud VRE services in the EOSC Exchange and integration with EOSC core services will be delivered to enlarge the community base, deliver the thematic marine EOSC for open web-based science and serve the needs of the EU Blue Economy, Marine Environment & Knowledge agendas.

Description of work (WP Leader: CNR)

Task 5.1 [M01-M42] "Blue-Cloud VRE evolution of common services and operation". *Lead: CNR; Partners: EGI, Nubis, GRNET.*
Blue-Cloud VRE common services - Identity and Access Management (IAM) Service, Information System (IS), Resource Manager (RM), Storage Manager (SM), Analytics Computing Framework (ACF), **will be evolved to reach TRL8** and better to serve the needs of the enlarged Blue-Cloud community. They will be operated to deliver high quality of service to the Blue-Cloud community **and will ensure an overall availability per year (uptime) greater than 99.995 %**.
The IAM will be tuned to join the Identify Federation through the EGI Check-in service properly. The IS and RM will be empowered to manage the new resources, computing and services, joining the Blue-Cloud VRE. The SM will be empowered to better offer tailored configurations supporting the analytics tasks. In particular, active cross-site replication will be evaluated and turned on to manage the processing pipeline distributed across two different sites, while active-passive cross-site replication will be used to ensure transparent failover to the remote site without any disruption. The SM will follow strict consistency within the data centre and eventual consistency across data centres to protect the data. Encryption of the data when stored on disk and when transmitted over the network will be enabled on demand. Object-level versioning with a unique ID to each version of a given object will power features like Object Locking, Immutability, Tiering and Life Cycle management. The SM will also be extended to interact with Data Lakes developed in T2.3.
The ACF will be empowered to support HTC on (Docker and Linux) containerised applications (improving portability of the application and its reproducibility in other infrastructures), isolation of application packages, and so increased security and reduced operational costs.
The JupyterHub component will be enhanced to support deployment over multiple Kubernetes clusters.

Task 5.2 [M12-M42] "Blue-Cloud VRE expansion by federating multiple e-infrastructures". *Lead CNR; Partners: EGI, Nubis, IFREMER, MARIS, MOI, CMCC, CINECA, SOCIB, UvA.*
The Blue-Cloud VRE, currently powered by D4Science, **will be expanded by federating multiple e-infrastructures computing resources and services** (provided by EGI, WEkEO, EUDAT, JERICO-CORE) in support of Analytical Big Data WorkBenches and VLabs. Each site providing computing resources will be federated either by an OpenStack region or a Kubernetes cluster. The minimum capacity of 256 CPU cores with 512 GB RAM and 10 TB persistent storage will be requested to join the Blue-Cloud VRE. Third-party services, instead, operated in independent administrative sites, will be linked and authorised through policy enforcement points (PEP) powered by NGINX.
It will provide a return on investment for each provider joining the Blue-Cloud VRE since compliance with EU GDPR and Privacy policy, security, monitoring, accounting, user management, fault management, and alerting management is granted by the VRE with no cost for the provider of the digital resources. The provider will be acknowledged by users in all products and services generated by exploiting the provider's resources.

Task 5.3 [M01-M42] "Blue-Cloud VRE interaction with EOSC projects". *Lead: EGI; Partners involved: MARIS, CNR, CMCC.*
The Blue-Cloud VRE will engage with funded H2020 and HE projects and will perform technical integration. In particular:

- EGI-ACE, which is running till June 2023, is building the EOSC Compute platform and delivering HTC, Cloud and HPC together with computing orchestrators and data management services.
- iMAGINE, starting in Sept '22 and ending in August '25, plans to provide a portfolio of 'free at the point of use' image datasets and high-performance image analysis tools empowered with Artificial Intelligence.
- FAIR-EASE plans to provide distributed and integrated services for the observation and modelling of the Earth system, environment and biodiversity.

The above services and tools will be analysed by leasing with those projects and Service Level Agreements will be established to add them to the set of services the community can exploit for supporting both the Analytical Big Data WorkBenches for EOVs and the Virtual Labs for specific aquatic research challenges.

Task 5.4 [M18-M42] "Blue-Cloud VRE interoperation with EOSC core services". *Lead CNR; Partners: GRNET, EGI.*

An EOSC Blue Task Force for Blue-Cloud integration with EOSC core services will be formed to ensure the compliance of the Blue-Cloud technical framework with the EOSC principles for service management, including Service Level Agreement (SLA), Operation Level Agreement (OLA), incident and service request management, service availability and continuity management. Blue-Cloud services, regularly registered in the Blue-Cloud Catalogue, will also be made accessible through the EOSC marketplace. Integration with the EOSC Helpdesk and Monitoring will also be performed.

KPIs

KPI 5.1 Total users in the Blue-Cloud Virtual Research Environment > 3.000 [M42].
KPI 5.2 Number of data analytics sessions per month > 2,000 [M42].
KPI 5.3 Sessions peak to manage per month > 5,000 [M42].
KPI 5.4 Number of HTC data analytics jobs per month > 5,000 [M42].
KPI5.5 Data analytics jobs' peak to manage per month > 25,000 [M42].
KPI 5.6 Common Services Availability per year (uptime) > 99.995 %. [M42].

3.1.3.6. WP6 "Outreach, engagement, and education"

Work Package number	6
Work Package title	Outreach, engagement, and education

Objectives: WP6 **promotes and disseminates the Blue-Cloud Key Exploitable Results (KERs)** to the identified list of key SGs throughout content-rich comms activities via multi-channel user-centric campaigns, includes communication of open science to the public; **educates a new generation of marine data practitioners and IT experts** via training courses/guidelines; boost multi-disciplinary cooperation by **creating synergies with strategic initiatives;** identify facilitators for reproducibility and cross-domain expansion, **assesses user experience** and validation mechanisms. **Monitoring the scientific and societal impact of Blue-Cloud Results**.
Success is dependent on interaction with all WPs, all the consortium has effort in this WP

Description of work (WP Leader: Trust-IT)

Task 6.1 [M01-M42] Communication and dissemination pathways. *Lead TRUST-IT; Partners: ALL.*
This task will deliver and maintain the Communication, Dissemination, Outreach and Education Strategy of the Blue-Cloud2026, D6.1is the reference del for the implementation of the outreach campaigns and related activities Design and evolution of the **project public website** is also part of this task, as entry point for the Blue-Cloud VRE with the website at www.blue-cloud.org, with 3 major, incremental releases in M12, M24, M36. **Communication materials**, will be produced *(see Sec. 2.2.2).* An editorial plan ensures distribution of results. Open Access (OA) publication of datasets & publications will be monitored under this task and organised via the Blue-Cloud catalogue (ref. T5.4) and publication via Open Access repositories (i.e. Zenodo). One dedicated campaign will drive Blue-Cloud2026 results towards the general public, **with 3 Ocean Literacy webinars targeting the general public**, and introducing the **Blue-Cloud TV** with interviews with VLab leaders & ESEB will explain the value of Open Science with the language of Civil society, NGOs, influencers and activists. The **Blue-Cloud Hackathon** *(subtask 6.1.1)* will be planned, organised and delivered, led by SSBE, the setup of the jury and managing the evaluation process. CNR will set up a tailored Blue-Cloud VLab for the Hackathon to support registrations, Team & idea formation.

Task 6.2 [M01-M42] "Blue-Cloud Training Academy". *Lead: EuroGOOS; Contributions: Trust-IT, IEEE, CNR, MARIS, IFREMER, VLIZ, SSBE, MOI, HCMR, IRD, FORTH.*

A **training programme**, included in D6.1, will provide the strategic route for this task, defining the specific types of end-users, and the most suitable tools to be used by the Academy to: a) **train them** to use the Blue-Cloud services *(subtask 6.2.1 Trust-IT, CNR, MARIS, VLIZ, SSBE, MOI)*, & b) **educate them** on how to make best use of the existing European Research Infrastructures and data services for long term data stewardship and wider use and sharing of FAIR data *(subtask 6.2.2 - EuroGOOS, IEEE, IRD, FORTH)*. It will be complemented with a **Training Catalogue of materials**, a searchable and metadata indexable Open Access Catalogue of **guidelines, including** Best practices in data management & sharing (EuroGOOS, IEEE); materials on EOVs, VLabs, VRE, DDAS (IFREMER, VLIZ, CNR, MARIS); guidelines on geoFAIR by IRD, training guidelines on Semantic Fish (FORTH). Introducing gamification techniques will be considered, making guidelines easy to digest by SGs. Built on existing frameworks Ocean Best Practices or thematic courses developed in FAO eLearning Academy.

Task 6.3 [M01-M42] "Stakeholders engagement and synergies". *Lead: Trust-IT; Partners: MARIS, CNR, SSBE, MOI, IRD, FORTH, HCMR.*
This task aims to identify, connect and engage with relevant EU and international initiatives in the marine research, open science & blue economy fields. Synergies include EU and worldwide initiatives such as: FIRMS fisheries networks (IRD & FORTH), ILIAD system of systems for Earth data challenges applications (MOI), MARIDA datasets for plastic debris observations (via HCMR), the JERICO-CORE Pilot infrastructure (SOCIB), DOORs for integration Black-Sea data (MARIS & SeaDataNet), the AANCHOR initiative for the collaboration with the Atlantic region (ESEB), COS4Cloud for citizen science AI technologies (ESEB Members). Strong ties with the EOSC partnership & EOSC-A, EOSC Data Providers onboarding group, EOSC-CORE technical interfaces (ESEB & CNR). The collaborative approach will include contribution to technical developments as well as dissemination activities. A Collaboration agreement will be signed with the most strategic initiatives.

Task 6.4 [M10-M42] "Impact monitoring and cross-domain expansion". *Lead: Trust-IT; Partners: MOI, SSB, iFREMER, IH, ULiege, IRD, CMCC, VLIZ, FORTH.*
This task monitors the scientific and societal impact of Blue-Cloud Results. In collaboration with WP7 (T7.2) via two series of structured interviews: 1) with WP3 and WP4 managers and users, to map the difficulties encountered in the development, usage and access to the solutions; 2) with representatives of the 7 SGs not directly involved in the VLabs and EOV workbenches to identify potential challenges, benefits and impacts of the solutions developed in their markets. The interviews will be collected as single factsheets and then analysed and turned into recommendations to be included in D7.4 Roadmap towards building a federated digital ecosystem in support of Mission Starfish into EOSC (T7.3) and into D7.5 Sustainability Strategy & Plan (T7.4) T6.4 is charged with organising 3 Annual Impact events, the final will be combined with the Final Conference.

KPIs
KPI 6.1 Three major website releases during the project lifetime [M36].
KPI 6.2 12 online training courses on FAIR Best Practices, DD&AS, VRE, Virtual Labs, EOV WorkBenches.
KPI 6.3 At least 10 collaboration agreements signed [M42].
More KPIs are specified in **Sec. 2.2.2** "Dissemination and communication measures to maximise impact".

3.1.3.7. WP7 "Exploitation, Strategic Roadmap to 2030 and Sustainability"

Work Package number	**7**
Work Package title	**Exploitation, Strategic Roadmap to 2030 and Sustainability**

Objectives: WP7 contributes to a **collaborative community of practice** and **roadmap** to successfully bring into **EOSC** the EU **digital geospatial ecosystem, it: 1)** establishes a sustained community dialogue with stakeholders across the EU ocean and marine data management landscape; **2)** Compiles & delivers an **exploitation plan** for newly developed and/or evolved Blue-Cloud domain specific services, including a business model for Blue-Cloud's functioning as "user environment" and incubator for developing, testing, and (in selected cases) hosting innovative web-based applications. **3)** Updates and further evolves **Blue-Cloud Strategic Roadmap to 2030** to reflect the results of the community & convey policy recommendations for the evolution of **EOSC**, based on lessons learned, as well as for the capitalisation and uptake of KERs by DestinE, EU DTO, Green Deal Data Space and wider EU & int'l initiatives. **4)** Designing and validating a long-term, sustainability model for Blue-Cloud.

Description of work (WP Leader: SSBE)

Task 7.1 [M01-M36] "Establishing the conditions for a sustained community dialogue". *Lead: SSBE; Partners involved: Trust-IT, MARIS, MOI, IFREMER, VLIZ, EuroGOOS, CNR, EGI).*
This task will establish a community dialogue to advance common practices for data sharing and management, and exploitation of common AI and machine learning methods for data harmonisation in support of big-data analyses. A stakeholder mapping & classification (power vs interest) exercise considering key actors for all 7 SGs will be completed to develop a stakeholder engagement plan (*Subtask 7.1.1*) integrated in D6.1, liaising with Task 6.3. A specific **DTO Task Force** will be set up with key stakeholders involved in the development of EU DTO related initiatives. The plan will be implemented, encompassing (*Subtask 7.1.2*) at least 2 surveys, 10 targeted interviews & meetings and 3 workshops bringing together the *DTO Task Force*, representatives from relevant EU initiatives and targeted communities and audiences (i.e., EOSC, DestinE, EU policy & HE Missions DGs MARE, RTD, CLIMA, AGRI, MOVE, Sustainable Blue Economy Partnership). Results and recommendations will be analysed, discussed, consolidated and fed into T7.2, T7.3 & T7.4, including defining pathways and mechanisms for long-term community dialogue and coordinated action beyond the project end.

Task 7.2 [M24-M36] "Developing an exploitation plan for Blue-Cloud's assets". *Lead: SSBE; Partners involved: ALL.*
IFREMER and VLIZ (WP3 & WP4 Leads,), will work with Task Partners to produce individual exploitation plans for the use cases (Analytical Big Data WorkBenches (WP3) and domain-specific analytical products and/or services (WP4)), identifying potential users; defining value proposition to each user segment; and specifying technical and/or operational requirements and resources needed for wider exploitation at an operational level (*Subtask 7.2.1)*. Feeding from this work, IFREMER and VLIZ will work with SSBE, Trust-IT, MARIS, MOI, CNR, EGI (*Subtask 7.2.2)* to define service requirements for the potential exploitation of these services by Blue-Cloud, CMEMS, EMODnet, relevant RIs and/or other key players (i.e., WEkEO, EU DTO). SSBE will produce *(Subtask 7.2.3*) a joint **Service Exploitation Plan**, including Blue-Cloud's role as a "**dynamic user environment**" and incubator of innovative services that brings together marine researchers, data scientists, modelers and computer scientists to accelerate Ocean research and innovation, (potentially) also hosting strategic, promising web-based applications until ready for community uptake. The plan will also identify **recommendations** to be fed into T7.3 for the future evolution of **EOSC**, based on requirements drawn up by the piloted use cases.

Task 7.3 [M24-M42] "Updating, evolving and broadening the scope of Blue-Cloud Strategic Roadmap to 2030". *Lead: SSBE; Partners involved, Trust-IT, MARIS, MOI, EuroGOOS, CNR.*
Feeding from Tasks 7.1, 7.2 and building on Blue-Cloud Strategic Roadmap to 2030, SSBE, working closely with Task Partners, will produce, discuss and validate with relevant (internal & external) communities, experts and **DTO Task Force** a long-term **roadmap** to successfully bring into **EOSC** the European **digital geospatial ecosystem** delivering recommendations for the capitalisation and/or uptake of key exploitable results by **EOSC**, **Destination Earth & DTO**, **EU Green Deal Data Space** (*Subtask 7.3.1)*. Partners will engage with key target audiences to give outreach to high-level messages and key recommendations stemming from the roadmap (*Subtask 7.3.2*), working in close coordination with WP6 to ensure and support wider dissemination and uptake of results.

Task 7.4 [M12-M42] "Designing and field-validating the Blue-Cloud sustainability model". *Lead: Trust-IT; Partners involved: MARIS, CNR, Ifremer, SSBE, MOI, VLIZ.*
This task provides guidance towards the delivery of a final Blue-Cloud 2026 Sustainability Plan for Blue-Cloud 2026. Identifying concrete individual & exploitation amongst all beneficiaries and the results obtained from T6.3 in terms of adoption, usage and cooperation with 3rd party initiatives and end-users all support this task; collaboration also with T6.4, T7.2 and from the policy discussions on an EOSC and DTO level. It will design a **Sustainability Business model canvas** encompassing Value Proposition (End-user relations, channels, customer Segments), Key Exploitable Assets, Partners and resources; Cost Structure including revenue streams; Economic, social and scientific costs –and benefits for maintaining the Blue-Cloud Open Science infrastructure. The canvas will be turned into a plan with recommendations for Policy makers (DG MARE, DG RTD, DGCNECT, DG DEFIS) in the subsequent 3 years and will explore longer sustainability, supported by major stakeholders.

KPIs
KPI 7.1 200 comments to the Blue-Cloud Strategic Roadmap during open consultation & interviews [M42].
KPI 7.2 Blue-Cloud cited in Horizon Europe Working Programme or other EC/DTO policies [M42].
KPI 7.3 30 participants to the 3 DTO Task Force & Policy workshops (on average) [M42].

3.1.4. List of deliverables (Table 3.1c)

Deliverable (number)	Deliverable name and description	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
D1.1	**Project Handbook**: guideline and instruments for regular quality and risk management of the project	WP1	Trust-IT	R	CO	M01
D6.1	**Communication, Dissemination, Outreach and Education Plan, 1st release**: first version of the plan adopted to define a strategy with objectives and actions aimed at maximising the project impact and visibility	WP6	Trust-IT	R	PU	M03
D4.1	**Blue Cloud VLabs technical requirements**: Report defining the technical requirements to set up the Vlabs	WP4	VLIZ	R	PU	M04
D1.2	**Data Management Plan**: plan covering availability to the consultation results, the data format, and methods to protect the availability of the data	WP1	MARIS	R	PU	M06
D4.2	**Blue Cloud VLabs implementation guidelines**: Report summarises the technical guidelines to be endorsed by the demonstrators developers	WP4	VLIZ	R	PU	M06
D2.1	**Existing DD&AS and Blue Data Infrastructures – Review and Specifications for Optimisation Report**: Report with FAIRness review of existing BDI web services for discovery and access and existing DD&AS central services	WP2	MARIS	R	PU	M08
D2.2	**New Blue Data Infrastructures – Service Analysis Report**: Detailed descriptions of the new to be connected BDIs (EMSO, EMBRC, SIOS, EMODnet Physics) with details on their local discovery and access mechanisms, types of data, metadata format, data formats, use of vocabularies, possible restrictions, and existing web services	WP2	MARIS	R	PU	M10
D5.1	**Blue-Cloud VRE common services, 1st release**: Report on the design principles and reference architectures of the released common services	WP5	CNR-ISTI	R	PU	M12
D2.4	**BDI sub-setting APIs and Data Lakes – Concept and Specifications Report**: Report with descriptions and analyses of existing sub-setting services at each of the BDIs, formulation of common requirements for BDI sub-setting APIs, and how BDIs might adapt existing or develop new sub-setting APIs	WP2	MARIS	R	PU	M14
D2.6	**Tuning between Blue-Cloud Data Lakes and DTO development, 1st report**: Progress report about the tuning process and the interfacing between the Blue-Cloud Data Lakes development and the DTO development	WP2	MOI	R	PU	M14
D5.2	**Blue-Cloud VRE operation report**: Report on the Blue Cloud VRE operation activity, including a detailed set of usage indicators	WP5	CNR-ISTI	R	PU	M18
D6.2	**Communication, Dissemination, Outreach and Education Plan, 2nd release**: intermediate version of the plan adopted to define a strategy with objectives and actions aimed at maximising the project impact and visibility	WP6	Trust-IT	R	PU	M18
D3.1	**1st release of aggregated and harmonised EOV datasets**: preliminary aggregated and harmonised EOV datasets obtained thanks to each workbench	WP3	IFREMER	DATA	PU	M20
D2.3	**Optimised and expanded Blue Cloud Data Discovery and Access Service – Documentation Report**: Report documenting the new release of the Blue Cloud Data Discovery and Access Service with optimised services, semantic interoperability, new BDIs connected, and new or adapted discovery and access BDI web services	WP2	MARIS	R	PU	M24
D5.3	**Blue-Cloud VRE federated infrastructures, 1st release**: Report on the initial set of resources, tools and services federated to the Blue-Cloud VRE	WP5	EGI	R	PU	M24
D6.4	**Blue-Cloud Stakeholders engagement and synergies, 1st report**: 1st overview of all the projects and infrastructures Blue-Cloud has established synergies with	WP6	Trust-IT	R	PU	M24
D7.1	**Individual Exploitation Plans of Workbenches**: A compilation of the individual Exploitation Plans of each of the Workbenches set up in WP3	WP7	IFREMER	R	CO	M24
D7.2	**Individual Exploitation Plans of Virtual Labs**: A compilation of the individual Exploitation Plans of each of the Virtual Labs set up in WP4	WP7	VLIZ	R	CO	M24
D4.3	**Blue Cloud Vlabs Users Handbook V1**: Step by step guidelines for Vlab users (phase 1)	WP4	VLIZ	R	PU	M25
D2.5	**Established BDI sub-setting APIs and Data Lakes – Documentation Report**: Report documenting the release of the Blue Cloud Data Lakes, their architecture and deployment, and the established sub-setting APIs at each BDI	WP2	MARIS	R	PU	M26
D2.7	**Tuning between Blue-Cloud Data Lakes and DTO development, 2nd report**: Progress report about the tuning process and the interfacing between the Blue-Cloud Data Lakes development and the DTO development	WP2	MOI	R	PU	M26
D6.3	**Communication, Dissemination, Outreach and Education Plan, 3rd release**: final version of the plan adopted to define a strategy with objectives and actions aimed at maximising the project impact and visibility	WP6	Trust-IT	R	PU	M30
D6.6	**Blue-Cloud Hackathon**: Summary report of the main activites performed and impact generated by the Hackathon	WP6	SSBE	R	PU	M34
D5.4	**Blue-Cloud VRE common services, 2nd release**: Updates on D5.1 to report on the changes applied to the design of the released common services	WP5	CNR-ISTI	R	PU	M36
D7.3	**Blue-Cloud Exploitation Plan**: A joint Service Exploitation Plan for the project KERs, including Blue-Cloud's role as a "dynamic user environment" and incubator of innovative services	WP7	SSBE	R	CO	M36
D4.4	**Blue Cloud Vlabs Users Handbook V2**: Step by step guidelines for Vlab users (phase 2)	WP4	VLIZ	R	PU	M37
D5.5	**Blue-Cloud VRE federated infrastructures, 2nd release**: Report on the stable set of resources, tools and services federated to the Blue-Cloud VRE	WP5	EGI	R	PU	M38
D5.6	**Blue-Cloud VRE Interactions with EOSC projects**: Report on the interactions with EOSC projects and the services and tools exploited by the Blue-Cloud VRE	WP5	EGI	R	PU	M40
D6.5	**Blue-Cloud Stakeholders engagement and synergies, 2nd report**: 2nd overview of all the projects and infrastructures Blue-Cloud has established synergies with	WP6	Trust-IT	R	PU	M40
D3.2	**Final release of open aggregated and harmonised EOV datasets**: final and open aggregated and harmonised EOV datasets stamped BC2026 obtained thanks to the workbenches	WP3	IFREMER	DATA	PU	M42
D3.3	**Workbenches and tools (notebooks, model, containers with instructions)**: Portable prototypes for operational services and data infrastructures	WP3	IFREMER	DATA	PU	M42
D4.5	**Blue Cloud Vlabs results, users feedback and applications**: Report summarising the results produced in the Vlabs, feedback from users and their applications into the societal challenges	WP4	VLIZ	R	PU	M42
D7.4	**Strategic Roadmap towards building a federated digital ecosystem in support of Mission Starfish into EOSC**: A roadmap with a clear path of actions and policy recommendations towards enabling a seamless interaction of the European digital geospatial ecosystem required to support the objective of restoring healthy oceans, seas, coastal & inland waters in Europe into EOSC, aligning with EU DTO & GDDS	WP7	SSBE	R	PU	M42
D7.5	**Blue-Cloud 2026 Sustainability Strategy & Plan**: Sustainability Business Model Canvas encompassing Value Proposition, Key Exploitable Assets, Partners and resources, Cost Structure including revenue streams, Economic, social and scientific costs, and benefits for maintaining the Blue-Cloud Open Science infrastructure	WP7	TRUST-IT	R	CO	M42

Table 9 – List of deliverables (Table 3.1c)

3.1.5. List of milestones (Table 3.1d)

Number	Milestone name	Related WP(s)	Due date (in Month)	Means of verification	*Owner*
M1.1	Kick-off meeting	WP1	M01	www.blue-cloud.org	Trust-IT
M6.1 thorugh M6.4	1st, 2nd, 3rd and 4th website release	WP6	M01, M18, M30, M40	www.blue-cloud.org	Trust-IT
M5.1	Blue-Cloud VRE Gateway	WP5	M02	www.blue-cloud.org	CNR-ISTI
M7.1, M7.2, M7.3	1st, 2nd, 3rd release Stakeholders Engagement Plan	WP7	M03, M18, M30	D6.1, D6.2, D6.3	SSBE
M5.2	Blue-Cloud VRE Monitoring Dashboards	WP5	M04	www.blue-cloud.org	CNR-ISTI
M6.5	Training Academy online page	WP6	M05	www.blue-cloud.org	Trust-IT
M6.6	Training Catalogue of BC 2026 materials	WP6	M05	www.blue-cloud.org	Trust-IT
M5.3	Blue-Cloud VRE Service Management Processes	WP5	M06	www.blue-cloud.org	CNR-ISTI
M1.2 through M1.8	GA and ESEB virtual meetings	WP1	M06, M12, M18, M24, M30, M34, M40	Minutes of Meetings	Trust-IT
M4.1	Blue Cloud VLabs technical requirements and implementation guidelines adopted	WP4	M09	www.blue-cloud.org	VLIZ
M7.4	Launch of stakeholder dialogue & consultations	WP7	M12	www.blue-cloud.org	SSBE
M7.5	Exploitation Plans agreed with Partners and aligned with key stakeholders	WP7	M18	Minutes of Meetings	SSBE
M2.1	Optimised Blue Cloud Data Discovery and Access service released	WP2	M24	www.blue-cloud.org	MARIS
M3.1	Preliminary Release of the Blue-Cloud EOV benchmarks	WP3	M24	www.blue-cloud.org	IFREMER
M7.6	Roadmap consultation survey launched	WP7	M24	www.blue-cloud.org	SSBE
M4.2	Blue Cloud VLabs Beta version released	WP4	M25	www.blue-cloud.org	VLIZ
M2.2	Blue-Cloud Data Lakes and BDI sub-setting APIs released	WP2	M26	www.blue-cloud.org	MARIS
M7.7	Key Roadmap recommendations from stakeholder consultation and use cases and ESEB	WP7	M36	Minutes of Meetings	SSBE
M4.3	Blue Cloud VLabs Final version released	WP4	M37	www.blue-cloud.org	VLIZ
M3.2	Final Release of the Blue-Cloud EOV benchmarks	WP3	M40	www.blue-cloud.org	IFREMER
M5.4	Blue-Cloud services in EOSC	WP5	M40	www.blue-cloud.org	EGI
M6.7	Final Conference Blue-Cloud 2026	WP6	M40	www.blue-cloud.org	Trust-IT
M4.4	Vlabs available in the EOSC Portal and integrated with the EOSC core services	WP4	M42	www.blue-cloud.org	VLIZ
M7.8	Key policy recommendations from the Blue-Cloud2026 roadmap	WP7	M42	Minutes of Meetings	SSBE

Table 10 – List of milestones (Table 3.1d)

3.1.6. Critical risks for implementation (Table 3.1e)

The Consortium will implement (Task 1.1 "Project Management & Financial Administration, including IPR management") a rigorous **risk management plan** (included in D1.1 "Project Handbook", delivered in Month 1). The management of the risks will be under the responsibility of the Project Coordinator who will be promptly informed

by the WP Leaders of newly identified risks (if any) or other critical changes in the risk management scenario that might arise during the project execution and who will devise, for approval of the PMB, of a mitigation plan to review the project objectives and detail a contingency plan to minimise the impact of the risk.
The following table identifies potential risks for the project and corresponding risk-mitigation measures. Risks with high severity have been mitigated a-priori. All risks (identified and new ones) will be monitored at project runtime.

Description of risk and level of risk (probability & impact)	WP(s) involved	Proposed risk-mitigation measures
R1. Inadequate management and deviations. *Likelihood: Low* *Impact: Medium*	WP1	Partners have extensive experience in coordination of EC-funded projects. Project meetings will take place regularly (typically, monthly video calls for each WP) and will identify and isolate potential problems. The meeting frequency will be further increased should critical situations arise. The WP Leaders, and ultimately the PMB, will impose specific corrective actions on the overall 42-month project workplan.
R2. Staff changes and absences. *Likelihood: Medium* *Impact: Low*	ALL	All Blue-Cloud 2026 partners have robust, secure, back-up resources, and in case of staff changes or absences, they shall leverage their staff and management capacity to complete the project as planned.
R3. Delivered systems are miss functional or non-functional (performance, scalability, etc.) *Likelihood: Medium* *Severity: Low*	WP2, WP3, WP4, WP5, WP6	User communities have an essential role in the implementation phases leading the requirements and the implementation. B) The project adopts an agile incremental approach of delivering functionality with quick repetitive early-prototyping cycles, reducing the case that requirements are missed. C) The Partners maintain a technology-agnostic approach and can adapt some technical decisions, resolving with alternative solutions the ill-functional elements.
R4. Lack of computing resources for supporting the Analytical Big Data WorkBenches for EOVs and the Virtual Labs *Likelihood: Low* *Severity: High*	WP5	The Blue-Cloud VRE is organised as a multi-site digital infrastructure with a central hub and peripheral sites that since the beginning of the project will provide sufficient computing capacities for supporting the needs of the project. Its architecture allows an easy integration of additional computing resources that can be federated following the most up-to-date standards and approaches. B) the consortium partners either manage or are strongly involved in e-infrastructures that can provide additional resources. C) All the computing resources are virtually managed and can be temporarily assigned to a specific VLab or WorkBench on-demand to manage exploitation peaks and reduce overload.
R5. Data lakes and virtual data analysis platform with too small capacity and performance to allow deployment of QA/QC workbenches *Likelihood: Medium* *Impact: High*	WP2 WP3	The partners have strong knowledge and previous experiences in such developments. They will be able to rapidly and efficiently find a backup solution outside the currently envisaged configuration if the project has underestimated the capacity and resources needed or faces some unexpected complications and issues. This backup solution will be preferably the similar developments made in the FAIR-EASE project (and to then together commonalise and strengthen further developments), the second possibility will be to switch the workbench developments on the Ifremer server (although it will have a cost) the time of development, enhancement and recovery of the BlueCloud data lakes and virtual data analysis platforms.
R6. Lack of engagement/feedback from the various stakeholder groups *Likelihood: Medium* *Severity: High*	WP4	Through partners network and coordinated action towards the large set of EU R&I initiatives, the risk of lack of engagement will be mitigated. Blue-Cloud 2026 will reinforce its efforts to attract all SGs including the use of resources of partnering institutes and organisations, also the non-EU ones and the ones Blue-Cloud is synergising with. We will work on "buy-in" arguments and messages to clarify the value proposition for the various SGs and we will further mobilise the multiplier networks with them. Lastly, more pro-active use of communication tools exploiting social media networks and other multipliers, diverting some external costs to small online, targeted PPC campaigns.
R7. Lack of participation in events (workshops, hackathon) *Likelihood: Medium* *Impact: Medium*	WP6	Partners will leverage on their vast network of contacts to spread early "save-the-date" notifications for events and encourage participation. Remote participation will be facilitated to increase attendance, e.g., via webinars & virtual hackathon. Piggy-bagging on existing, related events to capitalise on like-minded audiences.
R8. COVID-19 risks *Probability Medium* *Severity: Low*	ALL	Considering some persisting international restrictions and concerns as well as some changed habits as a result of 2 years of pandemic, the team considers several routine interactions, meetings and decision making done remotely.

Table 11 – Critical risks identified and mitigating actions

3.1.7. Summary of staff effort (Table 3.1f)

The total cost of the Blue-Cloud 2026 project is €8.999.660, over a total duration of 42 months, and has been allocated across cost categories and partners as outlined in the table below and explained in further tables within this Sec. 3.1. It is here expressly intended that ETHZ's funding is guaranteed by the Swiss SERI.

No.	Name of beneficiary	Country	Effort (PMs)	Personnel costs	Sub-contracting	Travel and subsistence	Other goods, works and services, incl. audit costs	Indirect Costs	Total estimated eligible costs	Requested EU contribution to eligible costs
1	Trust-IT	IT	*61,5*	€ 338.250,00	€ 0,00	€ 29.250,00	€ 225.550,00	€ 148.262,50	€ 741.312,50	€ 741.313,00
2	COMMpla	IT	*18*	€ 99.000,00	€ 0,00	€ 6.000,00	€ 2.400,00	€ 26.850,00	€ 134.250,00	€ 134.250,00
3	MARIS	NL	*62*	€ 527.000,00	€ 0,00	€ 29.250,00	€ 5.000,00	€ 140.312,50	€ 701.562,50	€ 701.563,00
4	CNR	IT	*94,5*	€ 439.425,00	€ 0,00	€ 20.250,00	€ 5.000,00	€ 116.168,75	€ 580.843,75	€ 580.844,00
5	Nubis	IT	*26,1*	€ 125.280,00	€ 0,00	€ 6.000,00	€ 0,00	€ 32.820,00	€ 164.100,00	€ 164.100,00
6	Ifremer	FR	*38,5*	€ 327.250,00	€ 0,00	€ 20.250,00	€ 5.000,00	€ 88.125,00	€ 440.625,00	€ 440.625,00
7	SSBE	BE	*49,5*	€ 396.000,00	€ 0,00	€ 20.250,00	€ 35.000,00	€ 112.812,50	€ 564.062,50	€ 564.063,00
8	MOI	FR	*24*	€ 144.000,00	€ 0,00	€ 20.250,00	€ 0,00	€ 41.062,50	€ 205.312,50	€ 205.313,00
9	VLIZ	BE	*60,5*	€ 429.550,00	€ 0,00	€ 20.250,00	€ 5.000,00	€ 113.700,00	€ 568.500,00	€ 568.500,00
10	CMCC	IT	*31,5*	€ 220.500,00	€ 0,00	€ 20.250,00	€ 0,00	€ 60.187,50	€ 300.937,50	€ 300.938,00
11	EMBL	DE	*36,6*	€ 334.561,00	€ 0,00	€ 20.250,00	€ 5.000,00	€ 89.952,75	€ 449.763,75	€ 449.764,00
12	KNMI	NL	*6,6*	€ 50.820,00	€ 0,00	€ 6.750,00	€ 0,00	€ 14.392,50	€ 71.962,50	€ 71.963,00
13	CINECA	IT	*24,6*	€ 103.320,00	€ 0,00	€ 6.750,00	€ 0,00	€ 27.517,50	€ 137.587,50	€ 137.588,00
14	GRNET	GR	*12,6*	€ 70.560,00	€ 0,00	€ 6.750,00	€ 0,00	€ 19.327,50	€ 96.637,50	€ 96.638,00
15	SU	FR	*34,6*	€ 276.800,00	€ 0,00	€ 6.750,00	€ 0,00	€ 70.887,50	€ 354.437,50	€ 354.438,00
16	UVA	NL	*11,6*	€ 75.400,00	€ 0,00	€ 6.750,00	€ 0,00	€ 20.537,50	€ 102.687,50	€ 102.688,00
17	FORTH	GR	*21*	€ 94.500,00	€ 0,00	€ 6.750,00	€ 0,00	€ 25.312,50	€ 126.562,50	€ 126.563,00
18	IRD	FR	*27,5*	€ 220.000,00	€ 0,00	€ 6.750,00	€ 0,00	€ 56.687,50	€ 283.437,50	€ 283.438,00
19	NOC-BODC	UK	*15,6*	€ 113.880,00	€ 0,00	€ 6.750,00	€ 0,00	€ 30.157,50	€ 150.787,50	€ 150.788,00
20	OGS	IT	*42,5*	€ 233.750,00	€ 0,00	€ 6.750,00	€ 0,00	€ 60.125,00	€ 300.625,00	€ 300.625,00
21	HCMR	GR	*17,6*	€ 61.600,00	€ 0,00	€ 6.750,00	€ 0,00	€ 17.087,50	€ 85.437,50	€ 85.438,00
22	ETT	IT	*13,6*	€ 81.600,00	€ 0,00	€ 6.750,00	€ 0,00	€ 22.087,50	€ 110.437,50	€ 110.438,00
23	EMSO-ERIC	IT	*13,6*	€ 95.200,00	€ 0,00	€ 6.750,00	€ 0,00	€ 25.487,50	€ 127.437,50	€ 127.438,00
24	AWI	DE	*9,6*	€ 78.720,00	€ 0,00	€ 6.750,00	€ 0,00	€ 21.367,50	€ 106.837,50	€ 106.838,00
25	ULiege	BE	*21,5*	€ 167.700,00	€ 0,00	€ 6.750,00	€ 0,00	€ 43.612,50	€ 218.062,50	€ 218.063,00
26	EGI	NL	*32*	€ 259.200,00	€ 0,00	€ 6.750,00	€ 48.600,00	€ 78.637,50	€ 393.187,50	€ 393.188,00
27	INGV	IT	*35,5*	€ 159.750,00	€ 0,00	€ 6.750,00	€ 0,00	€ 41.625,00	€ 208.125,00	€ 208.125,00
28	SOCIB	ES	*25,6*	€ 128.000,00	€ 0,00	€ 6.750,00	€ 0,00	€ 33.687,50	€ 168.437,50	€ 168.438,00
29	EuroGOOS	BE	*10,6*	€ 90.100,00	€ 0,00	€ 6.750,00	€ 0,00	€ 24.212,50	€ 121.062,50	€ 121.063,00
30	SMHI	SE	*12,6*	€ 85.680,00	€ 0,00	€ 6.750,00	€ 0,00	€ 23.107,50	€ 115.537,50	€ 115.538,00
31	EMBRC - ERIC	FR	*13,6*	€ 81.600,00	€ 0,00	€ 6.750,00	€ 0,00	€ 22.087,50	€ 110.437,50	€ 110.438,00
32	IH	PT	*34,5*	€ 120.750,00	€ 0,00	€ 6.750,00	€ 0,00	€ 31.875,00	€ 159.375,00	€ 159.375,00
34	SIOS	NO	*5,6*	€ 45.920,00	€ 0,00	€ 6.750,00	€ 0,00	€ 13.167,50	€ 65.837,50	€ 65.838,00
35	IOPAN	PL	*6,1*	€ 30.500,00	€ 0,00	€ 6.750,00	€ 0,00	€ 9.312,50	€ 46.562,50	€ 46.563,00
36	NERSC	NO	*4,6*	€ 46.000,00	€ 0,00	€ 6.750,00	€ 0,00	€ 13.187,50	€ 65.937,50	€ 65.938,00
37	HUB Ocean	NO	*8,7*	€ 82.650,00	€ 0,00	€ 6.750,00	€ 0,00	€ 22.350,00	€ 111.750,00	€ 111.750,00
38	IEEE	FR	*7,1*	€ 63.900,00	€ 15.000,00	€ 6.750,00	€ 3.000,00	€ 18.412,50	€ 107.062,50	€ 107.063,00
39	OceanScope	FR	*8,6*	€ 51.600,00	€ 0,00	€ 6.750,00	€ 0,00	€ 14.587,50	€ 72.937,50	€ 72.938,00
40	POKAPOK	FR	*16,1*	€ 96.600,00	€ 0,00	€ 6.750,00	€ 0,00	€ 25.837,50	€ 129.187,50	€ 129.188,00
	TOTAL		**996,4**	**€ 6.446.916,00**	**€ 15.000,00**	**€ 401.250,00**	**€ 339.550,00**	**€ 1.796.929,00**	**€ 8.999.645,00**	**€ 8.999.660,00**
33	ETHZ	CH	*36*	€ 327.708,23	€ 0,00	€ 14.851,49	€ 19.801,98	€ 90.590,43	€ 452.952,00	€ 0,00
	GRAND TOTAL		**1032,4**	**€ 6.774.624,23**	**€ 15.000,00**	**€ 416.101,49**	**€ 359.351,98**	**€ 1.887.519,43**	**€ 9.452.597,00**	**€ 8.999.660,00**

Table 12 – Breakdown of project costs

The number of PMs over the 42 months duration, for each WP, for each participant is indicated in the table below.

Participant #	Participant Short Name	WP1 Lead: Trust-IT	WP2 Lead: MARIS	WP3 Lead: Ifremer	WP4 Lead: VLIZ	WP5 Lead: CNR	WP6 Lead: Trust-IT	WP7 Lead: SSBE	Total PMs per Participant	Effort per participant (%)
1	Trust-IT	**22**	0	0	0	0	**27**	12,5	**61,5**	6,0%
2	COMMpla	1	0	0	0	0	13,5	3,5	**18**	1,7%
3	MARIS	10	**33**	0	4	4	3	8	**62**	6,0%
4	CNR	2	13	0	5	**63**	5,5	6	**94,5**	9,2%
5	Nubis	0,5	0	0	0	25	0,5	0,1	**26,1**	2,5%
6	Ifremer	1,5	6	**19**	0	2	3	7	**38,5**	3,7%
7	SSBE	3,5	2	1	0	0	12	**31**	**49,5**	4,8%
8	MOI	1,5	10	0	0	3	3,5	6	**24**	2,3%
9	VLIZ	1,5	12	0	**37**	0	3	7	**60,5**	5,9%
10	CMCC	1,5	0	3	20,5	3	2,5	1	**31,5**	3,1%
11	EMBL	1,5	11	22	0	0	2	0,1	**36,6**	3,5%
12	KNMI	1	0	0	5	0	0,5	0,1	**6,6**	0,6%
13	CINECA	1	20	0	0	3	0,5	0,1	**24,6**	2,4%
14	GRNET	1	4	0	0	7	0,5	0,1	**12,6**	1,2%
15	SU	1	8	25	0	0	0,5	0,1	**34,6**	3,4%
16	UVA	1	6	0	0	4	0,5	0,1	**11,6**	1,1%
17	FORTH	1	2	0	13,5	0	3,5	1	**21**	2,0%
18	IRD	1	2	0	16,5	0	7	1	**27,5**	2,7%
19	NOC-BODC	1	14	0	0	0	0,5	0,1	**15,6**	1,5%
20	OGS	1	0	25	15	0	0,5	1	**42,5**	4,1%
21	HCMR	1	0	15	0	0	1,5	0,1	**17,6**	1,7%
22	ETT	1	12	0	0	0	0,5	0,1	**13,6**	1,3%
23	EMSO-ERIC	1	12	0	0	0	0,5	0,1	**13,6**	1,3%
24	AWI	1	0	8	0	0	0,5	0,1	**9,6**	0,9%
25	ULiege	1	0	0	18,5	0	1	1	**21,5**	2,1%
26	EGI	1	4	0	0	23	0,5	3,5	**32**	3,1%
27	INGV	1	0	25	8	0	0,5	1	**35,5**	3,4%
28	SOCIB	1	5	0	16	3	0,5	0,1	**25,6**	2,5%
29	EuroGOOS	1	0	0	0	0	5,5	4,1	**10,6**	1,0%
30	SMHI	1	3	8	0	0	0,5	0,1	**12,6**	1,2%
31	EMBRC - ERIC	1	12	0	0	0	0,5	0,1	**13,6**	1,3%
32	IH	1	0	0	31,5	0	1	1	**34,5**	3,3%
33	ETHZ	1	0	33,5	0	0	0,5	1	**36**	3,5%
34	SIOS	0	5	0	0	0	0,5	0,1	**5,6**	0,5%
35	IOPAN	1	4	0,5	0	0	0,5	0,1	**6,1**	0,6%
36	NERSC	0	4	0	0	0	0,5	0,1	**4,6**	0,4%
37	HUB Ocean	1	7	0	0	0	0,5	0,2	**8,7**	0,8%
38	IEEE	0	0	0	3,5	0	3,5	0,1	**7,1**	0,7%
39	OceanScope	0	0	8	0	0	0,5	0,1	**8,6**	0,8%
40	POKAPOK	0	0	15,5	0	0	0,5	0,1	**16,1**	1,6%
	TOTAL P-Ms	**70,5**	**211**	**208,5**	**194**	**140**	**109,5**	**98,9**	**1032,4**	100%
	EFFORTS (%)	6,8%	20,4%	20,2%	18,8%	13,6%	10,6%	9,6%	100%	

Table 13 – Summary of staff effort (Table 3.1f)

3.1.8. 'Subcontracting costs' items (Table 3.1g)

One subcontract will be activated during the Blue-Cloud 2026 workplan, as per the table below.

Participant Number: 38 / Short Name: **IEEE**		
	Cost (€)	Description of tasks and justification
Sub-contracting	15,000	OTGA (Ocean Teacher Global Academy, Belgium) will create a framework for Blue-Cloud 2026 Training Academy specific courses and webinars, based on their unique experience in creating international training courses for ocean capacity development . OTGA will also distribute courses.

Table 14 – List of subcontracts

3.1.9. 'Purchase costs' items (travel and subsistence, equipment and other goods, works and services), Table 3.1h

Only the organisations Trust-IT, EGI, IOPAN, and IEEE in the Consortium have other direct costs exceeding 15% of the personnel costs, however a justification of all costs of the project is provided in Table 15, for transparency. Trust-IT will remunerate the ESEB members selected by the Consortium, by means of standard, individual agreement. For that purpose, a total of € 48,600 is allocated (see Sec. 3.2.4). The other direct costs have been conservatively and carefully calculated to support project activities. A conservative budget has been set aside for the 3 yearly Impact Events and the 3 workshops. Travel costs have been calculated to support activities, as per Table 16.

3.1.10. 'Other costs' items (e.g. internally invoiced goods and services), Table 3.1i

The other direct costs (€ 321,382) are detailed in Table 15 below. Lastly, € 37,970 audit costs have been earmarked, as follows: Trust-IT → €5,000; MARIS → €5,000; CNR → €5,000; Ifremer → €5,000; SSBE → €5,000; VLIZ → €5,000; EMBL → €5,000; ETHZ → €2,970.

External Cost	Total Project	Cost Category	Allocated to
Project meetings + EU Annual Impact Event + EU Workshops + 3rd Party Event Participation	€ 102.250	*Other Direct Costs*	*Trust-IT*
Dissemination Material and other costs	€ 14.700	*Other Direct Costs*	*Trust-IT*
Ulterior Dissemination Material	€ 3.000	*Other Direct Costs*	*IEEE*
Web platform hosting (yearly rate)	€ 2.400	*Other Direct Costs*	*COMMpla*
Hackathon logistics	€ 30.000	*Other Direct Costs*	*SSBE*
Hackaton prizes and extra cloud resources	€ 55.000	*Other Direct Costs*	*Trust-IT*
External Stakeholders Expert Board (ESEB)	€ 48.600	*Other Direct Costs*	*Trust-IT*
Resources allocated to EGI Cloud provider (ATM) to guarantee cloud infrastructure support for the project, in particular the Data Lakes.	€ 48.600	*Other Direct Costs*	*EGI*
Consumables incl. fieldwork and animal costs	€ 4.951	*Other Direct Costs*	*ETHZ*
Publications	€ 11.881	*Other Direct Costs*	*ETHZ*
Total	€ 321.382		

Events organisation / participation	No.	Unit Rate	Costs of logistics	No. Events	Total
Internal project meetings (6 F2F GA meetings + 1 Final Review Meeting)	40	€ 25,00		7	€ *7.000*
3 F2F workshops in Europe	75	€ 50,00	€ 5.000,00	3	€ *26.250*
3 yearly events in Europe	200	€ 50,00	€ 10.000,00	3	€ *60.000*
3rd Party Event participation (for the entire Consortium)	1	€ 500,00		18	€ *9.000*
TOTAL					€ 102.250

Dissemination Material and other costs	No.	Unit Rate	Total
FLYERS	3000	€ 1,00	€ *3.000*
POSTERS	8	€ 25,00	€ *200*
POP-UP BANNERS	15	€ 100,00	€ *1.500*
Web platform hosting (yearly rate)	3	€ 800,00	€ *2.400*
EVENT MATERIAL	3000	€ 2,00	€ *6.000*
Pay-per-click campaigns	20	€ 200,00	€ *4.000*
Ulterior Dissemination Material	1	€ 3.000,00	€ *3.000*
TOTAL			€ 20.100

Hackathon	No.	Unit Rate	Total
Hackathon logistics	1	€ 30.000,00	€ *30.000*
Hackathon prizes	1	€ 25.000,00	€ *25.000*
Hackathon extra cloud resources	1	€ 30.000,00	€ *30.000*
TOTAL			€ 85.000

External Stakeholders Expert Board (ESEB)	No.	No. F2F meetings	Travel & subsistence	No. Days of effort	Daily rate (€)	Total
Effort	12	0	€ -	9,0	€ 450,00	€ *48.600*
TOTAL						€ 48.600

Table 15 – Other direct cost items breakdown

Trust-IT; MARIS	No.	Travel per person	No. Meetings	Total
Travel to internal project meetings (5 GA meetings + 1 final review)	3	€ 750,00	6	€ *13.500*
Travel to 3 Annual Impact events in the EU	3	€ 750,00	6	€ *13.500*
Travel to 3rd party events	1	€ 750,00	3	€ *2.250*
TOTAL				€ 29.250

COMMpla; Nubis	No.	Travel per person	No. Meetings	Total
Travel to internal project meetings (5 GA meetings)	1	€ 750,00	5	€ *3.750*
Travel to 3 Annual Impact events in the EU	1	€ 750,00	3	€ *2.250*
Travel to 3rd party events	0	€ 750,00	0	€ -
TOTAL				€ 6.000

CNR; Ifremer; SSBE; MOI; VLIZ; CMCC; EMBL	No.	Travel per person	No. Meetings	Total
Travel to internal project meetings (5 GA meetings + 1 final review)	2	€ 750,00	6	€ *9.000*
Travel to 3 Annual Impact events in the EU	2	€ 750,00	6	€ *9.000*
Travel to 3rd party events	1	€ 750,00	3	€ *2.250*
TOTAL				€ 20.250

KNMI; CINECA; GRNET; SU; UVA; FORTH; IRD; NOC-BODC; OGS; HCMR; ETT; EMSO-ERIC; AWI; ULiège; EGI; INGV; SOCIB; EuroGOOS; SMHI; EMBRC-ERIC; IH; SIOS; IOPAN; NERSC; HUB Ocean; IEEE; OceanScope; POKAPOK	No. Participants	Travel per person	No. Meetings	Total
Travel to internal project meetings (5 GA meetings + 1 final review)	1	€ 750,00	6	€ *4.500*
Travel to 3 Annual Impact events in the EU	0	€ 750,00	6	€ -
Travel to 3rd party events	1	€ 750,00	3	€ *2.250*
TOTAL				€ 6.750

ETHZ	No.	Travel per person	No. Meetings	Total
Travel to internal project meetings (5 GA meetings + 1 final review)	3	€ 700,00	6	€ *12.600,00*
Travel to 3 Annual Impact events in the EU	0	€ 700,00	6	€ -
Travel to 3rd party events	1	€ 750,00	3	€ *2.250,00*
TOTAL				€ 14.850,00

Table 16 – Detail of travel budget allocation per partner

3.2. Capacity of participants and consortium as a whole

Following detailed consideration of the specific call's objectives and the expectations of both the research community and the multiple policy makers from the different DGs involved, Blue-Cloud has assembled a highly competent consortium, building on the successful experience of Blue-Cloud (September 2019 – August 2022) and through careful selection that comprises key European organisations acting as key facilitators in the different domains to support the challenges faced by Blue-Cloud 2026. A short description of the Consortium is provided below.

3.2.1. Consortium as a whole

The Consortium comprises: **40 European** partners (35 Beneficiaries, 1 Associated Partner, and 4 Affiliated Entities) from **13 different countries**, bringing complementary skills and expertise, matching the project's objectives and bringing together the necessary competences and skills. A panorama of the consortium is given in the figure below, that indicates, at a glance, the rich coverage of the strategic disciplinary and inter-disciplinary competences that will be brought in to carry out Blue-Cloud 2026's workplan.

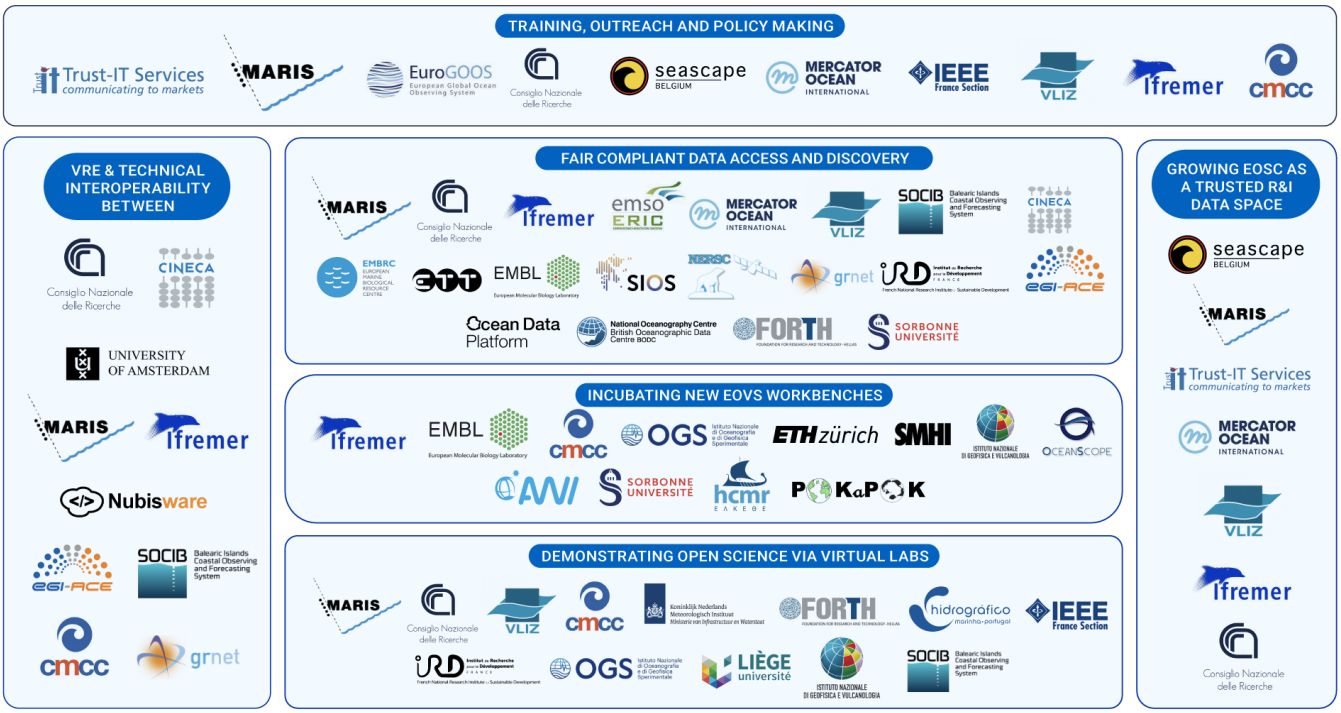

Figure 13 – The Blue-Cloud 2026 Consortium at-a-glance

3.2.2. Capacity of participants

The efficient delivery of the project is guaranteed through the overall Project coordination by **Trust-IT srl**, a nimble ICT intensive SME, which delivers ICT excellence in different domains, and communication for the blue marine science sector. Its AE **COMMpla** brings its ability in the delivery of digital services including the blue-cloud.org integrated platform. Apart from excellent geographic coverage, partners bring expertise & knowledge in domains including: ***data processing & analysis management services, blue data infrastructures, pragmatic VREs & Interoperability, open science, e-Infrastructure & RI operations, Training, FAIR compliance & EOSC***.

Partners have been chosen to ensure the overall and inclusive experience of the above. The Technical Coordination is led by **MARIS**, which develops and manages projects & internet systems for management and provision of marine and ocean data specifically, and which has been active in developing the European marine data management landscape since the eighties. MARIS leads **O1** "*expand and optimize the Blue-Cloud Data Discovery & Access service*" **supported by partners CNR**, part of ICDI, (Italian Computing & data Infrastructure), leading the VREs with an emphasis on delivering Blue Growth-related Services, **Ifremer** which contributes to the knowledge of the oceans and their resources, & is deeply involved in several EU RIs for Ocean Observation & Marine Data Management**, CINECA, GRNET, SU, VLIZ, EBI, NOC-BODC, UVA, FORTH, IRD, EMSO, EMBRC, SIOS, NERSC, ETT.** The activity around the Blue-Cloud data Lakes led by MARIS sees the intervention from **CNR (IIA), VLIZ, MOI, Ifremer, NOC-BODC, SU, EBI, SIOS, NERSC, IOPAN, EMBRC, SOCIB, ETT, CINECA, GRNET, UVA, SMHI, EMSO, EGI, Hub Ocean. MOI & VLIZ** will lead the technical connection between the European DTO and Blue-Cloud2026 Data federation. **O2** *"expand and further develop the functionalities of the Blue-Cloud VRE by federating more analytical services and more e-infrastructures* is achieved through the lead partner **CNR** and its AE **Nubis** supported **by EGI, & GRNET, Ifremer, MARIS MOI, CMCC, CINECA, SOCIB, UvA**. **O3,** which seeks to *stimulate further uptake and utilization of the Blue-Cloud VRE services and capabilities for developing Virtual Labs by Blue Data Infrastructures"*, is led by **VLIZ**, a govt. funded body acting as the

coordination platform for marine & coastal-related scientific research in Flanders and serving as an international contact point, supported by **MARIS & CNR**. The **5 VLabs** have been carefully planned and involve the most experienced partners in their field to lead and support them, VLab#1 is led by **IH**; supported by **IEEE, SOCIB;** VLab#2 led by **ULiège**, involving **CMCC; VLab#3** led by ***VLIZ;*** involving **OGS; VLab#4** is led by **CMCC** involving **OGS, INGV, KNMI;** VLab#5 is led by **IRD;** involving **FORTH, CNR.** Partners involved in contributing to **O4** in *"developing & validating analytical Workbenches"* is coordinated overall by **Ifremer** with support from **AWI** and **SSBE** for EMODnet liaison. EOV#1 will have the prestigious **INGV** lead, supported by partners **Ifremer, Oceanscope, Pokapok, HCMR.** EOV#2 is led by **OGS** supported by **Ifremer, Pokapok, SMHI, IOPAN,** finally, **the Swiss Federal Institute of Technology ETHZ,** CH leads EOV#3 Workbench and will request their financial contributions from the Swiss govt. should the proposal be retained for funding; support partners are: **SU,** and **EMBL-EBI** through their selected curation & analytical pipelines. **O5** which looks to "*develop and publish a range of online courses and educational guidance documents"* has the experienced **EuroGOOS** that leads in this field, supported by **Trust-IT, IEEE, CNR, MARIS, IFREMER, VLIZ, SSBE, MOI, HCMR, IRD, FORTH. O6** that **"***ensures long-term EOSC integration, alignment and growth of the EU digital ecosystem through sustained mechanisms for community dialogue"* is led by **SSBE** which comprises a team of marine science, data and policy experts provides research management & marine data management and are the EMODnet Secretariat. This objective will be supported by **Trust-IT, MARIS, MOI, IFREMER, VLIZ, EuroGOOS, CNR, EGI.** Also owing to its wide-spread networks, the Blue-Cloud 2026 partners all provide the needed complementarity, comprising consultancy or IT based organisations, e-Infrastructure and research infrastructure operators, blue cloud and EOSC stakeholder communities with the right degree of mandates with regards to the provision of services and support an open science policy, therefore all partners are involved in achieving **O7***"wide communication, scientific dissemination and vertical exploitation of scientific results & outputs, led by* **Trust-IT,** who will also lead a rigorous impact monitoring activity. The roadmap 2030 led by **SSBE** will enrich the Policy dimension of Blue-cloud 2026 coupled with a sustainability plan lead by **Trust-IT.**

3.2.3. Organisational structure and the decision-making

Overall coordination and management of the project is under the responsibility of the **Project Coordinator (PC), Sara Pittonet Gaiarin**, Senior Project Manager and shareholder at Trust-IT. Sara is the Project Coordinator of the Blue-Cloud Pilot and brings to the project the needed vision, competences, and ability to maintain cohesion within the Consortium. Sara will serve as the main contact point with the EC and the project partners, establishing collaborative liaisons with other projects and initiatives at European and international level. The PC will be supported in her daily work by the **Technical Coordinator (TC), Dick M.A. Schaap**, managing director of MARIS and authoritative expert in European marine data management. The PC reports any potential issues to the **General Assembly (GA)**, the ultimate governing body of the project, which validates the major decisions and is in charge of the resolution of any issue related to the proper operation of the Consortium. The **GA**, chaired by the PC, comprises one senior, decision-making representatives of each Partner.
The organisational structure of the Blue-Cloud 2026 Project is shown in the figure below.

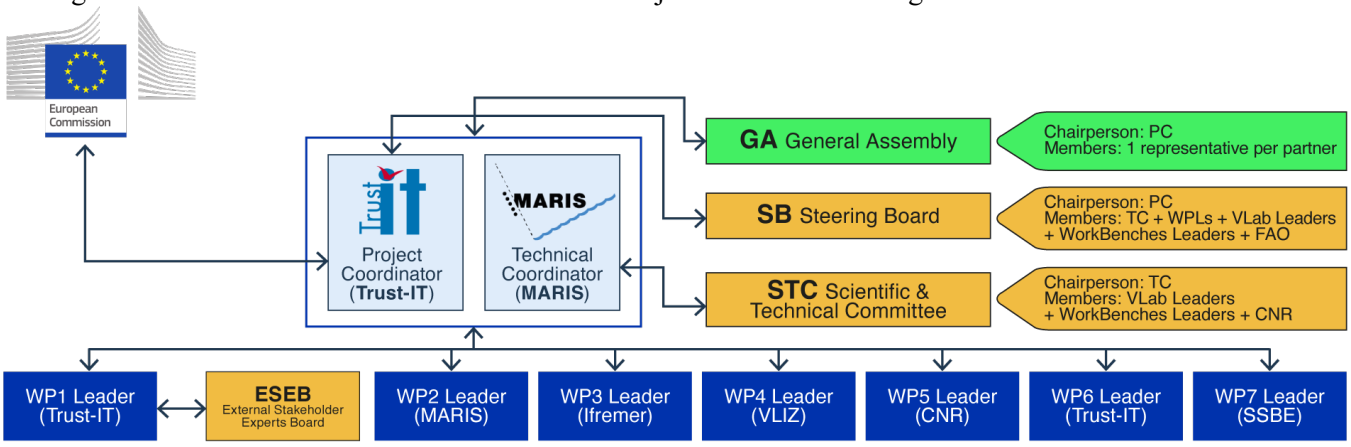

Figure 14 – Blue-Cloud 2026 Organisational Structure

The PC and TC are supported in their project management, respectively, by the **Steering Board (SB)**, chaired by the PC, and by the **Scientific and Technical Committee (STC)**, chaired by the TC. In particular, the STC supports all technical decisions linked to implementation of the workplan, whereas the SB provides strategic orientation of the project, ensures overall quality of the project deliverables, defines, assesses and updates the project workplan, maintains sound financial and administrative control of the project, assesses the overall dissemination, exploitation and communication strategy, monitors objective achievement and impact measurement, sustainability issues and conflict resolution procedures. As an extraordinary member of the SB, **FAO (Anton Ellenbroek)** will also ensure commitment of Blue-Cloud 2026 towards FAO's new Blue Transformation priority program area for sustainable

fisheries and aquaculture, and the UN Biodiversity Beyond National Jurisdictions (BBNJ) process. Whereas all **WP Leaders (WPLs)** are involved in SB meetings, they will normally convene monthly WP phone calls, although meetings may be convened at any other time, as needed. Lastly, **Task Leaders (TLs)** will be appointed, driving project activities and making sure that all participating partners contribute as per their role and allocated effort.

3.2.4. External Stakeholder Experts Board (ESEB)

Considering the productive experience registered in its predecessor project, the Blue-Cloud 2026 Consortium shall be supported by an ESEB**,** made up of 12 dynamic, high-level opinion leaders at EU and global level, with a proven track record in their field and with strategic positioning at policy level. The ESEB will regularly meet, only virtually, every six months and at the 2 roadmap and task force workshops. The ESEB will:

- Provide advisory steering & coaching advice to Blue-Cloud 2026 to evaluate progress provide insights and suggest synergies, to widen the community with other relevant initiatives in EU and globally advising on strategic global trends, acting as **Blue-Cloud Ambassadors**;
- Contribute, where applicable, to the Blue Cloud Strategic **Roadmap and policy workshops organised**;
- Participate in webinars as invited speakers and contribute valuable content in any physical meetings/workshops/events organised;
- They will be selected according to the technical challenges of the Blue-Cloud Hackathon to participate as members of the Jury;
- Maintain **confidentiality** on all technical and business information and material exchanged.

The figure shows the ESEB members that are already part of Blue-Cloud 2026. Each member will sign a standard contract. **Kate Larkin (SSBE and EMODnet secretariat), will chair the ESEB**, lending both her experience and influence to maintaining momentum and ensuring impact of the Board. The project has earmarked a conservative budget for payment of 9 person-days of effort (@450€/day) for the project duration for 12 people. It will be fully operational with 12 members from project kick-off, with two more experts enrolled for their competence in DTO.

Figure 15 – The Blue-Cloud 2026 External Stakeholder Experts Board (ESEB)

3.2.5. Quality Management

Quality assurance processes & procedures will be addressed in the "**D1.1 – Project Handbook**", in a dedicated "**Quality Plan**" section. The document will be finalised in M01 to ensure that all Partners adopt the same practices, conventions, project management approach (which will be based on the PM^2 methodology, see WP1), including production & peer review of deliverables. Periodic reporting to the EC will address quality management issues, including aspects of resources allocation and expenditure by all beneficiaries, affiliated entities, and associated partners, as well as highlights of any serious deviations of the work plan, including risks and contingencies.
Implementation of the plans to manage knowledge, the Blue-Cloud 2026 community-related activities, as well as **IPR issues** is under the responsibility of the TC, and ultimately of the SB, and is addressed in the Blue-Cloud 2026 Consortium Agreement (CA), signed before Grant Agreement. The **Conflict Resolution** process will be dealt with in the CA.

3.2.6. Support Tools

Some project support tools will be provided at the start of the project, documented in the Project Handbook.

Tool	Notes
Project management	• JIRA for agile working (tasks & priority management). • Cryptpad (www.cryptpad.fr) for Actions & Minutes + Owncloud for repository.
Tracking	• KPI tracker for the project's measurable impacts • Google Analytics for the project's website (www.blue-cloud.org) KPIs.

Table 17 – Support tools