

**Getting knowledge from data by
developing and running VREs**

**THE OCEAN RACE - GENOVA THE
GRAND FINALE 2023**

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the European Union



FUTURE OF THE SEAS
& OCEANS INITIATIVE



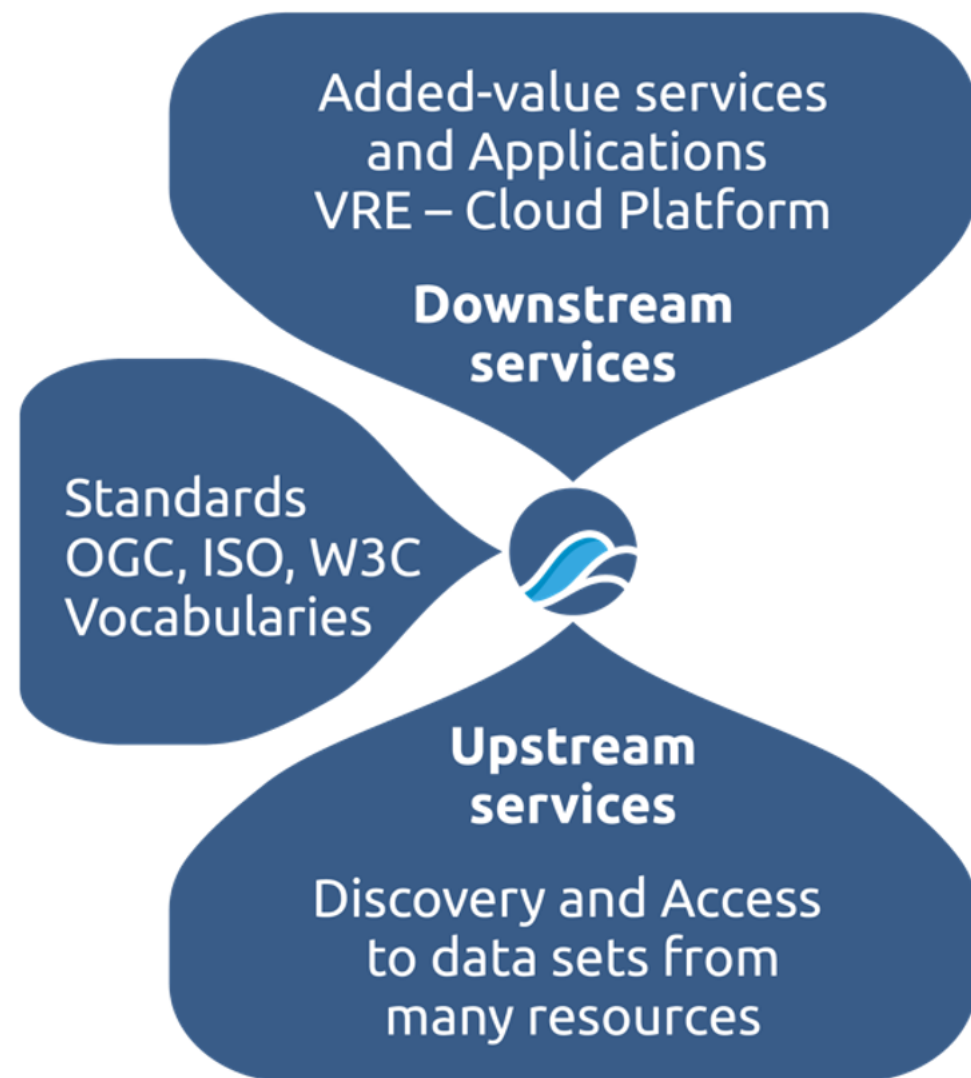
2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development

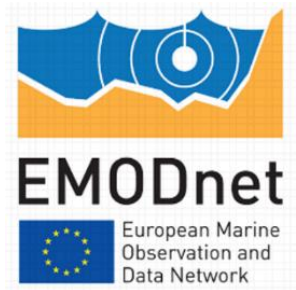


EUROPEAN OPEN
SCIENCE CLOUD

- To explore and demonstrate the potential of **cloud based open science** supporting research for ocean sustainability, and UN Decade of the Oceans and G7 Future of the Oceans
- To deploy a **cyber platform with smart federation** of multidisciplinary data repositories, analytical tools, and computing facilities
- To develop a **marine thematic European Open Science Cloud (EOSC)** serving the blue economy, marine environment & marine knowledge agendas

- Developing and deploying a Virtual Research Environment (VRE) with an array of services for configuring and running virtual labs for specific analytical workflows, use cases and demonstrators
- Applying common standards and interoperability solutions for providing harmonized metadata and data
- Developing and deploying harmonized discovery and access to established European marine data management and processing infrastructures



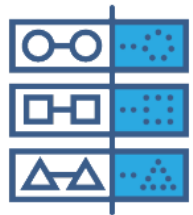


Blue Data infrastructures

E-infrastructures



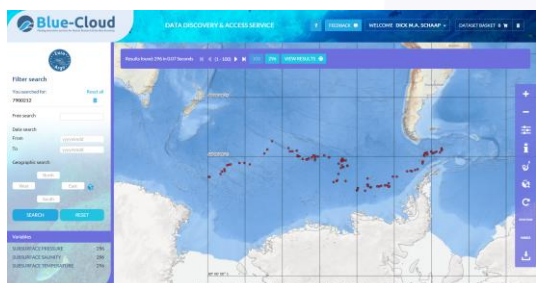
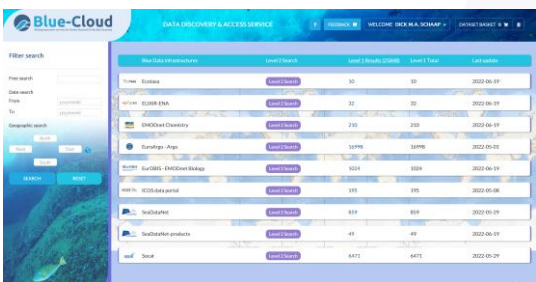
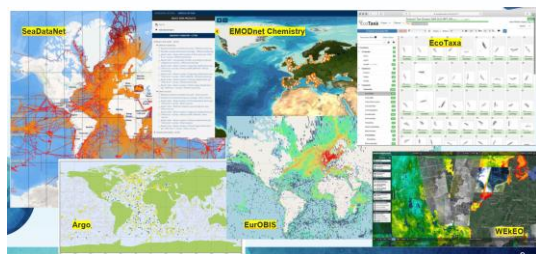
- **Blue-Cloud Data Discovery & Access service**, federating key European data management infrastructures, to facilitate users in finding and retrieving multi-disciplinary datasets from multiple repositories



- **Blue-Cloud Virtual Research Environment infrastructure** to provide a range of services and to facilitate orchestration of computing and analytical services for constructing, hosting and operating Virtual Labs for specific applications



- **Blue-Cloud Virtual Labs**, configured with specific analytical workflows to serve as **Demonstrators**, which can be adopted and adapted for other inputs and analyses



Facilitates users:

- Federated search for discovering interesting data sets (currently more than 10 million) in a two step approach
- Federated retrieval of identified data sets using a shopping basket mechanism
- Download of data sets or push to Blue-Cloud VRE

Facilitates managers of Blue Data Infrastructures:

- Wider outreach to potential users
- Stay informed about data requests and users for their repository
- Periodic reporting of downloads from their repository

Blue-Cloud DATA DISCOVERY & ACCESS SERVICE

Filter search

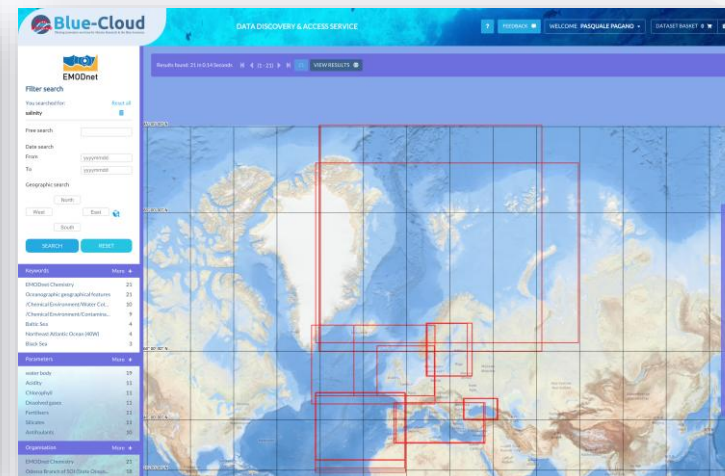
Free search:

Date search: From To

Geographic search:

SEARCH RESET

Blue Data infrastructure	Level 2 Search	Level 1 Results (22/01/21)	Level 1 Total	Last update
EOSC Eotaxia	Level 2 Search	10	10	2022-01-17
ELIXIR-ENA	Level 2 Search	32	32	2022-01-17
EMODnet Chemistry	Level 2 Search	207	207	2022-01-02
EuroArgo - Argo	Level 2 Search	16556	16556	2021-11-21
EuroBIS - EMODnet Biology	Level 2 Search	927	927	2022-01-17
ICOS - ICOS data portal	Level 2 Search	180	180	2022-01-17
SeaDataNet	Level 2 Search	849	849	2022-01-02
SeaDataNet products	Level 2 Search	49	49	2022-01-17
SoCal	Level 2 Search	6471	6471	2022-01-10



Complete your order

SEARCH FOR MORE

Results found: 516 (1-100)

#	Order #	BDN	Dataname	Source	Dataname	ID
22987	426	SeaDataCloud Black Sea Temperature and Salinity Climatology V2	North Sea - Eutrophication and Acidity aggregated datasets 1921/2020 v2021			
22986	426	Black Sea gridded climatology decades - for cold intermediate content at 1/8°	Arctic Ocean - Contaminants aggregated datasets 1974/2015 v2018			
22985	426	Mediterranean Sea - Temperature and salinity Historical Data Collection SeaDataCloud V1	Baltic Sea - Contaminants aggregated datasets 1974/2018 v2021			
22984	426	Baltic Sea - Temperature and salinity observation collection V2		IT	02-11-2021 16:20	Downloaded 13-12-2021 16:05
22983	425	A011185h.baz	RNODC_Bottle_11185_13_6	IT	02-11-2021 16:20	Downloaded 13-12-2021 16:05
22982	425	RNODC_Bottle_10855	RNODC_Bottle_10855_18	IT	02-11-2021 16:20	Downloaded 13-12-2021 16:05
22981	424	RNODC_Bottle_10855	RNODC_Bottle_10855_1	IT	02-11-2021 16:19	Downloaded 13-12-2021 16:05
17835	417	EuroBIS Asteroida distribution data from: Deep-sea fauna of European seas - an annotated species check-list of benthic invertebrates living deeper than 2000 m in the seas bordering Europe		IT	27-10-2021 11:03	Downloaded 02-12-2021 15:57

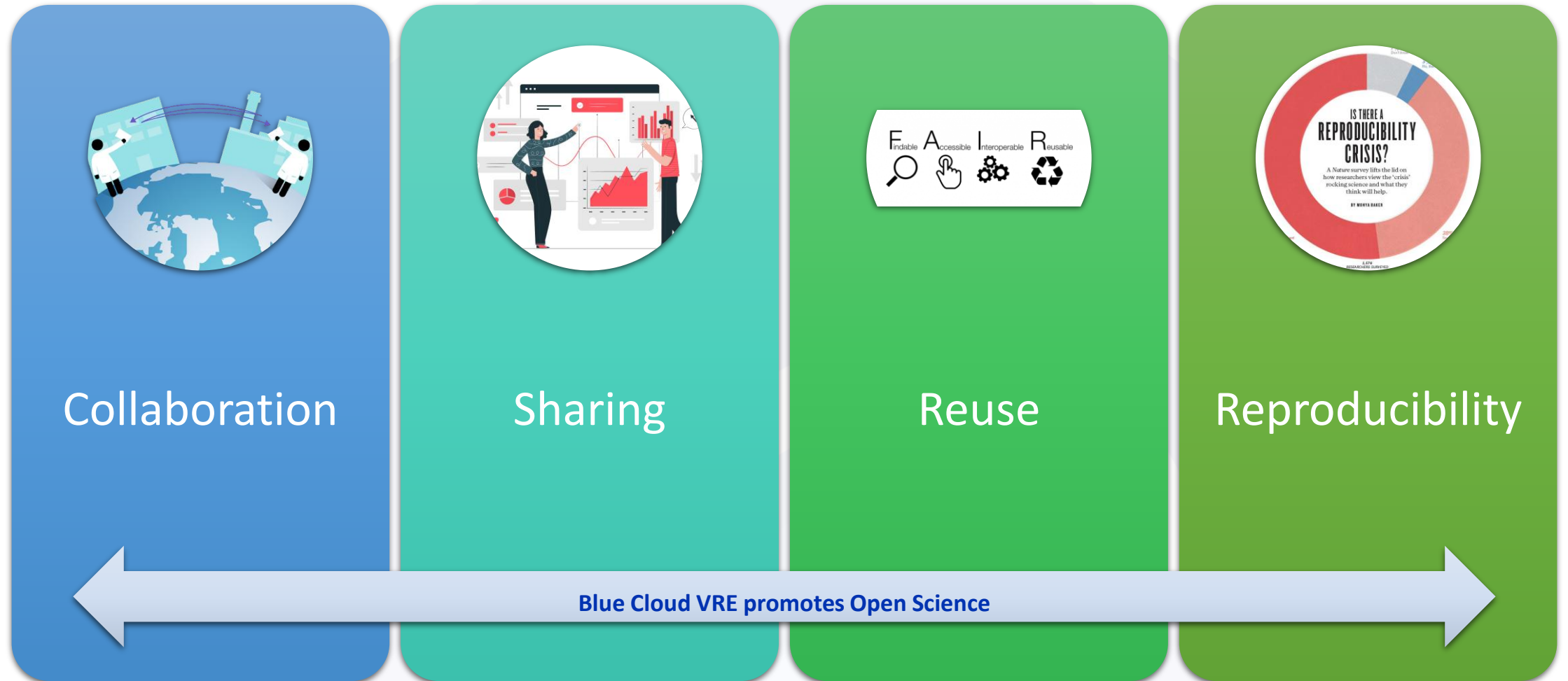
Compose and submit shopping request at the granule level



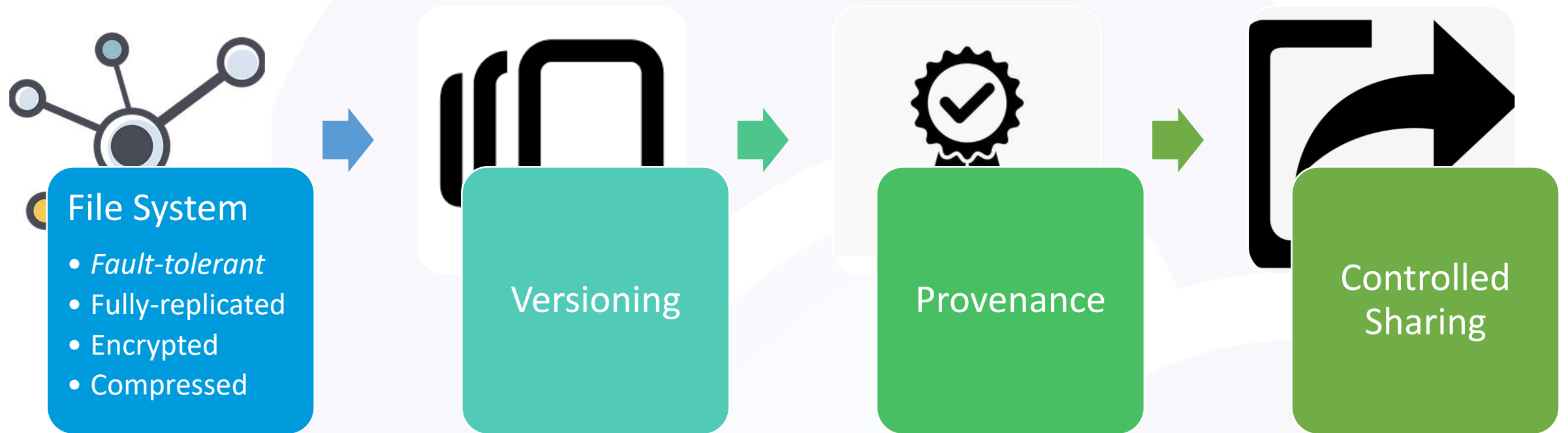
Retrieve the datasets by downloading from the Dashboard



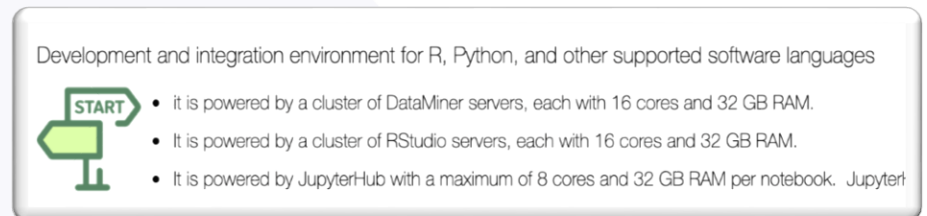
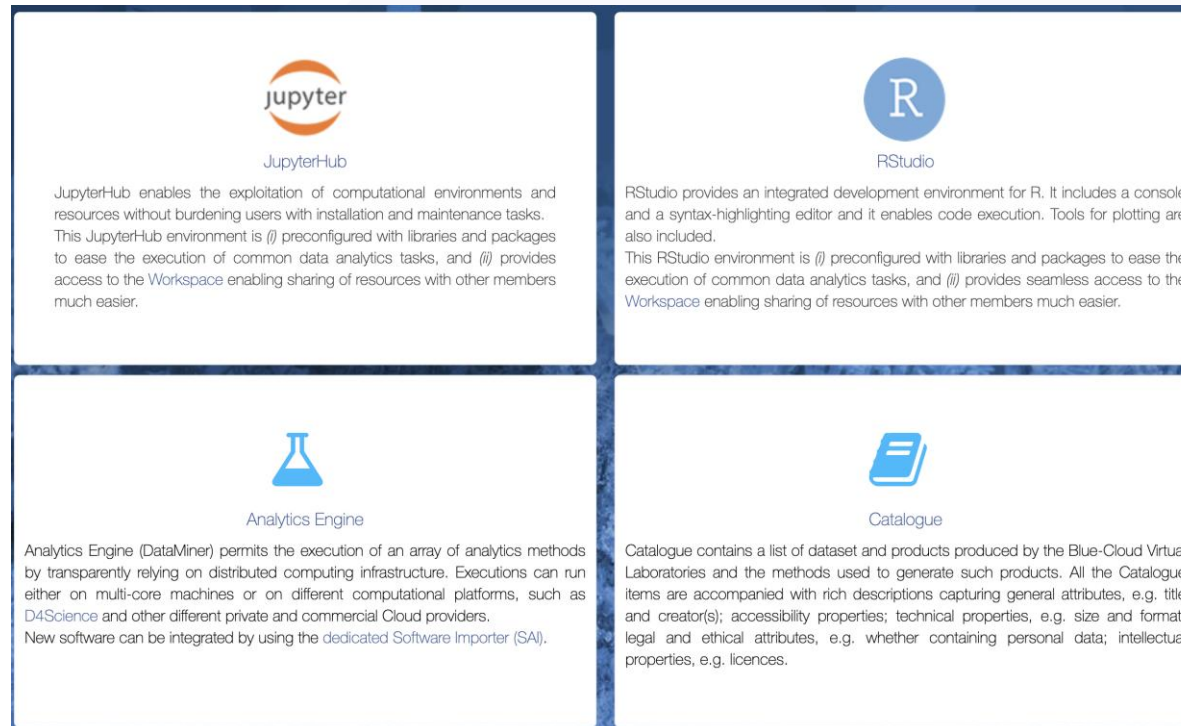
Push datasets to the Blue-Cloud VRE Data Pool

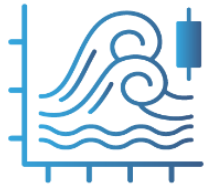


- Common **workspace** and **dataspace** to easily exploit technologies and services not designed to work together



- interactive notebooks via JupyterHub and community-specific applications delivered as a Docker container extend the Analytics framework





Marine Environmental Indicators



**Zoo & Phytoplankton
EOV products**



Aquaculture Monitor



**Fish a matter
of scales**



**Plankton
Genomics**

5 Virtual Labs



3+10 hackathon pilots

Sea Clearly

Sea Clearly focuses on providing an environmental impact assessment tool to determine locations for lowest probability of plastic pollution from two perspectives: 1) Plastic pollution reaching aquaculture cages and 2) Plastic pollution from cages reaching Marine Protected Areas (MPAs)

Partners:

Data sources through Blue-Cloud:
Copernicus Marine Service and EMODnet

PerfeCt - Performance of Aquaculture under Climate change

PerfeCt is an innovative geospatial web application built to forecast the effects of climate change on key aquaculture performance factors and help stakeholders determine future conditions for aquaculture at a given site.

Partners:

Data sources through Blue-Cloud:
Copernicus Marine Service, Copernicus Climate Service, EMODnet

The Wildlife Tracker for Oceans

The "Wildlife Tracker" is a cloud geo-framework dedicated to Marine Protected Areas (MPAs) management based on biologging and ocean satellite data. The platform offers a unique opportunity to overlay and enrich the movement tracks of wildlife over ecogeographical data layers such as Phytoplankton hot spots to observe in near real-time what may be influencing the animal activities and to spatially assess their meaningful habitats as MPAs.

Partners:

Data sources through Blue-Cloud:
The Global ocean three-dimensional (3D) key phytoplankton product of chlorophyll-a (Chl-a) concentration, as a proxy for total phytoplankton biomass from Vlab.

Synergies with E-infrastructures, Blue Data Infrastructures, and EU-funded projects



- The federation of BDIs by the **Blue-Cloud Data Discovery & Access service** has demonstrated its feasibility and indicated that more can be gained by streamlining and expanding the discovery and access processes at connected BDIs, in particular their web services.
- The modular architecture of the **Blue-Cloud VRE** is scalable and sustainable. It provides a platform for configuring more dedicated VLabs, and targeting broader (groups of) users, both developers and users, interested in elaborating VLab results.
- The **pilot Blue-Cloud project** has also confirmed that the EU marine community is interested in further exploring and exploiting this potential for accelerating knowledge and science-based solutions to aquatic challenges.

Blue-Cloud Mission to 2030

Blue-Cloud will evolve as a **key component of Europe's FAIR marine digital knowledge ecosystem**, providing a flagship community of practice and incubator for data analysis and modelling methods in support of applied research of the ocean, European seas, coastal and inland waters.

It will contribute to the successful evolution of the (digital) marine knowledge system required to support the EU Green Deal and the UN Agenda 2030, becoming a key link in:

- Making ocean & freshwater digital commons accessible to the wider scientific community via **EOSC**
- Supporting the development of analytical services and/or Digital Twins that add value to the core **European Digital Twin of the Ocean (EU DTO)** to inform policy making in the delivery of societal objectives



MISSION: To develop further the European federation of marine and inland water data management infrastructures & high quality services



A1. DD&AS

A FAIR compliant Data Discovery & Access Services > access to 10+ million open data sets & products by 13 major BDIs



A2. VRE

An Open Science Virtual Research Environment (VRE) federating multiple e-infrastructures > supporting Analytical Big Data Workbenches & VLabs



A3. EOVS

3 EOVS Workbenches for highly qualified data collections

3.000 DATA ANALYTICS SESSIONS PER MONTH - 5,000 HTC DATA ANALYTICS JOBS PER MONTH

A4. VLABS - FIVE DOMAIN-BASED VIRTUAL LABS



Coastal Ocean observations along Europe



Coastal currents from observations



Carbon-Plankton Dynamics



Marine Environmental Indicators



Global Fisheries Atlas



A7. COMMUNITY

- All EU countries engaged
- 3k+ engaged Blue-Cloud community users
- 5k+ followers across all the platforms
- 10+ External Stakeholders



OUTREACH

- 1 Blue-Cloud Hackathon
- 1 Blue-Cloud TV
- 18 Newsletter issues
- 11 Webinars on Blue-Cloud VRE, DDAS & EOVS Workbenches
- 3 Blue-Cloud Annual Impact Events
- 3 Ocean Literacy Webinars
- Videos & Interviews



A6. TRAINING ACADEMY & CATALOGUE

- 3 Online training course on Best Practices for FAIR data principles
- 3 Info session & course on the EOVS Workbenches
- 2 online webinars dedicated to the BlueCloud VRE
- 2 dedicated to the DDAS and the innovations introduced
- A series of training sessions on how to use the VLabs

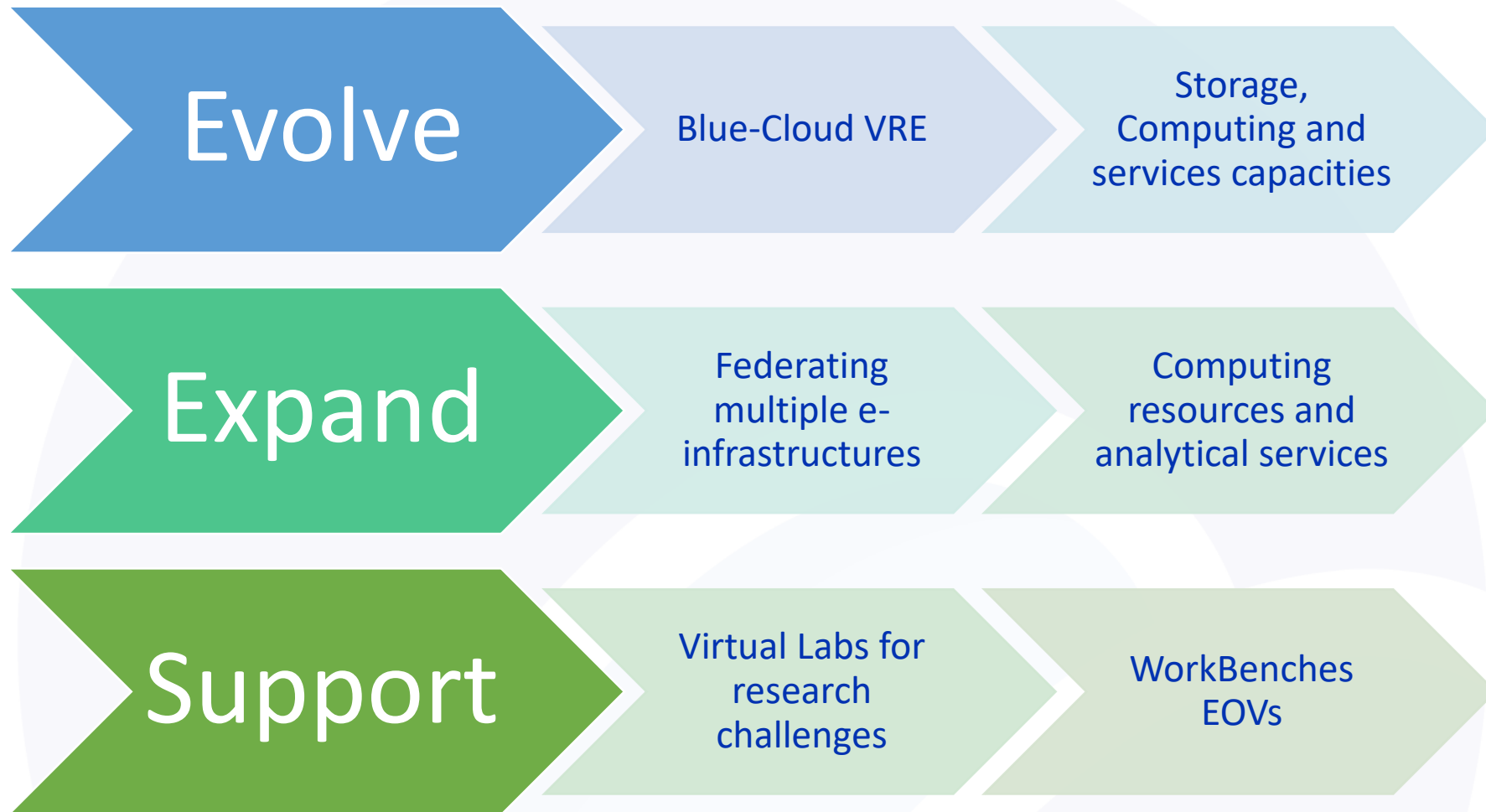


POLICY

- Scientific papers & articles
- Restoring healthy oceans, seas, coastal & inland waters in Europe
- Strategic Roadmap 2030
- Cross-domain expansion factsheets
- Sustainability Business model

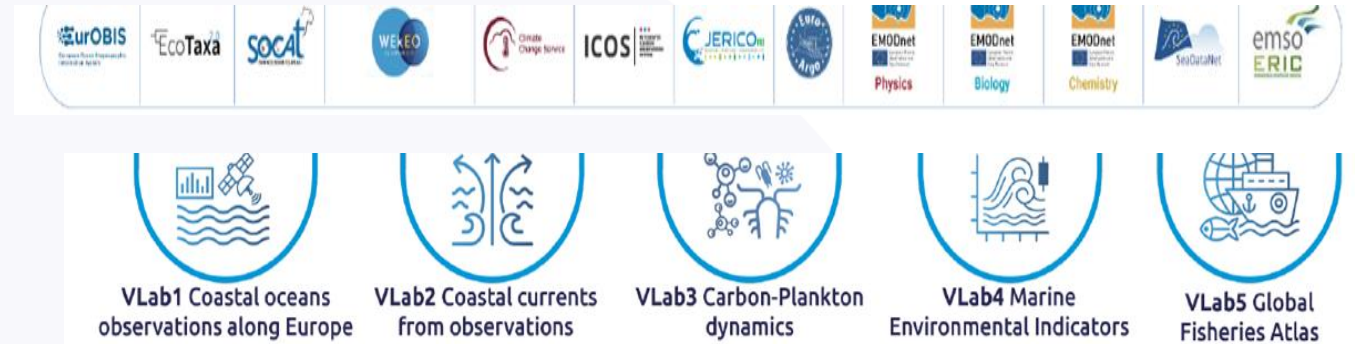
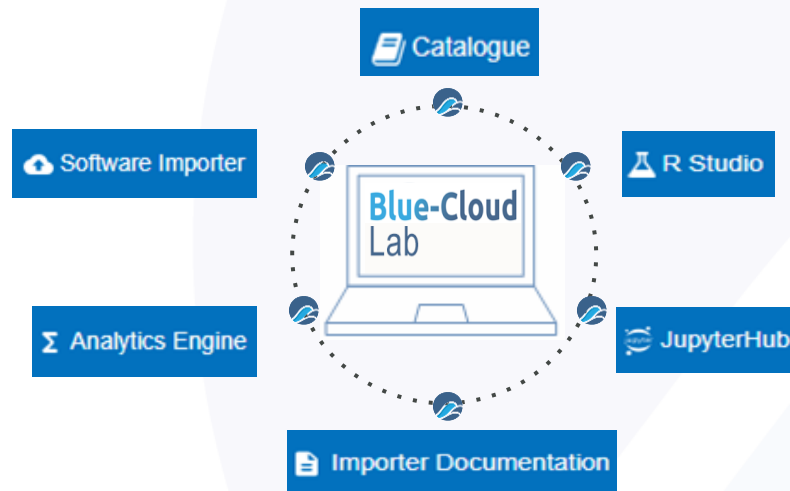


DTO Task Force



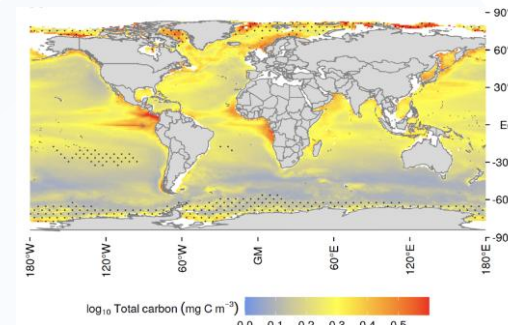
The power of the Blue Cloud and its services will be showcased by developing 2 new VLabs (Vlabs 1-2) in the Blue Cloud VRE, and advancing Vlabs 3-4-5

Vlabs make use of **marine multidisciplinary data** from BDIs and other resources, offering **innovative data products** and **analytical tools** in the Blue Cloud VRE, demonstrating the added-value of web-based open science.



Blue-Cloud analytical WorkBenches will be established for data intensive processes:

- developing, validating, and documenting new Blue-Cloud analytical Big Data **WorkBenches**, together with EMODnet, Copernicus Marine, and LifeWatch experts, for regularly producing sets of harmonised and validated **data collections** for a selection of **Essential Ocean Variables (EOVs)** in physics, chemistry, and biology
- resulting in high quality EOV collections, instrumental for analysing the state of the environment as undertaken by EMODnet and Copernicus Marine, use by wider research community, and numerical simulations as planned by the Digital Twins of the Oceans (DTO).
- **EOV workbench for physics: temperature and salinity**
- **EOV workbench for eutrophication: chlorophyll, nutrients, oxygen**
- **EOV workbench for ecosystems (plankton)**



- Blue-Cloud 2026 actively stimulates synergies with other EU projects and research communities
- They are invited to explore the Blue-Cloud services and to make use of these, e.g. by using existing Vlabs for their analyses or by developing their own Vlabs, making use of the Blue-Cloud computing, analytics and data facilities
- This will expand the Blue-Cloud community and its added-value for the Blue environment and economy

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Blue-Cloud 2026 Consortium

PROJECT COORDINATION OFFICE



A solid, multidisciplinary, committed team of 40 partners from 13 EU countries

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blue-cloud.org



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