



# **Executive Summary Blue-Cloud Draft Strategic Roadmap**

**Public Consultation | Summer 2021**

Take the survey to  
shape the future  
of Blue-Cloud!





**Blue-Cloud**  
Paving innovation services for Marine Research & the Blue Economy

## Blue-Cloud 2022 in a snapshot: Added value, web-based Open Science services and sample use-cases

Blue-Cloud  
Mission Statement  
2022

"To promote the sharing of data, processes and research findings in the marine domain by delivering a collaborative web-based environment that enables Open Science, underpinned by simplified access to a wealth of easily discoverable and interoperable marine data and products".

### Blue-Cloud Core Services

#### Blue-Cloud Data Discovery & Access Service

Single access point to broad range of datasets from key EU marine data and research infrastructures

#### Blue-Cloud Virtual Research Environment

A cloud-based, analytical and publishing framework - sharable Python, R and Jupyter notebooks hosted on a virtual machine underpinned by powerful computing resources - for constructing, hosting and operating virtual laboratories, which use Blue-Cloud core services to deliver domain specific services: co-designed analytical workflows, algorithms and data products for specific purposes.

### Blue-Cloud Virtual Labs offering domain services

- Zoo and Phytoplankton Essential Ocean Variables
- Plankton genomics
- Marine Environmental Indicators
- Global Tuna Fisheries Atlas Virtual Lab
- Global Record of Stocks & Fisheries
- Aquaculture Cage Detector

### Target Users

(non-exhaustive)  
Scientists & researchers  
Scientific researchers  
Operational marine & maritime researchers  
Data analysts  
Policy, decision making & Ocean governance  
Environmental Protection Agencies  
Marine Policy Officers  
Regional Fisheries Organizations & Advisory Organizations  
Data managers in spatial advisory units for MSP  
Blue industry & SMEs  
Aquaculture companies  
Offshore industries  
Research software engineers  
System developers

Marine Data & Research Infrastructures currently engaged in Blue-Cloud



EU Marine Knowledge Value Chain

Make observations  
Data acquisition

Store and organize  
Data management & services

Analyse & develop applications  
Analysis, models, innovation

Report & uptake  
Applications

Impact

## Demonstrating the potential of web-based Open Science in the marine domain

Credit: Seascope Belgium

Needs to deliver advice based on the evolution of an SDG indicator, monitoring its evolution over a 10-year timeframe



Needs to deliver an Environmental Impact Assessment for an aquaculture company planning new sites, requiring water quality data from different locations at 2-month intervals and sharing analysis with colleagues in a confidential environment

(Non-exhaustive) examples of Blue-Cloud users & needs serviced

Wants to discover new climatic indicators based on machine learning and is looking for simplified ways of analysing oceanographic data

Operational Researcher



POLICY

Policy implementation & monitoring  
Research to policy

Environmental impact Assessment  
Industry to policy

RESEARCH

Project Manager



INDUSTRY

Wants to monitor environmental parameters around an industrial off-shore facility and requires marine data from different locations

### Blue-Cloud

Blue-Cloud Domain Specific Services (2022)  
Supporting users in their quest to find solutions to (societal) challenges in the marine domain



### Blue-Cloud Core Services

#### Data Discovery & Access Service

Building on existing marine data & research infrastructures

#### Virtual Research Environment

Enhancing computing power and web-based analytical tools to support collaborative research & modelling

### Societal Value (non-exhaustive)

**EU Green Deal**  
Climate Neutrality 2050  
Sustainable Blue Economy  
Farm To Fork Strategy  
Biodiversity Strategy  
Marine Strategy Framework Directive  
Marine Spatial Planning Directive  
**UN Agenda 2030**  
SDG 2 (Zero Hunger)  
SDG 13 (Climate Action)  
SDG 14 (Life Under Water)  
**G7 Future of Seas & Ocean Initiative:**  
Ocean observations  
Ocean modelling & forecasting



# Blue-Cloud 2030: The Road Ahead

## Strategic framework towards shaping the future evolution of Blue-Cloud

From demonstrating the potential of Open Science in the marine domain to realizing its full potential in support of the EU Green Deal and UN Agenda 2030.






### Blue-Cloud Mission Statement 2022

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### Blue-Cloud Mission Statement 2030

"To contribute towards a European cloud-based data space that provides access to a thriving portfolio of analytical, simulation and visualization capabilities underpinned by seamless access to a wealth of FAIR, transdisciplinary ocean and freshwater data, enabling Open Science to deliver knowledge, innovation, collaboration, science-based policies, public awareness and citizenship for a safe, healthy, productive, predictive and transparent Ocean, in support of the EU Green Deal and the UN Agenda 2030".

#### Blue-Cloud Key Assets

 Data Discovery & Access Service	Establish dialogue with key "blue" data infrastructures towards aligned metadata standards and APIs	.....
 Catalogue	Show path towards connectivity with EOSC as thematic community	.....
 VRE & Virtual Labs	Demonstrate societal value through Blue-Cloud demonstrators & deliver exploitation plan	.....
 Community	Build the case for Open Science and win buy-in from marine science and data community	.....
 Roadmap	Establish dialogue and synergies towards long-term vision and collaboration	.....

#### Strategic pillars towards delivering Blue-Cloud Mission Statement 2030

1	Sustain flow of FAIR and open Ocean Data into Blue-Cloud Open Science ecosystem
2	Federate (with) "blue" data infrastructures and e-infrastructures
3	Promote wealth of Open Science applications and capitalize on Blue-Cloud to service Open Science in the marine domain
4	Build a thriving community of Ocean Open Science practitioners and users leveraging on skills, incentives and rewards
5	Connect and align with wider developments and other communities to bring in state-of-the-art and contribute experience

2022

2030

Specific actions around each strategic pillar will be identified through wide public consultation, leading to policy recommendations for the future evolution of Blue-Cloud into the decade.

Take the survey to shape the future of Blue-Cloud!



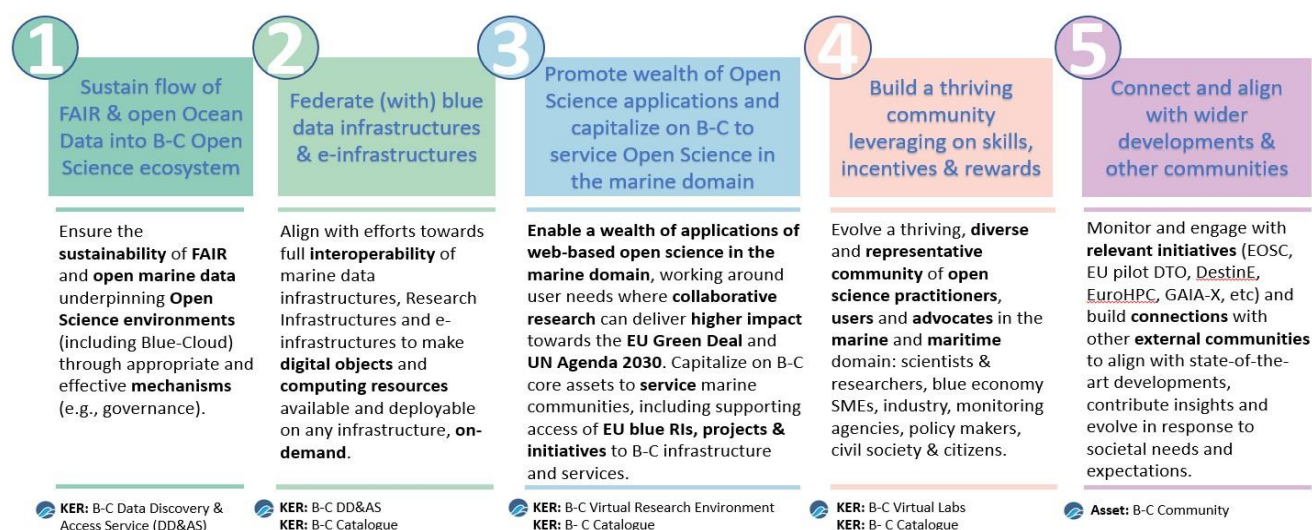
Credit: Seascope Belgium



# Executive summary

The **Horizon 2020 Blue-Cloud (B-C) project** launched in October 2019, aiming to **demonstrate the potential of web-based Open Science in the marine domain**. To deliver on this objective, it is **piloting** the development of a **web-based cyber platform** that will provide marine scientists with enhanced **analytical capabilities**. It will facilitate their engagement in **collaborative research** and will provide them with access to powerful **cloud-computing resources**, a range of **analytical tools** and **simplified access to multi-disciplinary data** from *in situ* and satellite-derived observations to model outputs. B-C is co-designed by, and builds on, existing European capability, including trusted data services EMODnet, CMEMS and other key research and data infrastructures and e-infrastructures. In the **short-term**, the project is building this cyber platform by means of a smart federation of selected, multidisciplinary data repositories, analytical tools and computing facilities. The added-value of B-C will be demonstrated by five specific “demonstrators” or use-cases. In the **medium- and long-term future**, B-C aspires to upscale this cyber platform, its resources, services and applications, together with a thriving community of Open Science service providers and users. B-C will evolve to further align with wider developments at European level to catalyse **transformative solutions** to priority **societal challenges** and unravel **new opportunities for innovation**, in support of the **EU Green Deal** and **UN Agenda 2030**. To guide the long-term capitalization and further development of this ambition into the future, the Blue-Cloud Project is producing a **roadmap to 2030**, which is being developed as a **co-designed, community-oriented policy document** with substantial stakeholder consultation and input. This document is a first **B-C Draft Strategic Roadmap**, which is being launched for public consultation from June to September 2021. For this reason, this document should not be seen as a **preliminary blueprint**, but rather as an intermediary step towards gathering **input, feedback and insight** from the **B-C Community** towards its evolution and grounding, benefiting from wide stakeholder input.

**Section 1** presents the process followed towards the development of the roadmap. **Section 2** reflects on the **policy context** that motivates the **Blue-Cloud’s** efforts, exploring the emergence of **Open Science** and the opportunities it brings in **support** of the **European Green Deal** and the **United Nations Agenda 2030 for Sustainable Development**. It also introduces the **added value** that **Blue-Cloud** will contribute towards seizing these opportunities through its **core assets** and **services**. **Section 3** reflects on an overarching **vision** that could guide the **future capitalization** and further development of these assets, working around five **strategic pillars** of action to support successful Open Science in the marine domain and inviting **feedback** and **contributions** towards grounding **B-C’s Strategic Roadmap to 2030**.



*Blue-Cloud Key Exploitable Results (KER) & strategic pillars of action towards delivering Blue-Cloud Mission Statement 2030*

A **Technical Annex** is provided as additional reading for stakeholders who are less familiar with Blue-Cloud's landscape and its offering, providing additional insight into Europe's marine knowledge value chain and the **services and technological and demonstrative assets** that the Blue-Cloud project will bring as added value to this landscape by 2022.

As the **first early draft "roadmap"**, this document sets the stage for, but **does not yet include, policy recommendations**, which will be the core content of the final roadmap. This current format is used for a better understanding of the Blue-Cloud efforts, **inviting feedback and contributions** from the **B-C Project Consortium**, the **B-C External Stakeholder Expert Board**, **users** of B-C services and **related projects and initiatives** with whom the project is in dialogue, but also from organizations and professionals **not yet directly engaged** in Blue-Cloud, but who could be interested in joining its efforts and/or benefitting from the use of its **assets** in the future. The **policy recommendations** for the final B-C Roadmap to 2030 will be drafted from community responses to the public consultation, in particular to the following key questions:

- How should **Blue-Cloud** evolve to support a **thriving ecosystem** for web-based **Open Science** and **Open data** in the **marine domain**?
- What additional **mechanisms** (e.g., governance) could add value to the existing EU long term marine data services to further ensure the **sustainability** of **FAIR Ocean data** underpinning B-C's Open Science environment and services? What additional mechanisms could best contribute to a broad **alignment** of the **marine community** towards future **EU pilot DTO** and **DestinE** developments?
- What **applications** of **Open Science** in the **marine domain** could have a higher probability of success, given current availability of data, models and actors willing to engage in collaborative science, across a broad range of topics? Which of such applications should be prioritized towards addressing current **user needs** and delivering **highest societal impact**?
- How should B-C's Open Science environment and services evolve to be fit-for-use not only for scientists, but also for other Open Science users such as **policy makers** and **blue economy SMEs and industry**? What needs do these users have that B-C could evolve to address? What **skills, incentives** and **rewards** can contribute to bring Open Science practitioners on board?
- How can B-C evolve to **further connect** with **marine data infrastructures** and **research infrastructures** to deliver full interoperability of marine data through the **B-C Data Discovery & Access Service**, aligning and in collaboration with other **international efforts**?
- What actions would be required to enable **B-C's Catalogue** of **analytical methods, algorithms** and **applications** to be **deployed in EOSC**, but also in other infrastructures -**closer to data-** or across **supercomputing platforms** in Europe?
- How should **B-C's assets** evolve to align with future **EU pilot DTO** and **DestinE** developments and other relevant, wider initiatives?

#### Join us in shaping the future of Blue-Cloud:

Bring **your views** and **opinion** on these questions and have your say on shaping **strategic policy recommendations** towards the future development of Blue-Cloud, so it evolves to deliver on your **needs** and **expectations**. Take the survey and provide feedback to the end of **September 2021**:

<https://www.blue-cloud.org/form/blue-cloud-roadmap-2030-2nd-online-consultation>

**Would you like to know more?** Read the full Blue-Cloud Draft Strategic Roadmap:

<https://data.d4science.net/VEBM>

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