BLUE MISSION BANOS

Supporting the Mission Ocean Lighthouse in the Baltic and North Sea Basins

Deliverable 1.6
Draft Knowledge and Data Management Plan

Grant Agreement number	**101093845**
Project title	BlueMissionBANOS – Supporting the Mission Ocean Lighthouse in the Baltic and North Sea Basin
Deliverable title	Draft Knowledge and Data Management Plan
Deliverable number	1.6
Deliverable version	1
Contractual date of delivery	30.11.2024
Actual date of delivery	23.12.2024
Document status	Final
Document version	Version 1
Online access	Yes
Diffusion	Public
Nature of deliverable	Public
Work Package	1
Partner responsible	University of Southern Denmark (SDU)
Contributing Partners	All
Author(s)	Maéva Vignes, Lionel Jouvet, Alexander Dernild, and Luisa Zeppelin (SDU)
Project Officer	Daniele De Bernardi
Editor	Frances Klatt, SUBMARINER
Approved by	Angela Schultz-Zehden, SUBMARINER
Keywords	BlueMissionBANOS, Mission Ocean, Data Management Plan, FAIR, Ethics

History of Changes		
Version	**Publication date**	**Changes**
1.0	25.11.2024	Draft deliverable completed
2.0	20.12.2024	Deliverable completed with additions following partner meeting in November 2024
2.1	23.12.2024	Deliverable submitted

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

BLUE MISSION BANOS

TABLE OF CONTENTS

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

BLUE MISSION BANOS

LIST OF ACRONYMS

BMB	BlueMissionBANOS – Supporting the Mission Ocean Lighthouse in the Baltic and North Sea Basin
DMP	Data Management Plan
KDMP	Knowledge and Data Management Plan
AGA	Grant Agreement Model
CA	Consortium Agreement
GA	Grant Agreement
OA	Open-Access
SDU	University of Southern Denmark
IP	Intellectual Property
WP	Work Package

LIST OF FIGURES

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

BLUE MISSION BANOS

EXECUTIVE SUMMARY

The objective of D1.6 is to present an updated draft of the Knowledge and Data Management Plan (KDMP) for review by all project partners. This draft has been developed using a free Data Management Template from DMPonline (a tool for writing data management plans, available at https://dmponline.deic.dk/) and with the support of the Data Management team at the University of Southern Denmark.

In alignment with EU policies and best practices, this KDMP encompasses:

a. Guidelines for handling research data during and after the project. b. Specifications of data types to be stored and shared. c. An explicit declaration regarding whether data will be shared or made open access.

Throughout the BMB project, partners will strategically gather data from EU, national, regional, and local open-access public databases or share their internal data. The data collection will encompass a wide range of information, including project details, funding opportunities, policies, stakeholder information, citizen science activities, and relevant private and public services and products. Each collected data point is essential to our project objectives, and we will ensure these diverse datasets are appropriately integrated, managed, and protected within a centralized database.

Our project adheres to the FAIR data principles (Findability, Accessibility, Interoperability, and Reusability) and emphasizes robust intellectual property rights (IPR) management.

Findability: Each dataset will be systematically indexed with unique and persistent identifiers, enhancing its discoverability by relevant parties. Rich metadata will be created and associated with each data record to improve findability.

Accessibility: We are committed to open data principles and will strive to provide access to data and metadata, subject to appropriate security and privacy regulations. Our data will be accessible via a well-documented and standardized API, ensuring users can easily access and understand the data. Where restrictions apply, a comprehensive justification will be provided.

Interoperability: To facilitate the integration and use of our data with other datasets, we will adhere to recognized data standards, formats, and vocabularies where possible. This approach ensures our data can be combined with other datasets, thereby increasing its value and potential for synergy.

Reusability: Our data will be accompanied by clear usage licenses (defaulting to Creative Commons CC BY-NC), providing clarity on the conditions of reuse. Metadata will include sufficient information to allow future users to understand the original study and replicate the methods if needed.

In terms of IPR Management, our project recognizes the importance of appropriate protections to safeguard the interests of all stakeholders. We will ensure compliance with all relevant IPR regulations, addressing ownership, licensing agreements, patents, copyrights, privacy concerns, and security. We will identify, assess, and manage IPR issues throughout the project's lifecycle, ensuring all involved

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

parties are aware of their rights and obligations and adhere to the policies outlined in Annex 5 of the Grant Agreement Model (AGA).

This version of the KDMP will be shared for feedback, input by partners, and managed by WP6 task leaders, with regular reviews by the BMB WP leaders in response to new data collection or changes in regulations and best practices. It is expected to undergo multiple revisions as the project evolves (minimum during periodic assessments of the project) to ensure adaptability where warranted (https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm).

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

1. KNOWLEDGE AND DATA MANAGEMENT PRINCIPLES

The BMB knowledge and data management principles adhere to the data management principles and guidelines established within the Mission Ocean CSA PREP4BLUE framework (Grant No. 101056957) by ERINN Innovation. This document aligns with the guidelines, policies, and best practices outlined in Deliverable 1.3 of BMB. The key principles for data collection and management are detailed below.

The BMB Data Management Plan (DMP) is designed to offer a comprehensive strategy for managing both background data and data generated throughout the project, with the goal of optimizing access to and reuse of research data. Intended as a dynamic document, the DMP will outline procedures for handling BMB research data during and after the project, with regular reviews and updates.

The DMP delineates the Research Output Management (ROM) lifecycle for datasets derived from BMB results. It addresses:

- Guiding principles for data management in accordance with EC Horizon Europe requirements.
- Strategies to ensure BMB data adheres to FAIR principles: Findable, Accessible, Interoperable, and Reusable.
- Data management costs and resource allocation.
- Data security, ethical considerations, and confidentiality measures.

BMB is expected to produce a variety of outputs, including databases, innovative solutions, new methodologies, data, protocols, experimental approaches, and strategies. Effective and structured Research Output Management is essential for integrating the work conducted across different work packages and themes, and for aligning scientific tasks with the overarching strategy of the BMB project.

The DMP also includes the following annexes, which will evolve throughout the project:

- Annex 1 provides valuable resources relevant to data management, assisting partners in making their research and data openly accessible within the context of Horizon Europe.
- Annex 2, to be added as the project progresses, will comprise the BMB Inventory of Datasets and will be developed as data is generated and managed.

1.1. KNOWLEDGE AND DATA MANAGEMENT GUIDING PRINCIPLES

The DMP of BMB is coordinated jointly under WP1 and WP6 and is structured around the following key points:

a) This DMP adheres to the obligations and mandatory practices outlined in AGA Article 17 – Annex 5. By developing the DMP based on these definitions, BMB partners will be able to address all IP protection and data issues in alignment with the specified obligations and practices. The DMP will evolve with the project and be updated regularly as significant changes occur.

b) The Consortium will comply with the requirements of Regulation (EU) 2016/679 of the Council of 27 April 2016, as well as GA Articles 14 and 15, concerning the protection of natural persons with

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

regard to the processing of personal data and the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

Data Types, Storage, Confidentiality, Ownership, Management of Intellectual Property, and Access: Procedures for data collection, storage, access, sharing policies, protection, retention, and destruction are aligned with EU standards as described in the BMB Grant Agreement (GA) and the Consortium Agreement (CA). Key articles include:

- GA Article 20.1: Keeping records and supporting documents.
- GA Article 16: Intellectual Property Rights.
- GA Article 16.1: Background and access rights to the background.
- GA Article 16.2: Ownership of results.
- GA Article 16.4: Specific rules on IP, results, and background.
- CA Article 8: Results.
- CA Article 9: Access Rights.
- CA Article 10: Confidentiality.

1.2. BMB RESEARCH OUTPUT MANAGEMENT POLICY

As detailed in the executive summary, the responsibility for the collection, organization, and formatting of data will lie with the relevant data owner. Each partner is accountable for their own records and documentation related to the data generated, ensuring compliance with accepted standards in their respective fields, under the supervision of Task Leaders. To prevent data loss, partners must implement reliable backup methods.

The data owner (members of the research team) retains the right to use research data when providing open access. This right allows the data owner to execute the original project plan before the data is made available for further use.

All results produced during the project will be evaluated for the need for IPR protection by the coordinating team in consultation with the relevant partners. The coordinating team is also responsible for strategic issues, ethics, and the exploitation of results, ensuring mutual understanding and fostering creative collaboration.

All data underlying peer-reviewed scientific publications must be made openly accessible within and beyond the Consortium and uploaded to an open-access repository complying with the FAIR principles within one month of publication, unless deemed confidential. The collection and upload of data and underlying publications to the repository are the responsibility of the data owners.

If data owners wish to restrict access to data that underlies publications, they must provide the coordinator with a ‘justifiable’ reason for doing so as soon as possible and evidence of such reason one month prior to the publication of the associated peer-reviewed scientific publication. For a list of ‘justifiable’ reasons under EC rules, please refer to section 2.1.3.2 below.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

For each dataset collected, processed, and/or generated in the project, the following elements will be documented and reported in the next DMP:

- Data Owner: Description of the data owner, including the project partner name, originating work package, task and activity, the responsible researcher(s)' name, and the primary contact details for data-related inquiries.
- Data Summary: A description of the data and an overview of how it is being captured and stored, including the name and description of the dataset, how it is being created and captured, the type and format of the data, the expected overall storage size of the data, and whether an IP evaluation is needed.
- Findability: Description of domain-relevant repositories, whether the data will be made identifiable by a standard identification mechanism, and the type of metadata that will be provided.
- Accessibility: Confirmation of whether all data is accessible and the methods or software tools needed to access the data. If the data is not accessible, a rationale for keeping it restricted must be provided.
- Interoperability: Description of whether the data is interoperable and the standard data/metadata vocabularies/ontologies relevant to it.
- Reusability: Description of the data licensing, any limits to the reuse of the data, and the date (where applicable) the data will be made available for reuse.
- Allocated Resources: Description of the estimated costs required to make the data FAIR and how these costs will be covered (e.g., covered by the WP budget).
- Security: Brief description of the data security measures in place, including confirmation of a plan for recovery, secure storage, and protection over the transfer of sensitive data.
- Ethics: Any potential ethical issues must be noted.

A detailed description of the type and format of BMB data that will be generated and collected in the BMB Data Plan Inventory will be shared on the BMB project Microsoft Teams group. The inventory will be included in the next update of the DMP in M18. Additional datasets may be identified and added to future versions of the DMP as necessary.

1.3. KEY PRINCIPLES AND PROTOCOLS (ALIGNED WITH PREP4BLUE PRINCIPLES AND PROTOCOLS)

The PREP4BLUE DMP serves as a reference document for partners to ensure compliance with both internal project and external EU rules and regulations. This section begins with a clear and easily accessible summary of the Key Principles and Protocols that all partners must follow. Subsequent sections provide further context and detailed explanations outlining the necessity of the established protocols.

Every partner is responsible for understanding and adhering to the protocols established in this document. The protocols are summarized under the following headings:

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

- Data Management
- Ensuring Data Findability
- Ensuring Data Accessibility and Reusability

The DMP functions as a practical manual and will be updated throughout the project whenever significant changes occur, such as:

- New types of data
- Changes in consortium policies
- Changes in consortium composition and external factors

As new data are generated, they will be logged in the Data Inventory Table format on the BMB Microsoft Teams platform by the data owner.

KEY PRINCIPLES & PROTOCOL - Data Management

- The organization and formatting of collected data will be the responsibility of the relevant data owner, in line with accepted standards in the respective field, overseen by Task Leaders. This includes formatting and metadata. BMB aims to automate data ingestion and adherence to FAIR principles, which should be a focus for all data owners.
- Each partner is responsible for ensuring the security of their datasets. To prevent data loss, partners must implement reliable backup methods. Partners are advised to consult with their organization's IT professionals to set up and manage data security and ensure appropriate safeguards are in place.
- From the start of each relevant task, project partners should consider identifying the most suitable file types and structures to support external interoperability once the data is ready and published where appropriate.

Best practices indicated below should be followed by individuals involved in the project's research outputs and data generation:

1. When relevant, register at ORCID: http://orcid.org, which provides a consistent identity for individuals.
2. Follow prior notice procedures as outlined in sections 8 and 9 of the BMB Consortium Agreement (CA).
3. Ensure that EC funding is acknowledged, including the project name and GA number (see section 4.1 and the PEDC for official text to use or contact SUB).
4. Ensure that peer-reviewed scientific publications based on BMB results are published in Open Access (e.g., Gold or Green).
5. Submit data underlying the published peer-reviewed scientific publications to the Coordinating Team (SUB) for evaluation.
6. When submitting these data, if a partner already intends to protect the data (see section 2.1.3.2), they should communicate this to the Coordinating Team to ensure an optimum level of confidentiality is upheld from the earliest stage.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

7. Once cleared by the Coordinating Team, or if no objection is raised within 10 working days of receipt, ensure that data underlying published peer-reviewed scientific publications are deposited in an appropriate open-access data repository no later than one month after publication.

PROTOCOL – Findability

For each dataset collected or generated through BMB, partners should consider the following Open-Access (OA) repository requirements (for all data approved for open access):

1. Researchers have the authority to select their repository of choice. Where possible, it should be domain-specific. To facilitate linkages, the suggested repository is Zenodo, but if that is not applicable, please consider the following:
    - The BMB Database, once operational, may be used as the suggested OA repository for BMB, if appropriate. The data will be made available through the cloud services of the eScience Centre at SDU (UCloud, DEiC EOSC-Nordic initiatives).
    - Use an external data archive or repository already established for your research domain to preserve the data according to recognized standards in your discipline. You may search for data repositories (see the non-exhaustive list of suggested repositories in Annex I).
    - Or, if available, use an institutional research data repository or your research group's established data management facilities.
2. Or use a cost-free data repository.
3. Ensure the chosen online repository facilitates the identification of data and refers to standard identification mechanisms (ideally persistent and unique identifiers such as Digital Object Identifiers (DOIs)).
4. The organization and formatting of the data collected will be the responsibility of the relevant data owner.
5. Each data owner will be responsible for depositing relevant data in the appropriate repository.
6. Ensure that research outputs and datasets are cross-referencing each other (e.g., scientific publications and the data behind them).
7. Outline the discoverability of the data (provide metadata). Each dataset owner will ensure that their chosen repositories disseminate (meta)data to OpenAIRE to maximize data sharing, finding, and reusing research outputs from BMB.

PROTOCOL – Accessibility and Reusability

Prior Notice and Confidentiality Review

- Although not obligatory, in the interest of FAIR data, BMB partners are encouraged to make any other project datasets that do not require protection – regardless of whether they are connected to a publication – available open-access.
- Information on all datasets must be entered into the Data Plan Inventory, which will be made available on the BMB Microsoft Teams platform.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

- Whenever information on a new dataset is uploaded to the BMB Microsoft Teams platform or a previously created dataset is changed in such a way as might alter its protection level, the partner primarily responsible for the dataset must notify the Project Coordination team.
    - If a partner intends to protect any data, they should communicate this to the Project Coordination team to ensure an optimum level of confidentiality is upheld from the earliest stage.
    - Any evidence of applications for protection and/or associated legal processes relating to said dataset should be sent to the Project Coordination team within six months of this notification.
- If no evidence of protection is provided, the Project Coordination team may request that data be made accessible.
- The Project Coordination team will provide feedback on the type of protection mechanism, if any, they believe should be applied to the data.
- If a dataset is deemed suitable for open access, the Project Coordination team will inform the data owner and request they submit information on their data to the Coordinating Team for evaluation. If cleared by the Coordinating Team, or if no objection is raised within 10 working days of receipt, the data owner is responsible for uploading it to an appropriate open-access repository within 30 days of Coordinating Team approval (see below for repository requirements).
- If a dataset is deemed unsuitable for open access, the data owner may still be required to place relevant metadata in a suitable repository, provided said metadata does not itself constitute a protection breach.

When considering the potential to make data open access, partners are requested to review the BMB CA. This defines the main approach regarding the ownership, protection, and access to key knowledge like Intellectual Property (IP) and data. This approach will allow the BMB partners, collectively and individually, to pursue opportunities arising from the project's results. Some of the major aspects covered in the CA are briefly summarized below:

- Confidentiality: Each partner will treat information from other partners as confidential unless otherwise stated and not disclose it to third parties unless the information is publicly available.
- Results-/ Background-/ Data- owners will notify the partnership of their planned intent to upload datasets to open-access repositories following the same prior notice procedure as is set up for the publication of results (45 days).
- Pre-existing Know-How: Each partner is, and remains, the sole owner of its IPR over its Pre-existing Know-How. The partners have identified and listed in the CA the Pre-Existing Know-How over which they may grant access rights for the project. The partners agree that the Access Rights to the Pre-existing Know-How needed for carrying out their own work under the project shall be granted on a royalty-free basis.
- Ownership and Protection of Results: The ownership of results will belong to the partner(s) generating the results. Protection will be implemented appropriately. When the result is the outcome of work carried out by two or more partners, and their respective share of the work cannot be ascertained, joint ownership will be agreed between the partners as established in

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

CA Article 8.2. If a partner wishes to assign any knowledge to a third party, they should do so while observing the conditions set out in the BMB GA, especially articles 8, 9, 10, and should inform the other partners and request their consent, which should not unreasonably be withheld.

- Access Rights: Partners grant each other royalty-free access rights to knowledge generated in the project and to the background knowledge they bring to the project to the extent needed to successfully perform the project tasks allocated to them (see CA article 9).
- Patents: Under Article 16.4 and Annex 5 of the GA, partners with knowledge suitable for patents are obliged to make applications for patents or similar forms of protection and shall supply details of such applications to the other partners. Information relating to patents that have been registered must be submitted under the 'IPR' section of the EU Funding and Tender Opportunities Portal.
- Use and Dissemination: If dissemination of knowledge does not adversely affect its protection or use and is subject to legitimate interests, the partners shall ensure further dissemination of their own knowledge as provided under the GA (see Article 17), which has been signed by all partners.

2. INITIAL DATA SUMMARY

The primary data that we are collecting, structuring, or anticipating collecting, enriching, or generating are listed below:

- WP2: Information on governance structures, responsibilities, and roles at sea-basin, national, and regional levels.
- WP3: Information on projects, initiatives, and actors with respect to Citizen Engagement and the Mission Ocean.
- WP4: Transformative solutions and their barriers and R&I needs to be scaled—successful methodologies to be transferred at local, national, and EU levels.
- WP5: Data and information related to the Sustainable, carbon-neutral, and circular Blue Economy and progress towards the Mission Objectives and sub-objectives.
- WP6: Projects and Technical Services related to the Mission Ocean in the BANOS area, together with information on the participants of the projects and service providers (at the institutional and personal level).

2.1. WILL YOU RE-USE ANY EXISTING DATA, AND WHAT WILL IT BE RE-USED FOR?

SDU will reuse data from various EU, national, regional, and local open-access public repositories, including but not limited to CORDIS Open, Horizon Dashboard & Results Platform (CINEA Project Portfolio), Kohesio, OpenAIRE, UN Decade of the Ocean, LIFE Project database, Interreg project

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

databases (keep.eu), Maritime Data Hub, and data from the Mission Ocean Charter (European Maritime Forum).

Additionally, we will reuse data from our partners who are willing to share their internal databases. Currently, the internal databases we are integrating include:

- The BMB coordinator SUB will share their internal database of institutional stakeholders (excluding personal contacts).
- VLIZ (PP) will share a dataset of citizen science activities linked to the Mission Ocean objectives collected in PREP4BLUE.
- The Blue Bio COFUND project partners participating in PREP4BLUE and BMB will share their database of projects and stakeholders.
- The Mission Ocean secretariat will share updates of the Mission Ocean Charter data in a table format.

The list of data to be reused will expand as the needs evolve throughout the duration of the BMB project.

2.2. WHAT TYPES AND FORMATS OF DATA WILL THE PROJECT GENERATE OR REUSE?

Given the scope of the project and its objectives, we anticipate collecting a diverse range of data types and formats. These can be broadly categorized as follows:

Project Data: This includes structured data related to various research projects, funding opportunities, and initiatives. These data may be in CSV, XLSX (Excel), JSON, or XML formats.

Policy Data: Information about policies related to ocean health, pollution control, and carbon emissions in the blue economy. These could be in text formats (TXT, DOCX, PDF) and would require extensive metadata to ensure they are findable and usable.

Stakeholder Data: This could include data on individuals, organizations, and institutions involved in or impacted by the project. These may be stored in structured data formats (CSV, XLSX, JSON, or XML) but may also include unstructured data such as text or email correspondence (TXT, EML).

Citizen Science Activities: This could encompass a broad range of data types, including geospatial data (e.g., GIS files for mapping pollution sources), sensor data (CSV, XLSX), and potentially images or videos (JPEG, PNG, MP4) documenting relevant activities.

Services and Product Data: This could include structured data about various public and private services and products related to Mission Ocean's objectives. Formats might include CSV, XLSX, or JSON files.

Metadata: Crucially, each data type listed above will have accompanying metadata, providing information about the data's context, quality, condition, and characteristics. Metadata can be stored in various formats, such as XML or RDF, depending on the standard followed.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

It is important to note that the data types and formats collected will depend on the data sources and the project's specific needs. A more detailed view of the data types and formats collected are added to Annex II of this KDMP.

2.3. WHAT IS THE PURPOSE OF THE DATA GENERATION OR RE-USE AND ITS RELATION TO THE PROJECT OBJECTIVES?

The data collected will support the achievement of the project's aims and, ultimately, the Mission Ocean objectives and sub-objectives.

Specifically, for WP6, the rationale for creating a digital catalogue of projects and technical services is as follows: "The geographic and sectoral fragmentation of existing technical services and project catalogues presents a significant obstacle to achieving the Mission's objectives. Information is available but scattered among regional and national innovation and knowledge hubs, described in specific languages, and often using non-standard metadata systems, making it difficult to access and largely unknown to end-users." Therefore, BMB will strive to integrate this fragmented information and enrich it to establish:

(i) A catalogue of existing services needed to deploy innovative solutions for decarbonization and circularity in the blue economy sectors within the BANOS area. (ii) A curated catalogue of recent (2014 onwards), ongoing, and future (2022-2025) projects at national, regional, sea basin, and European levels relevant to BANOS lighthouses—considering both public and private funders and including the results of the projects.

Building a digital catalogue of projects and technical services in the form of a database will facilitate direct online matchmaking between actors developing and deploying innovative solutions and service providers who could support their efforts through testing, validation, upscaling, reproduction, and customization. A dedicated and customized BMB web portal will be developed to make the catalogue accessible to end-users.

Data collection and integration is a continuous process throughout the entire duration of the BMB project. We will collect and list relevant projects and initiatives across the BANOS area in a semi-automated manner through:

(i) Consultation with relevant stakeholders. (ii) Automated data collection from existing databases such as CORDIS Open, Horizon Dashboard & Results Platform, Kohesio, SUB's Actors Map & Catalogue, and the future MIP Ocean Platform.

We will model data and use dedicated terminology (ontologies) to combine content from different sources, such as surveys, databases, web content, free text descriptions, or interviews. Each data point/entry will be associated with metadata relevant to diverse end-users and sector perspectives, ensuring the generation of sustainable and interoperable digital catalogues.

It is important to note that the BMB Database is being developed jointly with the Mission Ocean Ecosystem database of PREP4BLUE and the BlueMissionAA Database. The web interfaces of these three projects will also be developed and deployed jointly. The database and web interface have been

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

released (November 2023 for the 1st BMB Mission Arena in Gothenburg), EcoDALLI and BlueMissionMed can now access the platform and database as users. New databases/datasets have been integrated into our database, and online forms are now available for the user to enter manually new data. A review process has been developed to validate the integration of user data in the database.

2.4. WHAT IS THE EXPECTED SIZE OF THE DATA THAT YOU INTEND TO GENERATE OR REUSE?

The expected size of the BMB database will range from several hundred gigabytes to a few dozen terabytes. Structured tabular data, including descriptions of projects, products, or stakeholders' expertise, typically falls within the gigabyte range when comprising several thousand entries. However, the inclusion of pictures or videos to describe services or products could increase the database size to several terabytes.

2.5. TO WHOM MIGHT YOUR DATA BE USEFUL ('DATA UTILITY') OUTSIDE THE PROJECT?

The data collected will be valuable for BMB partners and all stakeholders interested in or involved with the Mission Ocean. The types of stakeholders we target with the BMB database and web interface include:

- EU-level Mission supporters.
- Partners in relevant projects funded under the Mission and running parallel to BMB.
- Transnational and national organizations involved in the governance of the Mission Ocean.
- Public and private funding programs with synergies with Mission Ocean.
- Sub-regional policymakers interested in the Mission Ocean.
- Blue economy industry and supporting organizations or associations.
- Citizen engagement organizations or NGOs, such as Aquaria/Science Museums or Blue Schools.
- Public and private research institutes and service providers contributing to the Mission Ocean objectives.
- Local, regional, and national media.

Different stakeholders will likely have varying interests in how they access the data. For example:

- EU Mission Ocean supporting services (including the MIP Ocean) will access raw data through APIs.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

- R&I actors from academia or industry will be more interested in searching through projects or services/products data to identify others working on similar topics.
- Journalists from national or local media might be interested in obtaining snapshots or overviews of the projects or stakeholders involved in the Mission Ocean.

3. MAKING BMB DATA FAIR

3.1. MAKING DATA FINDABLE, INCLUDING PROVISIONS FOR METADATA

Identifiers

Persistent identifiers (PIDs) are crucial as they unambiguously identify data and facilitate data citation. BMB partners will select data repositories that assign a persistent identifier, such as a Digital Object Identifier (DOI). Partners will also be encouraged to register with ORCID to create a personal, professional ID.

Metadata

Metadata is data that provides information about other data. The primary metadata categories for BMB research data are descriptive (title, abstract, author, keywords, technical characteristics), structural (pages, chapters, tables, pictograms, diagrams), and administrative (file type, permissions, and creation details). Metadata is as important as the data itself, as it allows applications to categorize and archive datasets, enabling users to search for and find relevant datasets easily. For this reason, metadata produced in BMB will adhere to the OBPS recommendations on the use of common vocabularies.

OpenAIRE is a platform funded and supported by the European Commission with the mission to shift scholarly communication towards openness and transparency and to facilitate innovative ways to communicate and monitor research. **Each dataset owner will ensure that their chosen repositories disseminate (meta)data to OpenAIRE to maximize data sharing, finding, and reusing research outputs from BMB.** Any repository listed in this DMP is interoperable with OpenAIRE. Partners who wish to use a different repository may inquire with the Coordinating Team to check whether it disseminates to OpenAIRE. If it does not, the Coordinating Team may contact OpenAIRE to see whether it can be added.

As the project progresses and datasets are identified and collected, further information on standards specifications for metadata creation will be outlined in subsequent versions of the KDMP. Information on naming conventions used, approaches towards search keywords, clear versioning, and making data findable and cross-linked will also be provided.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

3.2. MAKING DATA ACCESSIBLE – REPOSITORY

BMB has now its own database, the BMB Database, which is publicly available and promoted through the project website and a dedicated web platform. Additionally, BMB partners are selecting the most appropriate data repositories that facilitate the finding, accessing, reusing, and interoperating of datasets, in line with the basic principles that Horizon Europe projects must comply with. A full list of repositories is presented in Annex I of this document.

In view of synchronizing the BMB Database with the MIP Ocean Platform, we have dedicated resources within BMB WP6 to develop APIs that will enhance data accessibility, reusability, and interoperability.

3.3. MAKING DATA INTEROPERABLE

Labelling of Data: To ensure our data is interoperable, reusable, and cross-compatible, we stratified and label data about services and projects using a controlled Mission Ocean Ontology (MOOnt). The MOOnt facilitates the integration of BMB data with the broader community focused on the sustainable and circular blue economy. The MOOnt builds upon other EU projects (PREP4BLUE, iMarine, BlueBRIDGE, EMODNet, EU Digital Twin Ocean) and utilize standard 'linked open vocabularies' (e.g., MarineTLO, e-Government Core Vocabularies, EURIO, EuroSciVoc, and other vocabularies from LOV and W3C Semantic Web resources). Each data entry in our database is labelled using the MOOnt, with categories describing the user/person (researcher, lawyer, etc.), organization (academic, industry, governmental, etc.), sector of activity (technology, economy, environmental, societal, policy, legal, etc.), and impact (decarbonization, climate, biodiversity, circularity, innovation, digital transformation, etc.).

Interoperability, Synergies, and Sustainability: The use of the MOOnt ensures interoperability with existing Ocean and Water knowledge systems and, more broadly, with the EC digital knowledge systems (e.g., EMODNet, iMarine & BlueBRIDGE, Digital Twin Ocean, Horizon Results Platform, and Kohesio). In addition to making data accessible, we will develop robust and sustainable APIs for end-users to automatically retrieve all our open data and use it for their own purposes. We are also performing regular dumps of open data (aligned with FAIR principles) available on Zenodo and OpenAIRE. Through constant dialogue with the MIP, PREP4BLUE, and other Mission Ocean services, we are aligning expectations, avoiding duplication of work, exchanging best practices, and synchronizing data whenever relevant or required. The web interfaces has been developed using open-source libraries. The code is thoroughly annotated to ensure its reuse during and after the end of BMB, with SDU/SUB committed to maintaining the database and interfaces post-project, subject to available resources.

3.4. INCREASE DATA RE-USE

We have implemented several strategies to ensure that the data generated and collected is reusable not only by the project team but also by other researchers, policymakers, and stakeholders who may benefit from our work.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Comprehensive Documentation: We will create detailed data documentation to help users understand, validate, and reproduce our analysis. This includes:

- Methodological descriptions outlining how the data was collected, processed, and analyzed.
- Details on variable names, definitions, possible values, and units of measurement.
- Details on data cleaning processes to assist with the replication of our methodology.
- Analysis scripts or code, if applicable, to provide complete transparency about how the data was manipulated and analyzed.

All these elements are stored with the data and are accessible whenever the data is accessed, ensuring potential users have all the information they need to interpret and utilize the data effectively.

Data Availability: Our aim is to make our data as openly available as possible, facilitating its reuse and potential for impact. However, data will only be made publicly available after thoroughly assessing ethical, legal, and commercial constraints. Where full open access is not possible, we will provide as much access as feasible while respecting these constraints.

Data Licensing: We use Creative Commons licenses to clarify the terms of data reuse. Whenever possible, our default choice of license is CC-BY-NC, in line with the obligations set out in the Grant Agreement and reflecting our commitment to open science.

Data Usability by Third Parties: Our commitment to the FAIR principles ensures that the data produced during the project will be usable by third parties, even after the project's end. This will be achieved by ensuring the data is effectively stored, documented, and accessible. The use of standard formats, clear and comprehensive metadata, and careful documentation of methodologies will ensure that third parties can effectively understand and reuse the data. Wherever possible, data will be stored in an accessible data repository beyond the project's end to ensure its continued availability.

Data Provenance: The provenance of the data is thoroughly documented to ensure transparency and traceability. This includes information about where the data originated (source), who collected it, when it was collected, any transformations it has undergone, and how it has been used throughout the project. Provenance is documented using recognized standards to promote interoperability. Documenting provenance provides important context, help establish the data's credibility, and support data reuse.

Data Quality Assurance: Ensuring high data quality is central to our project. We implement rigorous data quality assurance processes, including:

- Data Verification: After data collection, we carry out data verification to check for any inconsistencies or errors in the data.
- Data Validation: We ensure that the data accurately represents the reality it is supposed to depict. This may include cross-checking with other sources or with subject-matter experts.
- Data Cleaning: Any errors detected are addressed in a data cleaning process, with the original raw data preserved for transparency.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

- Routine Quality Checks: Regular audits and reviews are and will be conducted to maintain data quality throughout the project.

4. OTHER PROJECT OUTPUTS

Beyond the data itself, which is shared through an interactive web interface and dedicated APIs, the project can now generate a range of other research outputs that can provide valuable insights and resources to stakeholders. These include:

Dashboard: Detailed reports summarizing findings, trends, and insights derived from the data. These can be shared as downloadable content through the web interface or as interactive web pages allowing users to explore findings in more detail.

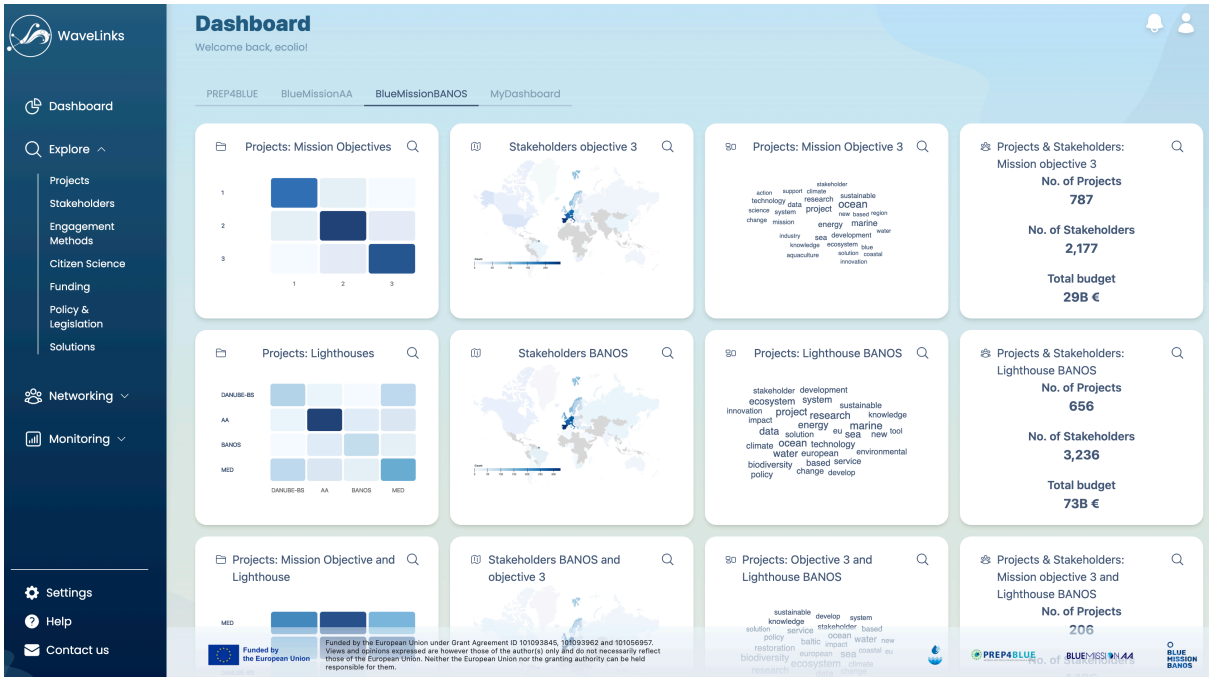

Figure 1 WaveLinks BMB dashboard

Data Visualizations: Graphs, charts, maps, word clouds and heatmap are embedded within the web interface to facilitate understanding of the data. Interactive data visualizations are also be provided, allowing users to explore the data more dynamically and engagingly.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

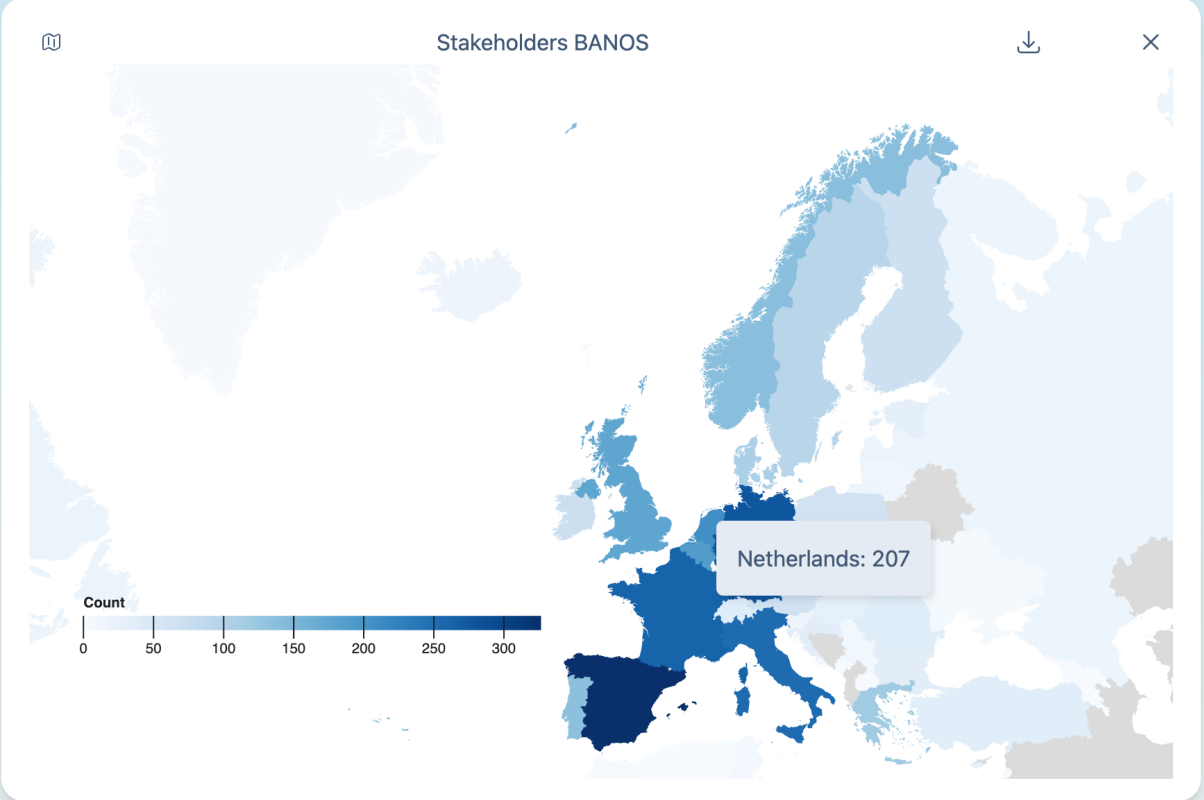

Figure 2 WaveLinks BMB stakeholders map

Methodological Guides: Clear, step-by-step guides explaining how the data was collected, cleaned, analyzed, and interpreted. These could also include directions on how to use the web interface effectively. These guides can be shared as downloadable documents or as part of the web interface's help section.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

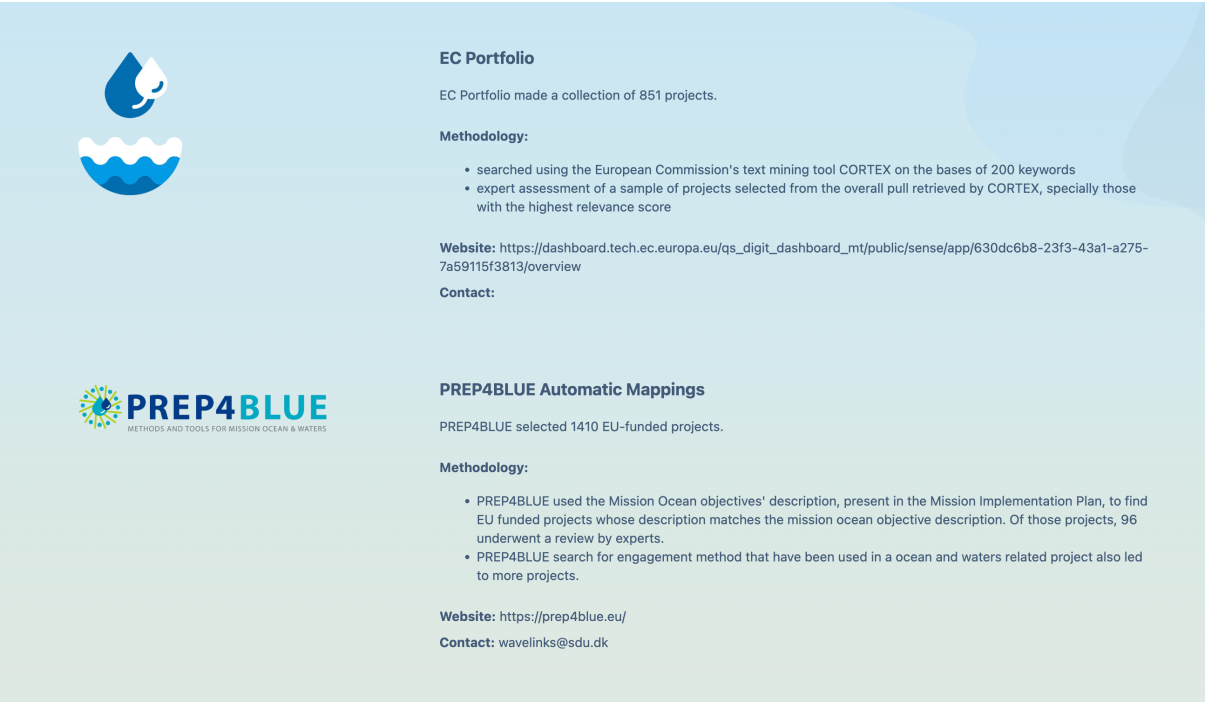

Figure 3 WaveLinks overview of data sources and methodology

Training Materials: If the project involves novel methods or tools, training materials (such as tutorials, webinars, or workshops) could be produced to help stakeholders understand and utilize the database and user interface. These could be shared through the BMB Microsoft Teams platform or on external platforms like YouTube.

Publications: If the project leads to academic papers or conference presentations, these can be shared through the BMB website, CORDIS, and OpenAIRE. BMB project partners are fully committed to Open Science. We will ensure that all publications, reports, and public deliverables (when approved by the EC) are published in Gold and Green Open Access. All work package deliverables will be open access on the project website, including the interactive Mission BANOS web platform (WP6).

Software and Code: If the project develops new software, algorithms, or code, these will be shared on the GitHub platform after considering the IPR protection of involved partners. Clear documentation will accompany these outputs to facilitate their reuse.

Datasets: Beyond the database itself, curated datasets (i.e., subsets of the data that have been carefully cleaned, annotated, and organized for specific analyses) can be valuable outputs. These can be made available for download through the web platform and BMB website.

In terms of how these outputs should be shared, best practices suggest that they should be made as openly available as possible, following the FAIR principles, and ensuring appropriate licensing and IPR management. Stakeholders should be informed about new outputs through updates on BMB Microsoft Teams and project consortium meetings.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

5. ALLOCATION OF RESOURCES

Costs associated with the open access of research data in Horizon Europe are eligible under the conditions specified in the BMB GA, particularly Article 6 – Eligible and Ineligible Costs, including Article 6.2.C.3 – Other goods, works, and services, as well as other relevant articles pertinent to the chosen cost category. These costs encompass data deposit, long-term storage, and the time and effort required to prepare the data for sharing and preservation. Costs cannot be claimed retrospectively. Project partners are responsible for including any relevant costs in their financial statements. SDU is expected to cover the majority of the data management, processing, and storage costs and has allocated a dedicated budget for this purpose.

6. DATA SECURITY

Data generated by the project may be stored and shared among all Consortium members via the BMB TEAMS platform. Each partner can manage access levels as needed. If a more secure platform is required, or if data is intended to remain within a partner's private domain, this should be clearly communicated and justified. The transfer of sensitive data can be facilitated through several routes provided by SDU, and these options should be explored by the Consortium as necessary.

For storing and processing data within the BMB database, SDU employs an internal cloud service provided by the eScience Center at SDU. This cloud service is aligned with the EOSC and DEIC Nordic initiatives and has been ISO 27001 certified since February 2020, following a formal evaluation by the accredited external auditor, DNV GL.

Partners are required to implement multiple methods for backing up and copying research data to protect it from unauthorized access, use, or disclosure. All partners should consult with their organization's IT professionals to establish and manage data security measures and ensure appropriate safeguards are in place. Partners should also consider encrypting data files before storage or transfer and take the necessary steps to ensure their security.

Data uploaded to Zenodo.org will be preserved for the long term. Long-term data management primarily focuses on security regarding where the data will be stored and how it will remain accessible after the completion of the research project. Partners must ensure that data is stored in certified repositories for long-term preservation and curation, with a minimum retention period of five years post-project.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

7. ETHICS

The coordinator and Work Package (WP) leaders are responsible for ensuring compliance with fundamental ethical principles throughout the project. Ethical considerations, including the "do no significant harm" principle and the protection of IP rights, will be continuously monitored during project implementation.

Data from questionnaires, briefing materials, and project deliverables will be reviewed to ensure adherence to ethical principles in accordance with the Nuremberg Code, the European Textbook on Ethics in Research, and the EC Ethics Appraisal Procedure. BMB will develop a secured Stakeholder Repository with individual access rights and assign Stakeholder Interlocutors to ensure clear responsibilities for handling and protecting personal data, in compliance with GDPR and other relevant laws. An Informed Consent form will be created and used to inform and obtain consent from each individual participating in project stakeholder activities and from those whose personal data will be collected (e.g., during interviews, interactive events, recorded trainings, webinars, and surveys).

BMB utilizes the Microsoft TEAMS secure management system as an online repository for internal documents, with individual access rights. The coordinator and WP leaders will address any ethical questions that arise to ensure compliance with ethical principles and applicable international, EU, and national laws during the research activities. If any project activities raise ethical concerns, they will be handled rigorously according to the recommendations provided in the European Commission Ethics Self-Assessment Guidelines. Should unexpected ethical issues arise during the project, the coordinator will provide the necessary information as requested via the Funding and Tenders Portal, outlining how the Consortium intends to address them.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

BLUE MISSION BANOS

8. ANNEX I: ONLINE OPEN-ACCESS RESSOURCES & USEFUL LINKS

Oceanographic specific best practices

- https://www.oceanbestpractices.org/
- https://www.bodc.ac.uk/resources/vocabularies/

Open Science in Horizon Europe

- Open Science: https://openscience.eu
- Open Research Europe: https://open-research-europe.ec.europa.eu/

FAIR Findable (repositories)

- Directory of Open-Access Repositories: http://www.opendoar.org/
- Registry of Research Data Repositories: https://www.re3data.org/
- ZENODO Open-Access Data Repository: https://zenodo.org/
- INSPIRE: https://inspire.ec.europa.eu/
- EMODNET: https://emodnet.eu/en
- Copernicus: https://www.copernicus.eu/en/library
- Horizon Results Platform (HRP) Horizon Results Platform (europa.eu)
- The official portal for European data: https://data.europa.eu/en
- European Open science Cloud: https://eosc-portal.eu/

FAIR: Findable (Identifiers)

- Making Data 'Findable' using Persistent Identifiers: https://www.openaire.eu/how-to-make-your-data-fair
- Using Identifiers for Open Access- for Authors and Research Materials: http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?action=display&doc_id=4607

FAIR: Findable (Metadata)

- Oceanographic specific vocabularies for metadata: https://www.bodc.ac.uk/resources/vocabularies/
- Explanations of Scientific Metadata: http://www.dcc.ac.uk/resources/curation-reference-manual/chapters-production/scientific-metadata
- Metadata Standards Directory Working Group: http://rd-alliance.github.io/metadata-directory/
- Open Data and Metadata Standards: https://joinup.ec.europa.eu/sites/default/files/document/2015-05/d2.1.2_training_module_2.2_open_data_quality_v1.00_en.pdf
- Use of DataCite for metadata provisions: https://guidelines.openaire.eu/en/latest/data/use_of_datacite.html

FAIR: Interoperable

- OpenAIRE Guidelines for Literature Repositories, Data Archives, and CRIS Managers based on CERIF-XML: https://guidelines.openaire.eu/en/latest/

FAIR: Reusable (licensing)

- Creative Commons licensing : https://creativecommons.org/licenses/
- Advice on commercialisation of research data: https://eudat.eu/data-access-and-re-use
- Licensing Wizard: https://b2share.eudat.eu/

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

- IPR Helpdesk Advice on seeking IP Professionals: https://www.iprhelpdesk.eu/sites/default/files/documents/Guide-IP-professionals.pdf
- IPR Helpdesk Factsheet on IPR Valuation: https://www.iprhelpdesk.eu/sites/default/files/newsdocuments/Fact-Sheet-IP-Valuation.pdf

9. ANNEXE II: DATASETS

BlueBio

BlueBio Cofund made a collection of 3254 projects.

The BlueBio project's database is a product of the "related activities" implemented within the ERA-NET COFUND BlueBio and comprises research projects funded at international and national level in Fisheries, Aquaculture, Seafood Processing and Marine Biotechnolgy and active in the time period 2003-2022 (forecasted). It represents an implementation of the databases already developed within the COFASP ERA-NET.

Website: https://bluebioeconomy.eu/

Contact: annanora.tassetti@cnr.it

Charter

The Charter includes 434 projects.

The Mission Ocean Charter is build up by projects that are commiting to joining efforts to achieve the three objectives of the Mission Restore our Ocean and Waters by 2030. The Charter is non-binding and open to any public or private interested parties.

Methodology: Organisations adhere to the Charter by submitting relevant projects through a dedicated online platform, which will remain open throughout the duration of this Mission

Submitted projects are assessed by the European Commission for their coherence with the Mission objectives and enablers

All Mission Ocean and Waters projects are made publicly available on the EC website.

Website: https://maritime-forum.ec.europa.eu/theme/research/mission-ocean-and-waters_en

Contact: eu-mission-ocean-and-waters@ec.europa.eu

CORDIS

2074 projects on WaveLinks are EU-funded and present in CORDIS datasets.

CORDIS is the European Commission's primary repository and portal on all European Union funded research projects. CORDIS data was not directly integrated into WaveLinks but other data sources used by WaveLinks include CORDIS projects.

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Website: https://cordis.europa.eu/projects

EC Portfolio

EC Portfolio made a collection of 851 projects.

Methodology: searched using the European Commission's text mining tool CORTEX on the bases of 200 keywords

expert assessment of a sample of projects selected from the overall pull retrieved by CORTEX, specially those with the highest relevance score

Website: https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/630dc6b8-23f3-43a1-a275-7a59115f3813/overview

PREP4BLUE Automatic Mappings & PREP4BLUE Automatic Mapping reviewed by experts

PREP4BLUE selected 1410 EU-funded projects.

Methodology: PREP4BLUE used the Mission Ocean objectives' description, present in the Mission Implementation Plan, to find EU funded projects whose description matches the mission ocean objective description. Of those projects, 96 underwent a review by experts.

PREP4BLUE search for engagement method that have been used in a ocean and waters related project also led to more projects.

Website: https://prep4blue.eu/

Contact: wavelinks@sdu.dk

UN Ocean Decade

The UN Ocean Decade includes 296 projects, programmes and contributions.

Organisations working towards ocean restoration can pledge their projects to the UN Ocean Decade. Information on these projects is given by the organisation when pledging its project. Programmes where not included in the projects page of WaveLinks.

Website: https://oceandecade.org/

Funded by the European Union under Grant Agreement ID 101093845. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.