POWER STORAGE IN D OCEAN

D1.3. 1st UPDATED VERSION OF THE DATA MANAGEMENT PLAN

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ABBREVIATIONS

ACRONYM	MEANING
IPR	Intellectual Property Rights
CC Licenses	Creative Commons Licenses
CSV	Comma-Separated Values
CTN	Centro Tecnológico Naval
DMP	Data Management Plan
EESS	Electric Energy Storage System
ESS	Energy Storage Systems
FRESS	Fast Response Energy Storage Systems
GDPR	General Data Protection Regulation
KESS	Kinetic Energy Storage System
LCA	Life Cycle Analysis
LCC	Life-Cycle Cost
LCOS	Levelized Cost of Storage
OpenAIRE	Open Access Infrastructure for Research in Europe
SMES	Superconducting Magnetic Energy Storage
SoC	State of Charge
WP	Work Package

SCOPE

This document provides the 1ST updated version of the Data Management Plan (DMP) for the POSEIDON project presented in month 6 (D1.2) and corresponds to Deliverable 1.3 of Work Package 1 (WP1) Project Management and Coordination. It is according to the Open Research Data Pilot (ORD pilot) under Horizon 2020. The purpose of this DMP is to support the data management life cycle of all data that will be collected, processed, or generated by the project.

As a project participating in the Open Research Data Pilot (ORDP) in Horizon 2020, this document structure and contents are based on the Guidelines on FAIR Data Management in Horizon 2020 (Version 3.0, 26 July 2016) and Guidelines on Implementation of Open Access to Scientific Publications and Research Data in projects supported by the European Research Council under Horizon 2020 (Version 1.1, 21 April 2017).

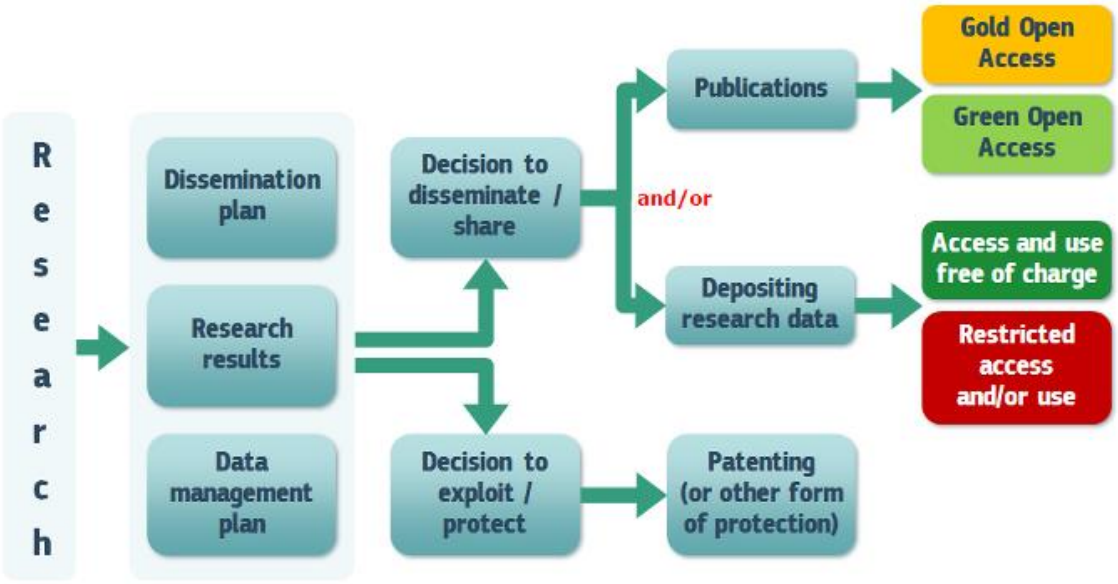

Figure 1: Open access to scientific publication and research data decision diagram in the context of dissemination and exploitation.

The following sections outline the types of collected and generated data, how these data will be exploited and made accessible for verification and re-use and how data will be curated and preserved upon closure of the project.

This DPM is a living document and will be updated over the course of the project whenever significant changes arise, such as (but not limited to):

- New data.
- Changes in consortium policies (e.g., new innovation potential, decision to file for a patent).
- Changes in consortium composition and external factors (e.g., new consortium members joining or old members leaving).

All changes made to this document will be communicated to the project partners. Common standards, folder structure and identifiers will be agreed with the project consortium.

This DMP has been shared and agreed between the project partners.

1. DATA SUMMARY

1.1. DATA RELATED TO THE PROJECT AND DATA ORIGIN

The POSEIDON main objective is to demonstrate the applicability of 3 innovative fast-response ESS in waterborne transport (Supercapacitors, Flywheels and SMES) addressing their on-board integration, cost-competitiveness, efficiency and safety, in relevant environments.

To carry out the marinization and technical development of the mentioned technologies, a "Model Based System Engineering" has been started to implement allowing to run several tools using the same data and preliminary information. For instance, different models will be implemented to run mechatronic simulations at early design stages to validate the designs or identify issues.

In parallel with the development of the three FRESS and their individual and combined testing, FRESS Modelling will be carried out, which is basically aimed at performing the following analysis:

i. Individual models of each storage system including the power electronics and control systems and its interconnection to determine the power availability depending on the SoC and the convenience to provide a certain power level depending on the power demand and the environmental conditions.
ii. Modelling each of the installed storage system together with the electric system of the ship.
iii. Engineering modelling of the three FRESS to optimize their complete integration in the container and the ships, including cable routing, services, protections, safety requirements, etc.

Finally, the FRESS integration on board will be feasible through different stages:

i. Requirement Definition: new specific "navalization" requirements will be defined for the ESS to be feasible to operate onboard.
ii. Simulation: Model Based Design of the Electric Network onboard, including the FRESS equipment and systems and Propulsion, will allow to simulate it at early design stages with "real" (or required) operational profiles. Thanks to these simulation campaigns, the design will be completed and preliminary tested.
iii. Harbour Trials: installation of the container onboard and preliminary tests at harbour.
iv. Sea Trials: With the container installed onboard, the different FRESS will be tested on navigational conditions. After all these steps, the final model will be updated with relevant feedback.

In essence, testing the full functionality of the application will be performed at the lab for all systems, while the ship tests will have a more limited functionality but will be done in a real environment where the goal is to know how this environment affects the storage systems performance (and the ship).

As can be derived from the above, a great amount of data will be generated throughout the project, since many performance parameters will be measured (electrical parameters, magnetic field, power outputs, , accelerations, etc.).

In addition, relevant information on the marine environment that may be of interest for the simulations will be obtained from EU data platforms such as EMODNET and COPERNICUS.

1.2. TYPES AND FORMATS

During the project, it is expected that several types of data in different formats from documents, images, software codes and external sources will be generated and stored.

- Data and metadata will be requested, stored and transferred in comma-separated values (CSV) format.
- To facilitate the data exchange, MS Excel compatible files including comma-separated and .xls(x) format will be also accepted.
- For analytical purposes, other formats include .py (python), .m/.mat (Matlab), ,wbpj (Ansys), .pbm (Quickfield) .mph(Comsol).
- Where applicable, data formats may be migrated when new technologies become available and are proven robust enough to ensure digital continuity and continued availability of data.

A summary of data origin, types, formats and volume is shown hereafter:

DATA ORIGIN	WP LEADER	TASK	TYPES	FORMATS	VOLUME
WP 1	CTN	Management of the project	N/A	N/A	N/A
WP 2	CYCLOMED	Modelling, design study, manufacturing and testing report of an SMES	1. FEM and analytical simulation files: ANSYS, QF, COMSOL, MATLAB, EXCEL 2. Manufacturing 3D models and drawings 3. Test data from instrumentation: .CSV files	1. .wbpj (ANSYS), .pbm (QF), .mph (COMSOL), .m/.mat (MATLAB), .xls/.csv (EXCEL) 2. .step/.dwg (Solidworks), .pdf 3. .csv	~250 GB
WP 3	ANTEC	Modelling, design study and adaptation of a KESS for waterborne conditions	1. 3D models and 2D fabrication drawings 2. Simulationof electrical model 3. FEM and analytical simulation files	1. .step (Solidworks) for 3D / .dwg and .pdf for 2D 2. .slx (Simscape library from MATLAB-Simulink 3. .wbpj (ANSYS). .mat (MATLAB)	~200 GB
WP 4	OCEM	Modeling, design, manufacture and test of EESS	Simulations, design and production files	.pptx (PowerPoint), .xlsx (Excel), .py (python), .mo (OpenModelica), .stp (3d model)	500 MB
WP 5	TPH	Model based design Integration simulations, validation, and tests	Simulation and measurements results	.csv, .mat	1GB
WP 6	TPH	Risk assessment and safety studies	Reports	.docx (Word) and/or .pdf	~200 MB
WP 7	CTN	Analysis of LCC LCA of FRESS solutions	1. Tools 2. Reports	1. .xls (EXCEL) 2. .docx (Word) and/or .pdf	~200 MB

WP 8	CTN	Dissemination and Communication	1. Web-site 2. Newsletters 3. Media posts	1. .html 2. .html 3. .html	N/A

1.3. DATA UTILITY

As a result of the activities and tasks carried out within the POSEIDON project, three FRESS technologies are being developed. Other outputs are a refined metrics:

- Levelized Cost of Storage (LCOS) tool for ESS cost assessment and comparison.
- A LCC and LCA analysis of FRESS technologies applied to the waterborne segment.
- A disruptive technologies assessment: complementarity with hydrogen and solid sails.

The data generated from the three innovative outcomes of the project will be used as a background for future projects, to demonstrate the technology in a relevant environment. Also, the results will be used in developing, creating and marketing a commercial product of a Levelized Cost of Storage tool for ESS cost assessment and comparison.

The main target groups that will benefit from the results obtained from project POSEIDON will be shipping companies, shipowners, Port Authorities, Regional Authorities, Classification Societies, etc. But also, passengers and citizens of port cities. Others directly benefited will be technologic/scientific researchers and environmental researchers.

2. FAIR DATA

All resources within this project (unless otherwise specifically mentioned in the consortium agreement) are being made publicly available through **Zenodo** as well as **the European Open Science Cloud** (EOSC).

To make data openly accessible all project software deliverables will be licensed under open-source principles, unless otherwise specifically mentioned in the consortium agreement or decided by the general assembly. POSEIDON underscores the importance of open access to scientific publications; thus, results will preferably be made available through Open Access.

Regarding storage and sharing of data, datasets of the project are stored in the project storage system, namely the Poseidon SharePoint, which will act as a platform for data storage, both research and management. At the end of the project, the workspace will be hosted by CTN to guarantee its availability and long term archival.

CTN will be responsible for data management and quality assurance.

Sensitive data will be anonymized before being made public, and data that cannot be made public will be archived in a suitable closed repository in agreement with the data owner. All data will be gathered and stored in accordance with the GDPR requirements.

To enhance preservation and make available results and research data, the open-access repository **Zenodo** and the **European Open Science Cloud (EOSC)** are being used. Consequently, all data and metadata involved in the project will comply with FAIR data principles.

Finally, and in line with the communication and dissemination plan, additional platforms, such as the POSEIDON website will publish and disseminate posters, presentations, publications, and other data.

2.1. MAKING DATA FINDABLE

All data have an associated metadata document (stored as a .txt file) which describes key aspects of the data.

All final versions of the deliverables are being hosted on Zenodo, an open-access repository that assigns a DOI (Digital Object Identifier) to each uploaded document.

Project deliverables are adjusted to the following nomenclature:

POSEIDON-[number of Deliverable]-[xxx_xxx]-RevNN

Where xxx_xxx is a meaningful short description of the document or file, where words are separated by "_", e.g.: *POSEIDON-D1.2-Data_Management_Plan-Rev01*.

All files made publicly available reference POSEIDON in their name, with the recommended convention "*POSEIDON_xxxxxxx*".

Photographs and audio/visual recordings are named as follows:

POSEIDON-[event]_[date of event]_[description of the event]

E.g., POSEIDON_workshop_kick-off_meeting].

2.2. MAKING DATA OPENLY ACCESSIBLE

In order to maximize the impact of POSEIDON research data, the results have been shared withing and beyond the consortium. Selected data and results with the scientific community and additional stakeholders through publications in scientific journals and presentations at conferences, as well as open access repositories.

All data are openly available and accessible, with the exception of personally identifiable information and data underlines deliverables that are covered by confidentiality. The personal data processed in POSEIDON will not be made publicly accessible but kept closed and inaccessible to third parties.

All personal data, as defined in Article 4 of the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (General Data Protection Regulation) are being treated following the principles stated in Article 5 of the aforementioned Regulation.

Data are available to all consortium partners via SharePoint Site. The access to SharePoint repository is restricted to the Consortium. Should other individuals wish to access the data for research purposes during the project, it will be openly shared on request.

Data will be published using standard file formats (txt, pdf, csv etc.). All data will be accessed using standard tools. Software relevant to access the data would be made available, but it is not seen as being a requirement. Should it be needed, we will provide the required open source to access and analyze the data.

For the duration of the project, personal data will be stored on the local secured server of the partner responsible for taking care of it. Data to be public is stored in Sharepoint.

2.3. MAKING DATA INTEROPERABLE

Partners go through OpenAIRE guidelines for online interoperability, including OpenAIRE Guidelines for Literature Repositories, OpenAIRE Guidelines for Data Archives, OpenAIRE Guidelines for CRIS Managers based on CERIF-XML. These guidelines can be found at: https://guidelines.openaire.eu/en/latest/. Partners also ensure that BLAZE data observes FAIR data principles under H2020 open-access policy: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oadatamgt_en.pdf

In order to ensure the interoperability, all datasets use the same standards for data and metadata capture/creation.

As the project progresses and data is identified and collected, further information on making data interoperable will be outlined in subsequent versions of the DMP. In specific, information on data and metadata vocabularies, standards or methodology to follow to facilitate interoperability and whether the project uses standard vocabulary for all data types present to allow interdisciplinary interoperability.

2.4. DATA RE-USE

CC Licenses are used for all data to be preserved, ensuring that the data remains accessible and reusable by the wider community. All Personally Identifiable Information (PII) is restricted to internal use only and is not shared with third parties. For any information that is shared, we use standard formats, open-source software, and comprehensive documentation to ensure its re-usability by third parties.

For datasets deposited in public data repositories, such as ZENODO, access is unrestricted, allowing anyone to utilize the data. To maintain high standards of quality, an internal peer review process is implemented for all major project deliverables. Each Work Package (WP) leader is responsible for submitting their documents to an assigned internal reviewer from another partner organization. This reviewer ensures the documents meet the required quality standards.

The project data remains re-usable for a minimum of one year, guaranteeing its availability for future research and applications.

3. ALLOCATION OF RESOURCES

Costs related to open access to research data in Horizon 2020 are eligible for reimbursement under the conditions defined in the H2020 Grant Agreement, in particular Article 6, but also other articles relevant for the cost category chosen. Project beneficiaries will be responsible for applying for reimbursement for costs related to making data accessible to others beyond the consortium.

The costs for making data FAIR includes:

- Fees associated with the publication of scientific articles containing project's research data in "Gold" Open access journals. The cost sharing, in the case of multiple authors, shall be decided among the authors on a case-by-case basis.
- Project Website operation: to be determined.

- Data archiving at ZENODO and on other online data base: free of charge
- Copyright licensing with Creative Commons: free of charge

The project members of the General Assembly are also responsible for the Data Management of POSEIDON dataset and research data in accordance with each organization internal Data Protection Officer (DPO).

Each partner is responsible for the data they produce. Any fee incurred for Open Access through scientific publication of the data will be the responsibility of the data owner (authors) partner(s).

4. DATA SECURITY

The following guidelines will be followed in order to ensure the security of the data:

- Store data in at least two separate locations to avoid loss of data.
- Encrypt data if it is deemed necessary by the participating researchers.
- Limit the use of USB flash drives.
- Label files in a systematically structured way in order to ensure the coherence of the final dataset.

As an initial step, only the Consortium Partners will have access to the cloud storage where dataset and metadata are filed. Following, scientific publications and articles, the dataset deliverables and the final demonstrator research results will be shared through ZENODO to promote the data making FAIR.

5. ETHICAL ASPECTS

As stated in Annex 5 of the Grant Agreement, the actions carried out in this project comply with:

- Ethical principles (including the highest standards of research integrity).
- Applicable EU, international and national law, including the EU Charter of Fundamental Rights and the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Supplementary Protocols.

Particular attention is paid to the principle of proportionality, the right to privacy, the right to the protection of personal data, the right to the physical and mental integrity of persons, the right to non-discrimination, the need to ensure protection of the environment and high levels of human health protection.

In addition, the project partners agree to comply with the fundamental principle of research integrity as set out in the European Code of Conduct for Research Integrity[1].

This implies compliance with:

- Reliability in ensuring the quality of research reflected in the design, the methodology, the analysis and the use of resources.
- Honesty in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair and unbiased way.
- Respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment.

[1] European Code of Conduct for Research Integrity of ALLEA (All European Academies).