



MMinE-SwEEPER

Data Management Plan – WP 5

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Abstract	This Data Management Plan (DMP) outlines the data handling within the MMinE-SwEEPER project. It relates to three different platforms being used for different purposes. (1) The GEOMAR cloud for project internal documentation, (2) the JPI Oceans Knowledge Portal Munitions in the Sea as a publicly accessible website for links, references and information, and (3) the TrueOcean data platform for



	managing, collaborating, and analyzing geospatial and marine survey data within the project.
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1. Introduction

The MMinE-SwEEPER project is centred around five main objectives:

- A. Compiling existing knowledge and management approaches,
- B. Advancing robotic applications, 3D imaging, and AI-supported data analysis,
- C. Conducting trials and use-case surveys across Europe,
- D. Strengthening cooperation and capacity building, and
- E. Promoting European collaboration, management strategies, and solutions.

Objectives B and C are closely tied to geospatial and marine survey data, as they involve the exchange of both existing and newly acquired data for processing and analysis. Additionally, Objective A plays a critical role by ensuring compliance with security requirements when sharing data and compiling relevant documents and stakeholder contact details. To support data and information sharing throughout the project, three tools are being utilized:

- GEOMAR Cloud: A secure platform for exchanging internal project information such as reports, email lists, and other documentation. It also supports online editing.
- JPI Oceans Knowledge Portal Munitions in the Sea: A publicly accessible website that also serves as a repository for storing references, links, and information, which will be expanded and updated as the project progresses.
- north.io's TrueOcean Data Platform: Designed for managing, collaborating on, processing, and analysing survey data, particularly geospatial and marine survey data.

The GEOMAR Cloud is password-protected and primarily used for sharing internal reports and documents. The JPI Oceans Knowledge Portal acts as a public library for disseminating information derived from the project's results. For managing geospatial and marine survey data, the TrueOcean platform serves as the core technology, offering tools for secure storage, data sharing, collaboration, and processing functionalities. Security-relevant survey data will be hosted on this platform and hence the TrueOcean platform is a key focus of the project's Data Management Plan (DMP). The TrueOcean data platform should meet the needs of research institutions, survey companies, and national agencies by providing a secure storage and sharing of data with clearly defined access controls, ensuring data owners maintain authority over who can view and use their data. In addition, it should provide data visualization tools for restricted audiences and, when appropriate, the public. Public access to survey data will be limited due to the sensitive nature of munitions in the sea.



This Data Management Plan outlines the information for handling data on munitions in the sea within the MMinE-SwEEPER project. As a living document, it reflects the project's initial strategies and will evolve over time, incorporating updates and refinements as the project progresses and data management practices are refined. An annual review of the data management plan will account for any changes and updates in the document.

2. Data summary

The objective to collect data on the GEOMAR cloud is to share project relevant documents, like reports, contact lists, meeting notes, and administrative documents. In addition, the platform can be used to collaborate on these documents.

The objective of collecting information on the JPI Oceans Knowledge Portal Munitions in the Sea is to explain and make declassified information easily accessible to a wider audience and to ensure that knowledge produced within the project is preserved beyond its completion. To achieve this, training materials, recorded webinars and workshops, as well as workshop presentations, will be compiled. The content will cover the entire process of dealing with marine munitions. The ambition is to create an online reference for practitioners, and, in this way, serve as decision support.

The primary objective of data collection on the TrueOcean platform is to share and collaborate on the geospatial and marine survey data with the aim to detect, classify, and potentially identify munitions in the sea. In addition, environmental data should be gathered to evaluate their impact on the surrounding environment. This data can provide critical insights into the location, quantity, and potential risks associated with underwater munitions. Within the project, existing data will be shared among partners to enhance processing and analysis algorithms, enabling the extraction of the required information (Objective B). Additionally, new data will be acquired by the project partners during trials and use-case surveys within the project to improve data acquisition techniques and survey methodologies (Objective C). Relevant data from external repositories may also be integrated into the data platform if it contributes valuable information about underwater munitions or supports the planning of field trials.

The extracted information on location, quantity, and risks is vital for governmental institutions and policymakers (Objective A). Therefore, the platform should facilitate collaboration among a wide range of stakeholders, from technical experts—such as research institutions, military entities, and survey companies—to policymakers, including organizations like HELCOM and national authorities.



For marine surveys, a variety of sensors are being used, resulting in diverse data formats. Common sensor types include:

- Multibeam echosounders (*.all, *.s7k, *.gsf)
- Side-scan sonar or synthetic aperture sonar (*.xtf, *.jsf, *.sdf)
- Sub-bottom profilers (*.seggy)
- Magnetometers (*.txt, *.csv)
- Electromagnetic sensors (*.txt, *.csv)
- Optical and acoustic cameras (*.png, *.jpeg)

Additionally, environmental sensors (e.g., *.txt, *.csv) will record chemical properties within the water column. The processed and analysed data will primarily produce raster/map formats (e.g., *.geotiff) and vector formats (e.g., *.shp, *.gpkg).

Although it is challenging to estimate the total data volume at the outset, the current data management platform has a capacity of 10 TB. However, the platform's scalability offers a key advantage, allowing for seamless expansion of storage space if needed.

3. FAIR Data

The [FAIR](#) principles are designed to make data **F**indable, **A**ccessible, **I**nteroperable, and **R**eusable. The principles highlight the importance of machine-actionability, as the growing volume, complexity, and speed of data creation have led humans to increasingly depend on computational support to manage it. Due to the sensitive nature of the topic involving munitions in the sea, not all data can be publicly shared. How to publish non-sensitive data needs to be decided during the project and first ideas are mentioned in 3.2 and 3.3. In general, for the data on the TrueOcean platform, we strive to adhere to the FAIR principles. These principles, however, may only apply to verified stakeholders who are authorized to find, access, interoperate, and reuse the data. The access rights should always be defined by the data owner. On the TrueOcean platform data access is handled through a project and folder structure where the stakeholder who creates a project can set custom access rights for the data in the project and hence has full control over who can access the data.

3.1 Making data findable, including provisions for metadata

The TrueOcean data platform hosts survey and geospatial data, featuring a map interface that allows users to locate data geographically. When data is uploaded to the platform,



metadata such as coordinates, file format, and data type (e.g., raster, vector, point cloud, multibeam, side-scan sonar) is automatically extracted from the files. Users can search for data on the map using a location-based search option, further refining results with filters for the keywords file format and data type. An appropriate metadata standard for geospatial data is [ISO 19115](#), which is also incorporated into catalog frameworks like [DCAT](#) and its geospatial extension, [GeoDCAT-AP](#). This standard is generic for geospatial data and does not specifically address the marine domain, which may require minor adjustments. The TrueOcean data platform is trying to evolve its metadata management to align with these standards, drawing on advancements in metadata [self-description](#) developed within the Marispace-X project. Nonetheless, it remains necessary to evaluate the extent to which tailored metadata is required to meet the specific needs of stakeholders addressing the topic of munitions in the sea.

3.2 Making data accessible

Data on the TrueOcean platform is accessible to users of the platform. Once, data is found on the map search within the TrueOcean data platform, it can be accessed in the project directory where it has been stored. Note that finding and accessing the data depends on the access rights the user has for the specified data which is given by the data owner. Data could also have been added from an external source via web map services ([WMS](#)) or web feature services ([WFS](#)) and hence the data might than be accessed via the provided link. Also, the compatibility with catalogue services for the web ([CSW](#)) should be considered to publish and search metadata. WMS, WFS and WCS are standardized, open-source protocols developed under the Open Geospatial Consortium ([OGC](#)). One possible scenario for providing publicly available data through the TrueOcean platform is to create a dedicated map, such as one labelled "Public." Stakeholders can add data that is authorized for public sharing from their project to this map. Once the data is added, the map can be made accessible to the public using the WMS interface. However, it is important to note that publishing an entire map would require new feature integrations within the TrueOcean platform.

3.3 Making data interoperable

Data exchange on the TrueOcean platform is facilitated through standard protocols such as URL, SFTP, and RSYNC. Shared data can be accessed directly by stakeholders who have been granted the necessary credentials (username and password). Additionally, raster data uploaded to the platform can be published via the standard open-source Web Map Service



([WMS](#)). As the wide variety of sensors used in marine surveys results in multiple data formats, using a unified data format is highly beneficial. The TrueOcean platform includes a file converter service that is continuously updated to support the conversion of various marine data formats into a single unified format. This unified data format is [Apache Parquet](#), an open-source standard that is regularly maintained with strong support from the [Apache Software Foundation](#). Parquet is optimized for cloud applications, ensuring efficient data storage and processing. As noted earlier, [GeoDCAT-AP](#) is a relevant vocabulary for geospatial metadata and could be considered for further development to enhance compatibility with this standard. Currently, metadata on the TrueOcean platform is stored in an internal database. Mapping of metadata to common vocabularies, like [GeoDCAT-AP](#), could be considered for developments within the project.

3.4 Increase data re-use

Given the sensitive nature of the topic, the reuse of any data must be determined by the respective data owner on a case-by-case basis.

4. Allocation of Resources

Currently, resources of the GEOMAR cloud and TrueOcean platform are only allocated for the time of the project, also due to the high sensitivity of the data. Any prolongation of data preservation after the project will be decided on during the project, also depending on the data that could be shareable at the end of the project. Hosting costs for data storage on the TrueOcean platform within the project are covered by north.io.

5. Data Security

The GEOMAR Cloud is a password-protected federated cloud service hosted by DFN (Deutsches Forschungsnetzwerk) at the Technical University Berlin which can be used by every associated institution of the DFN. The cloud service itself is software of the company Nextcloud aligned with the needs of the scientific community. The service synchronizes data on multiple devices and is either accessible in a web interface, the Nextcloud-Sync-Client, or via WebDAV.

The JPI Oceans Knowledge Portal Munitions in the Sea is hosted on Fraunhofer servers. [Data protection](#) is controlled by the Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V.. All data managed in AEM is stored locally within the Fraunhofer



Gesellschaft (currently in the data center in Sankt Augustin (Birlinghoven)). Daily backups of all systems are performed. These backups are stored beyond direct access to prevent any subsequent manipulation but never leave the Fraunhofer Gesellschaft. Backups are retained for six months. All systems are protected by firewalls (only necessary access is permitted; whitelisting) and other security measures. The infrastructure is designed redundantly. The AEM system operates behind a load balancer, ensuring that a system failure does not affect website availability.

The TrueOcean data platform is hosted on [IONOS](#) tier IV data centers, which fully comply with DSGVO requirements for data storage and archiving. These data centers are certified with the BSI C5-Testat Type certificate ([list of certificates](#)). Data is stored on servers located in Frankfurt, Germany, with two copies maintained on physically separated servers to prevent loss due to hardware failure and damages. Additionally, a nightly backup is stored on a third server in Berlin, Germany. The backup is retained for 30 days, allowing data to be recovered within this period. The currently implemented security features of the provided TrueOcean platform comprises the following. The access to the TrueOcean platform is password-protected. On the platform different user roles (admin, member, guest) exist that allow us to set different rights for the project folders where data is stored by the respective data owner. Data owners can define access rights for other users at folder or subfolder levels, customizing permissions such as “view,” “edit,” “upload,” or “share.” By default, only the data owner can access their project data. Data can be shared, given that the user has the right to do so, via URL, SFTP, or RSYNC. Credentials (username and password) are provided to ensure secure data exchange. The TrueOcean platform also features a log that tracks key activities, such as the creation and deletion of projects, upload and download channels, and data shares. It records details such as the type of activity, the associated date, and the user involved. Future updates to the log could include additional information, such as user invitations and deletions, user logins and logouts, and data uploads and downloads. A list of all users and their last date of activity is also available via the user management. This log data and user information is valuable for the Project Security Officer and the Security Advisory Board, helping them monitor and track activities on the TrueOcean platform. Within WP5 further security relevant features (e.g., 2-factor-authentication) are defined by the project partners and stakeholders and should be implemented into the existing TrueOcean data platform.

As the TrueOcean platform is only allocated for the time of the project, all data on the platform will be deleted at the end of the project. Data that was downloaded from the



platform needs to be handled appropriately by the respective project partner according to the consortium agreement.

6. Ethical aspects

At this stage, no ethical aspects were identified within the project.

7. Other issues

At this stage, no other issues were identified within the project.