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Data Management Plan Template for Funded Cruises

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V1.1	2019-04-18	Feedback from AWI	Thomas Vandenberghe with input from Anneli Stroebel
V1.2	2019-05-15	Feedback from MARIS and AWI	Thomas Vandenberghe

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TABLE OF CONTENTS

Contents

1	Introduction	1
2	Main Objectives	2
3.	Annexes	3
	3.1. EurofleetsPlus Funded Cruise Data Management Plan Guidelines	3
	3.2 EurofleetsPlus Funded Cruise Data Management Plan Template	9



This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 824077



Deliverable No.



1 Introduction

In order to evaluate that data generated during funded cruises adheres to the FAIR principles and to document any data management steps, the creation of a data management plan is mandatory for both applicants and grantees.

The data should be Findable, Accessible, Interoperable and Reusable. EurofleetsPlus will enable these FAIR objectives by having vessel operators and scientists use a set of software tools and workflows, provided by the EurofleetsPlus, SeaDataNet and related infrastructures.

More information can be found in the documents in Section 3 Annex 3.1 and 3.2.



This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 824077





2 Main Objectives

The main objective of the Data Management Plan (DMP) template is to offer scientists the framework to build their own DMP. At the same time, it should inform them of the tools and procedures EurofleetsPlus offers them so they can achieve FAIR data management of their funded cruise with as little effort as needed.

Important information like timelines are also provided. The timelines are based on the timings indicated in the Guidelines for applicants (prepared by the Alfred-Wegener-Institut (AWI)), which have been based on the Guidelines developed for the Eurofleets 2 project. The Guidelines for applicants have been adapted where necessary in consultation with AWI. These are the deadlines: Metadata of the cruise (SeaDataNet Cruise Summary Report): within two weeks after the cruise

- Metadata of the datasets of the cruise: within one month after the cruise
- En-route data: via EARS, delayed mode
- CTD data: within two months
- "manual" data, e.g. sample-based: two months, but at the latest before M45 (01/11/2022).
- embargo: optional, up to two years after the cruise, justified in the DMP

For this deliverable a template for a data management plan for funded cruises has been created. This "template" consists of two files, a guidance document and a questionnaire that should be answered. The questionnaire follows the original Horizon 2020 template on http://ec.europa.eu/research/participants/data/ref/h2020/gm/reporting/h2020-tpl-oa-data-mgt-plan_en.docx. Some questions are added, some removed, based on their use in the EurofleetsPlus framework.

The outcome of this deliverable is instrumental to Deliverable 'D4.6 Data management plan tool (customized DMPonline)'. The data management plan tool contains the same questions and bundles them in one multi-user web application.

The questionnaire is only created for this deliverable, will not be distributed and PIs should only complete the questionnaire via the DMP website. The DMP website is hosted at http://dmp.ef-ears.eu. The DMP will therefore have the form of a Q-A, not a freeform document.

Applicants should create a preliminary DMP, and after the grant is assigned, they are required to extend the DMP to full status





3. Annexes

3.1. EurofleetsPlus Funded Cruise Data Management Plan Guidelines

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TEMPLATE HORIZON 2020 DATA MANAGEMENT PLAN (DMP)

EurofleetsPlus

- > Instructions and footnotes in blue must not appear in the text.
- > For options [in square brackets]: the option that applies must be chosen.
- For fields in [grey in square brackets] (even if they are part of an option as specified in the previous item): enter the appropriate data.

Introduction

This Horizon 2020 DMP template has been adapted for EurofleetsPlus funded cruises. You should develop a single DMP for your project to cover its overall approach. However, where there are specific issues for individual datasets (e.g. regarding openness), you should clearly spell this out.

Guidelines on FAIR Data Management in Horizon 2020 are available in the Online Manual.

FAIR data management

In general terms, your research data should be 'FAIR', that is findable, accessible, interoperable and re-usable. These principles precede implementation choices and do not necessarily suggest any specific technology, standard, or implementation-solution.

This template is not intended as a strict technical implementation of the FAIR principles; it is rather inspired by FAIR as a general concept.

More information about FAIR:

FAIR data principles (FORCE11 discussion forum)

FAIR principles (article in Nature)

Structure of the template

The template is a set of questions that you should answer with a level of detail appropriate to the project.

It is not required to provide detailed answers to all the questions in the first version of the DMP that needs to be submitted by month 6 of the project. Rather, the DMP is intended to be a living document in which information can be made available on a finer level of granularity through updates as the implementation of the project progresses and when significant changes occur. Therefore, DMPs should have a clear version number and include a timetable for updates. As a minimum, the DMP should be updated in the context of the periodic evaluation/assessment of the project. If there are no other periodic reviews envisaged within the grant agreement, an update needs to be made in time for the final review at the latest.

In the following the main sections to be covered by the DMP are outlined. At the end of the document, Table 1 contains a summary of these elements in bullet form.

This template itself may be updated as the policy evolves.

Project¹ Number:824077

Project Acronym: EurofleetsPlus

Project title: An alliance of European marine research infrastructures to meet the evolving requirements of the research and industrial communities

Cruise project title:

Cruise project acronym (if any):

DATA MANAGEMENT PLAN

VERSION:

DATE:

AUTHOR:

¹ The term 'project' used in this template equates to an 'action' in certain other Horizon 2020 documentation

General guidelines

The Horizon 2020 Programme asks that the research output of its beneficiaries adheres to the FAIR principle and furthermore, that open access to research data is ensured to a maximal extent. Open access refers to the practice of providing online access to scientific information (publications and research data) that is free of charge to the end-user and reusable. FAIR data is findable, accessible, interoperable and readable.

FAIR data may still be (partially) private, e.g. when it is only shared under certain conditions. Open research data is freely available to anyone to access, use and share. Since 2017, open research data is the default option for H2020, while it is still possible to opt-out and select a more closed data model. For general H2020 projects, this may be because you want to protect your data before any publication has taken place, keep intellectual property rights for commercial purposes, or have privacy or security concerns. In summary, any EurofleetsPlus research data must be Findable, Accessible, Interoperable and Reusable for the group of users you as a research cruise principal investigator have defined; this may be anyone, with unrestricted access, in which case your data is considered open data.

Within open data there are gradations, going from fully open (public domain), to legally obliging attribution, to barring commercial re-use etc. A good overview of open licenses can be found on CreativeCommons, <u>https://creativecommons.org/licenses</u>. A further benefit is that these licenses are ready-for-use, unambiguous (as they already have a legal description), and are machine readable.

The default EurofleetsPlus license for cruise data is the public domain CC0-license, https://creativecommons.org/publicdomain/zero/1.0, as re-using data should not be made unnecessarily complex.

EurofleetsPlus applies the FAIR and Open principles of the H2020 framework on three levels: the EF+ project itself, the JRA research output and the TNA funded cruises. For this reason there will be two Data Management Plan (DMP) types in use: a general one for EurofleetsPlus, and one for each funded cruise, which must use the current document as a template. The DMP for cruises comes in two forms, a preliminary DMP at submission time and a final DMP after the cruise funding has been granted.

We have based ourselves on the Guidelines on FAIR Data Management in Horizon 2020 (http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-datamgt_en.pdf) to define the template for the DMP. Some of the specifics, for instance those on the timing of any opt-out (see p. 3), make less sense in the EurofleetsPlus context, and are not applicable. The only way to opt-in a dataset is by having selected an embargo period (that must be specified at the time of writing the DMP).

For EurofleetsPlus, opting out of open data is possible at the time the preliminary DMP is created or after the project has been granted, at the time the final DMP is submitted, but only for data with a distinct commercialibility, or by extending the embargo period. The embargo period may last up to two years after the cruise, however, the data must be provided to the EurofleetsPlus data centres in a timely fashion (it will be managed but not be disseminated further).

Project proposals will be judged on the completeness of the Data Management Plan and on what basis they enable their datasets to become FAIR. The DMP is a living document that follows the research lifecycle and should be updated during the project lifetime, especially after the cruise ended, to reflect any changes to your procedures. A data management plan prerecords the procedures you plan to follow with regards to data management, to ensure that they are actually followed.

Crucial elements like embargoes, opting-out data and licensing must be included as soon as possible in the DMP for the different types of datasets.

This document is a Data Management Plan in paper form, and contains a set of guidelines and the actual data management plan in textual form. This document may be used to draft your Data Management Plan. However, as creating a data management plan is a dynamic process and as versioning is difficult to manage using word documents, we use an online DMP tool, called DMP Roadmap. This also facilitates managing a multitude of submissions.

The Data Management Plan (both the preliminary and full DMP) of a cruise proposal MUST be created with DMP Roadmap on the website http://dmp.ef-ears.eu and kept up-to-date after funding.

A preliminary DMP is created at the time of the project proposal. This preliminary DMP contains a more limited set of questions. You can leave out details at this stage. After the proposal is granted, the Data Management Plan will have to be completed in full. For this, you need to answer additional questions and extend your existing answers to cover the issues more in-depth. Three reference data management centres, assigned to a funded project, will review your DMP and provide feedback at that stage. The Data Management partners are the Hellenic Centre for Marine Research (HCMR) in Greece, the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS) in Italy and the Belgian Marine Data Centre (BMDC). *The data centres are also responsible for receiving and processing your datasets.*

There are two periods considered: a) the period during which the scientist should entrust the data centres with his/her data; b) the embargo period, which may extend beyond period a). Data delivered under a) will be imported in databases, normalised against vocabularies, but if the embargo still applies the data will not be made available for download anywhere. In any case the data must be provided well before the end of the whole EurofleetsPlus project otherwise there is no time for the data centres to make it interoperable.

Information regarding your cruise must be provided as follows:

- Metadata of the cruise (SeaDataNet Cruise Summary Report): within two weeks after the cruise
- Metadata of the datasets of the cruise: within one month after the cruise
- en-route data: via EARS, delayed mode
- CTD data: within two months
- "manual" data, e.g. sample-based: two months, but at the latest before M45 (01/11/2022).
- embargo: optional, up to two years after the cruise, justified in the DMP

The EurofleetsPlus project will in due time provide the necessary infrastructure to make the data that is gathered during the funded cruises FAIR without any extra infrastructural work on your Institute's part being necessary. The EurofleetsPlus infrastructure:

- takes care of en-route data acquisition (salinity, temperature, depth etc. that are continuously measured). The EARS software is responsible for this.
- ensures that "manual" data (data originating from specific manual operations like sampling and deployments) can be enriched with the necessary meta-information (e.g. sampling devices, time of sampling, person responsible for sampling). The EARS software is responsible for this.
- stores cruise metadata (in the EVIOR portal), and can bridge this with SeaDataNet Cruise Summary Reports

Furthermore, EurofleetsPlus also bridges with other systems from SeaDataNet (using the Common Data Index data repository to finally store the data and the Cruise Summary Report to store cruise details) and EMODnet (using the Data ingestion Portal to describe dataset metadata).

- Your data and metadata is made interoperable like this:
- Within two weeks after the cruise, complete the Cruise Summary Report following the 'Guidelines for applicants'
- Your cruise might have resulted in one or more CTD or "manual" datasets. The metadata of each dataset needs to be described to make them findable. Within resp. 3 or 6 months after the cruise, you are invited to add these datasets in the EMODnet Data ingestion Portal. In this system you can then later upload the data itself.
- However, the data gathered during the cruise is not yet ready for interoperability with existing datasets. The reference data centres will make your data available on European oceanographic data repositories (i.e. SeaDataNet and EMODnet). This makes them interoperable with the other datasets there, ensuring your dataset's reusablility.
- En-route data from your cruise will be standardised by using the Eurofleets Automatic Reporting System (EARS), made available on the EVIOR portal and in the SeaDataNet Common Data Index data repository. No effort from your side is needed for this.

Steps

- Follow the webinar on FAIR, DMPs and DMP Roadmap via http://www.eurofleets.eu
- Prepare your proposal
- Create an account on the EF+ DMP Roadmap (<u>http://dmp.ef-ears.eu</u>) and complete the preliminary DMP
- Submit your proposal on the official EurofleetsPlus submission website, together with a pdf of the DMP generated from DMP Roadmap
- Await confirmation that you are awarded the project
- Complete the final DMP on http://dmp.ef-ears.eu
- Receive additional feedback from the reference data centres on improving the DMP
- Participate in the cruise
- Provide the metadata of the manual dataset(s) on the EMODnet Data ingestion Portal as soon as possible after the cruise
- Upload the data to the metadata record(s) within 3 or 6 months after the cruise

3.2 EurofleetsPlus Funded Cruise Data Management Plan Template

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TEMPLATE HORIZON 2020 DATA MANAGEMENT PLAN (DMP)

EurofleetsPlus

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Cruise project acronym (if any):

DATA MANAGEMENT PLAN

VERSION:

DATE:

AUTHOR:

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Data Management Plan

The questions in bold should be addressed in the preliminary and final DMPs, the others only in the final DMP.

1. Data Summary

What is the purpose of the data collection/generation and its relation to the objectives of the project?

What types and formats of data will the project generate/collect?

Will you re-use any existing data and how? Is this hosted on any data repository? Which ones?

How is the original data gathered on board and how do you transfer it to shore? What processing on the raw data do you plan? What will be the end state of the data when it is ready for uptake into a data repository?

What is the expected size (Megabyte to Terabyte range) of the data?

Who will be the principal users of the data? Users are both active (those that clean up or analyse the data) and passive (those that read or assess the data).

2. FAIR data

2. 1. Making data findable, including provisions for metadata

What naming conventions for your data files will you follow?

Can you list some search keywords? The purpose of keywords is to optimize the findability of the datasets. Best practice is to refer to definitions in standard vocabularies.

Do you foresee a need for different versions of the data? Both for your own internal use and when publishing the data? E.g. for some analyses the data might need reorganisation from a common ancestor. Which versioning scheme do you have in mind?

The EurofleetsPlus data repository will allow you to create the metadata when uploading the data. What metadata elements will be most relevant for other scientists active in the same field as you to assess the fitness of your datasets for their own use? Can you outline them?

Guidance: 'Metadata' is considered 'data about data'. In this context it represents 'information about datasets'. Metadata should take into account the following elements:

- Title
- Abstract
- Lineage: Different basic steps that have been performed to the raw data in order to help the interpretation by other users (e.g. statistical analyses, subsetting, geographical reprojection,...): global origin, simple categorization of sampling methods, previous file formats the data had, specific steps and transformations taken to clean, compile and present the data. Relations with other data sets.
- Language(s) used in the data
- Format(s): file formats
- Creation date of the dataset
- Latest revision date of the dataset
- Author of the dataset
 - Full name of the organization
 - Name of the responsible person
 - Email address
 - Postal address
 - City

- Postal code
- Country
- Website
- Geographic area: named area
- Coordinate Reference System (CRS): WGS 84, ETRS89,...
- Spatial Extent (Bounding Box): The spatial coordinates of the widest geographical extent (westBoundLongitude, eastBoundLongitude, southBoundLatitude, northBoundLatitude)
- Temporal Extent: start and stop date of the collection points
- Taxonomic coverage: The taxa (use appropriate levels like families, orders or classes) this dataset contains
- Limitations for data using: E.g. not for navigation purposes, provided without liability, sensitive information withheld...
- Conditions for data sharing: licenses, embargoes

2.2. Making data openly accessible

Which data produced and/or used in the project will be made openly available as the default? If certain datasets cannot be shared (or need to be shared under restrictions or embargo), explain why, clearly separating legal and contractual reasons from voluntary restrictions. Do this for each type of dataset you will create.

If you answered positive to the previous question, will data access be granted on a user-by-user basis? How will the identity of the person accessing the data be ascertained?

Do you plan to make the data and metadata available on another repository than the EuroFleets/SeaDataNet data repository, for instance an institutional, a thematic or a geographic repository?

What methods or software tools are needed to access the data?

Is documentation about the software needed to access the data included?

Is it possible to include the relevant software (e.g. in open source code)?

Where will the documentation and code be deposited? Preference should be given to certified repositories which support open access where possible.

2.3. Making data interoperable

Reference data centres will make your data interoperable with the standards used in European marine research. A large part of this work is to connect the information surrounding the data in the original datasets to standardized definitions (stored in vocabularies). Therefore, it is important that the operations during a scientific cruise are noted down in a detailed way, so that they can be interpreted correctly.

Guidance: This meta-information should be provided for different elements:

- Provide the vessel name, and any platform on that vessel (i.e. ROV, AUVs, RIBs) used for sampling
- Campaign:
 - The code as used by the vessel operator
 - The name of the campaign if any
 - The ports of departure and arrival
 - Sea areas visited
- A description of the different features of interest (e.g. sea water column at depth range x, sediment layer at depth range y, benthos communities of gravel beds) of each individual measurement.
- Sampling in the case when an ex-situ measurement is performed on the feature of interest:

- The sampling location coordinates and their Coordinate Reference System
- The name of the location, and in case of a station, the station code
- The time, sampling depths and locations at the beginning of the sampling, and if applicable also at the end
- Sea bottom depth at sampling location if relevant
- Vertical datum: depth reference system (mean sea level)
- The time, length, swath and width over which sampling took place
- The exact sampling device: type, model and make, characteristics, calibration information...
- Subsamples for chemistry, biology or geology: the extent of the subsample, from which part/depth/organ it was taken...
- The observed property you have observed or measured:
 - The scientific purpose of the measurement or observation operation
 - The parameter
 - Statistical modifiers (time-averaged, percentile, standard error)
 - The time at which the measurement was taken
 - The time reference at which the measurement was taken (UTC, time offset to UTC)
- The procedure you applied to take the measurement:
 - Any preparatory steps: sieving, filtration, mixing
 - An indication on the fraction (matrix) or combined sample these steps resulted in (e.g. dissolved, particles (180-300um), wet weight/dry weight)
 - For chemistry, a description of all analytical steps taken
 - The algorithm you have applied to the raw device output if applicable
 - The exact measurement device: type, model and make, characteristics, calibration information
 - The time (plus time reference) at which the result of the procedure was known (if it is different from the time at which the measurement was taken)
- The result of the measurement:

• The value

• The unit of the value, expressed in units that are considered a community standard

(Please note that in the strictest sense, only the elements in bold are considered the data ('values'), the rest can be considered meta-information. Also, don't worry too much about structuring this information, a tabular format, repeating shared meta-information elements for values, is in most cases just fine.)

Please specify how you plan to unambiguously capture and store the specified individual meta-information elements to facilitate the reference data centres to connect your information to the definitions in vocabularies in an efficient way.

Notwithstanding the work the reference data centres will perform, do you plan to already make use of standardized definitions (stored in vocabularies) to store the above meta-information?

In case it is unavoidable that you use uncommon or generate novel or project specific scientific terminology, do you plan to provide mappings to more commonly used terminology? How will you cope with information loss? How will you embed this information in the above meta-information and make sure they are seen as novel?

2.4. Increase data re-use (through clarifying licences)

How will the data be licensed to permit the widest re-use possible?

Guidance: Horizon 2020 wants to stimulate openly accessible data, with maximal reusability. In order to facilitate this, open, up-front and machine readable licenses are preferred, such as those on https://creativecommons.org/licenses.

Furthermore, we want to highlight that EurofleetsPlus data must be as open as possible, which means that the CC0 (public domain) license is the most appropriate.

When will the data be made available for re-use? If an embargo is sought to give time to publish or seek patents, specify why and how long this will apply, bearing in mind that research data should be made available as soon as possible.

Is the data produced and/or used in the project usable by third parties, in particular after the end of the project? If the re-use of some data is restricted, explain why.

How long is it intended that the data remains re-usable?

During the dataset lifecycle, do you plan to note down the data harmonisation, data quality assurance and data curation processes to ensure they are correctly described in the metadata?

3. Allocation of resources

Who will be responsible for data management in your project?

4. Data security

Before the data is transferred to the EurofleetsPlus data repository, what provisions are in place for data security (including data recovery, secure storage and transfer)?

5. Ethical aspects

Are there any ethical or legal issues that can have an impact on data sharing?

6. Other issues

On top of the infrastructure and procedures that EurofleetsPlus provides, which national/sectorial/ departmental procedures for data management are you following?

7. Further support in developing your DMP

The following organisations are supporting FAIR data management for European marine research:

- SeaDataNet extended the ISO 19115 geographic metadata standard, and, by using standard vocabularies, provides data access services covering many different fields.
- The European Marine Observation and Data Network (EMODNet) provides access to data and data products and strengthens and makes extensive use of the SeaDataNet infrastructure.
- EurofleetsPlus provides the necessary data management frameworks to connect the on-board science to the data repositories.

The <u>EUDAT B2SHARE</u> tool includes a built-in license wizard that facilitates the selection of an adequate license for research data.

The EurofleetsPlus Data Management Plan must be completed using the DMP Roadmap tool provided on http://dmp.ef-ears.eu.

SUMMARY TABLE 1

FAIR Data Management at a glance: issues to cover in your Horizon 2020 DMP

This table provides a summary of the Data Management Plan (DMP) issues to be addressed, as outlined above.

DMP component	Issues to be addressed
1. Data summary	State the purpose of the data collection/generation
	Explain the relation to the objectives of the project
	Specify the types and formats of data generated/collected
	• Specify if existing data is being re-used (if any)
	Specify the origin of the data
	Specify how you will transfer, handle and process your data
	• State the expected size of the data (if known)
	Outline the data utility: to whom will it be useful
2. FAIR Data	Outline naming conventions used
2.1. Making data findable, including provisions for	Outline the approach towards search keywords
metadata	Outline the approach for clear versioning
	Outline the most important metadata element

2.2 Making data openly accessible	• Specify which data will be made openly available? If some data is kept closed provide rationale for doing so
	Specify how access will be provided in case there are any restrictions
	• Specify whether you will make the data available on another infrastructure than the EurofleetsPlus one.
	• Specify what methods or software tools are needed to access the data? Is documentation about the software needed to access the data included? Is it possible to include the relevant software (e.g. in open source code)?
	Specify where the data and associated metadata, documentation and code are deposited
2.3. Making data interoperable	• Assess how you will capture and store the elements that facilitate or ensure the interoperability of your data.
	• Specify whether you will be using standard vocabularies for all data types present in your data set.
2.4. Increase data re-use (through clarifying licences)	Specify how the data will be licenced to permit the widest reuse possible
	• Specify when the data will be made available for re-use. If applicable, specify why and for what period a data embargo is needed
	• Specify whether the data produced and/or used in the project is useable by third parties, in particular after the end of the project? If the re-use of some data is restricted, explain why
	• Specify the length of time for which the data will remain re-usable
	Describe how you will capture data harmonisation, quality assurance and data curation processes
3. Allocation of resources	• Estimate the costs for making your data FAIR. Describe how you intend to cover these costs
	Clearly identify responsibilities for data management in your project
	Describe costs and potential value of long term preservation
4. Data security	Address data recovery as well as secure storage and transfer of sensitive data
5. Ethical aspects	Are there any ethical or legal issues that can have an impact on data sharing?
6. Other	• Refer to other national/funder/sectorial/departmental procedures for data management that you are using (if any)

HISTORY OF CHANGES			
Version	Publication date	Change	
1.0	13.10.2016	Initial version	
1.0b	2019-04-10	 Revised for EurofleetsPlus H2020 Project 	