FunShield4Med

SHIELDING FOOD SAFETY AND SECURITY BY ENABLING THE FORESIGHT OF FUNGAL SPOILAGE AND MYCOTOXINS THREATS IN THE MEDITERRANEAN REGION UNDER CLIMATE CHANGE CONDITIONS

D1.1 - Data Management Plan

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ACRONYMS LIST

DMP	Data Management Plan
EC	European Commission
EU	European Union
HE	Horizon Europe (EU Framework Programme for Research and Innovation)
CSA	Coordination and Support Action
GA	Grant Agreement
DoA	Description of Action
FAIR	Findable, Accessible, Interoperable, and Re-usable
ORE	Open Research Europe
QMEA	Quantitative Mycological/Mycotoxin Exposure Assessment
EFSA	European Food Safety Authority
DOI	Digital Object Identifier
EOSC	European Open Science Cloud
GDPR	General Data Protection Regulation
EuroCRIS	European (branch of international not-for-profit association for management of) Current Research Information Systems
CERIF	Common European Research Information Format
HDD	Hard Disc Drive
EB	Executive Board

EXECUTIVE SUMMARY

The present Deliverable, "D1.1 Data Management Plan", describes the procedures established by FunShield4Med to meet the principles of open science for research data as stipulated by the European Commission (EC) for Funding and Tender Opportunities[1]. These procedures include data management guidelines, measures, templates, standards, and roles, for all members of the Consortium, to manage the research data used and/or generated in the project responsibly and in line with the Open Research Europe (ORE) and FAIR pathways, as proposed by EC and Go-FAIR organisation, respectively[2].

FunShield4Med is a Coordination & Support Action of HE Programme, with all Beneficiaries representing higher educational or public research institutions, having already adopted measures of open science for research data. These facts will help towards a smooth adoption of the relative open science principles required under HE actions implementation. In addition, the dynamic format of DMP, having foreseen regular updates during lifespan of project, will allow to consider the potential midterm and final corrective actions demanded by EC reviews, and to include data types and format not present in this fist version of the Data Management Plan (DMP).

[1] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf. Accessed 13/05/23.
[2] https://www.go-fair.org/fair-principles/. Accessed on 03/05/2023.

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1. Data Summary

FunShield4Med DMP focuses on making every data used and/or generated by the project FAIR (findable, accessible, interoperable, and reusable). In this first version of the DMP is described the pathway to be followed by Beneficiaries to ensure the open access for the created scientific publications (Golden Open Access), the re-used or newly generated scientific datasets, the accompanying metadata, resources, and methodology for their preservation (5-year period after end of project lifetime), and supportive measures to ensure their FAIR character.

FunShield4Med, will build on existing knowledge publicly available from the academic partners of the Consortium, and in this context, data will be used for modelling and prevalence studies of mycotoxins production and quantitative mycological/mycotoxins exposure assessments. These data will be provided by all members of the consortium to support project implementation until new data are generated from the joint research project foreseen by the Description of Action (DoA) of project's Grant Agreement (GA).

The purpose of the data generation and reuse is the analysis of the mycotoxins' hazards and of mycotoxigenic fungi surveillance at dynamic changing climatic environments. These experiments will be based on classical mycological identification and enumeration techniques, and mycotoxin determination and quantification in food and drinks. Other data will include sequencing data and images collected from microscopic analysis of fungi, which will be used to develop mycological/mycotoxin exposure assessment (QMEA) tools under the different climatic scenarios.

The project will generate or reuse research data, including metadata, standards, and quality assurance measures. Specifically, the data sets foreseen for reuse in the project include:

- Scientific publications, like articles from peer-reviewed journals, books, conference proceedings, etc., owned by publishers, with a unit purchase or subscription base cost covered by the project.
- Open Access scientific publications, owned by publishers or authors but freely available.
- Grey literature like reports, policy literature, working papers, newsletters, government documents, protocols, etc. available freely through internet.
- EU standards and regulations, offered without cost through relative EU authorities (EC, EFSA, etc.)
- Physical (e.g., temperature, relative humidity), chemical (e.g., mycotoxins analysis), and biological data (e.g., sequencing data, microbial populations data), from other projects and/or from past research contacted by the consortium members.
- Climate prediction models, from other past projects and/or from past research contacted by consortium members.
- Personal data (e.g, name, affiliation, country, mailing address, professional background, job title, gender, IP addresses, photographs, etc.) only for members of consortium and other partners upon consent.

The project plans the production of new data including:

- Public deliverables, all going to be publicly available through the project's website.
- Scientific publications, also being publicly available, either from Golden Open access journal or repository platforms of authors and partners.
- Open-source software contributions for modelling purposes.
- Datasets from experimentation and surveys, deposited in an open cloud environment, accessible from project's website.

- Physical (e.g., temperature, relative humidity), chemical (e.g., mycotoxins analysis), and biological data (e.g., sequencing data, microbial populations data), from other projects and/or from past research contacted by the consortium members.
- Microbiological and physicochemical data from experimentation and surveys, deposited in an open cloud environment, accessible from project's website.
- Toxicological data of mycotoxins, deposited in an open cloud environment, accessible from project's website.
- Predictive models, deposited in an open cloud environment, accessible from project's website.
- Risk Assessments models, deposited in an open cloud environment, accessible from project's website.
- Personal data (name, affiliation, country, mailing address, gender and photographs) of participants to training events (seminars, workshops, and summer schools) with restricted access only to consortium and EC officers, and always in line with GDPR rules.s

The expected size of data that will be generated and managed, either by re-use of already existing data, or newly created, is estimated from 1 to 15GB depending on the number of commodities analysed and mycotoxins in test, and on programming code used for modelling, size and type of created outputs.

The deliverables list is already available in DoA (Table: List of Deliverables) of GA No 101079173, and together with their reports will be freely accessible in project's website under "The Project" menu tab and "Deliverables" selection. Also, in line with HE implementation rules, deliverables will be deposited in EC project's management portal (SyGMa). The scientific publications, upon their acceptance after submission to the respective journals and conferences, will be accessible from project's website, journals' platforms, and conferences proceedings, under Golden Access principles, and will be also deposited in the EC project management portal.

All data (raw and processed, modelled, metadata, etc.) and material (publications, deliverables, training, and other dissemination/communication resources) generated during the project's lifespan will be open and accessible through the website, for utilisation and exploitation from the scientific community and the agri-food stakeholders, and for the information and awareness of interested public groups (consumers, associations, public). Upon a Partner's request, access may be restricted for some data, if the legitimate interests of the partner could be harmed, but only after having the agreement of Grand Assembly, and according to Consortium Agreement's provisions.

2. FAIR data

2.1. Making data findable, including provisions for metadata

FunShield4Med DMP considers the relative FAIR pathway as proposed by Go-FAIR organisation. Data generated will be accompanied by a metadata file describing all the details regarding how the data files associated were acquired and having provision to enable machine-readable descriptions. When data are part of a research paper or article, they will be associated with the Digital Object Identifier (DOI) of the related publication. Keywords, which will be directly incorporated when uploading the data sets in public trusted repositories, will be provided to support findability for subsequent re-use and exploitation.

DOI assignment will keep relevant datasets and metadata associated with the object created for. Datasets from experimentation, surveys, and models, produced during the project, will be maintained by each consortium member pertaining to their own tasks with naming conventions (e.g., "DATASETNAME VERSION YYYY.MM.DD.csv" or .xlsx) to make it easily searchable and discoverable, while a relative metadata file (stored as a .txt file) will be created will all information linked to the dataset. Each consortium member will maintain the data and metadata in their organisation's servers and will provide open access through their deposition to the project's website and the dedicated repository, to be freely discoverable and accessible for interested parties.

2.2. Making data accessible

Almost every dataset resulting out of FunShield4Med activities, will be freely accessible and protected by minimally restrictive or unrestricted licenses when needed, although there is provision for sharing some data through private access. Data and documents publicly available will be accessible from the project's website, while more than one repository is going to be created for the project. There is already created a dedicated Google Drive for all resources, inputs, and outputs, of the project to be stored, with full access restricted to project partners at the time. In addition to the project dedicated Google Drive, the project will try to utilize European Open Science Cloud (EOSC) to store, curate and share data. Especially for analytical data regarding the levels of parent and emerging mycotoxins in food and drinks screened in the context of joint research project, as well as the QMEAs, these will be communicated and shared with the European Food Safety Authority (EFSA). Finally, each participant will keep a backup repository at institutional level, under their repository facilities and secured servers (e.g., ELGO-ITAP provides to its research personnel space and resources for data and metadata stockage to the organisation's central servers).

Should other individuals wish to access the project's repository, the requested Drive subfolder will be openly shared on request, to identity the person accessing the data, and to be ascertained and verified. Open access to research data will be "as open as possible as closed as necessary". Those datasets and algorithms not publicly available will remain the property of the creator until made open source after publication.

Data and metadata openly available will be licenced under a public domain dedication such as the various Creative Commons licenses[3] and according to the Grant Agreement provisions, and in case that this is not necessary, a justification will be provided under next versions of current deliverable.

As FunShield4Med consortium is composed of only 5 partners there is not foreseen a data access committee. The General Assembly and the Executive Board will undertake the evaluation/approvement access requests to personal/sensitive data, while relevant actions will always follow GDPR rules.

2.3. Making data interoperable

To make metadata interoperable, FunShield4Med will follow the Common European Research Information Format (CERIF) of EuroCRIS[4] as a standard, while for newly created data the commonly used formats of Microsoft Office files, Adobe PDF, png/jpg for images and .avi for videos will be preferred. During project's lifespan, when new data will be identified and collected, further information on their interoperability will be provided under next versions of DMP. To raise interoperability of its research and educational results FunShield4Med outputs (data, educational

[3] http://creativecommons.org/publicdomain/zero/1.0/. Accessed 10/05/2023.
[4] https://eurocris.org/. Accessed 20/04/2023.

material etc.) will be assigned to a metadata file under a .txt format including all relevant information as presented to Table 1 following.

Table 1: DMP Metadata File and Template Elements

Dataset title	Dataset name.
Responsible (Partner)	Responsible person and partner for collection/creation.
Description	Description of dataset including if being result of other existing data reuse or generated from scratch, if it has been transformed from a different format, the reason of their use/creation, links to their source (repository, publication, etc.), information about size, type, etc.
Original source	Links and credits to original data owner(s) or to partner(s) contributed to its creation.
Format	The format used and in case of a collection of related datasets, indication for all.
Metadata	What metadata has been provided to enable machine-readable descriptions of the dataset.
Access & Sharing	Public, Restricted (to specific groups), or closed. If not public, including justification on reasons for not being, and when will be widely open. Also, specifications for the procedures to be followed for accessing and/or sharing.
Copyright & IPR	When needed, provision of information on copyrights and intellectual property.
Dissemination & reuse	Links to relevant DEC actions under the project and reuse by other projects/individuals.

2.4. Increase of data reuse

FunShield4Med DMP will have as ultimate scope, the generated knowledge from its implantation to be broadly reused by the relevant scientists, stakeholders, and associations, to the direction of securing food from mycotoxins. The data type and format (mycotoxins analysis, mycological surveys, molecular data etc.) can be easily transformed, processed, used as inputs to several types and of different scope models, enrich already existing risk assessments or create new, making them of great value for the scientific community. To this end, reusability of data and metadata will be enhanced from their format standardisation, open-source software, and proper documentation, as well as from the multiple and different repositories created during the project's life. To secure the whole process of this knowledge exchange and reuse, data, metadata, and other resources, with potential reusability will be linked to Common Creatives licences, if necessary, and will be publicly available for educational, research and non-profit purposes. The accompanying metadata and descriptions will help future user to acquire the necessary components like origin, history, provider etc. enabling their meaningful reuse and proper citation. Consortium partners, through their relevant infrastructure, like Technology Transfer Offices and IT Departments, will seek guidance and resources to achieve a considerable FAIRification of project's results. Finally, FunShield4Med by following the relevant standards, guidelines, and resources (EuroCRIS, FAIR, EOSC, GDPR etc.) will try to conform to the ORE principles for a real open access in research.

3. Other research outputs

FunShield4Med will create a series of different research outputs apart from data and metadata. These are predictive models and QMEAs, e-tutorials, webinars, training material and many outreach activities like podcasts,

YouTube videos, promoting material like flyers, social media posts, as these are presented and described in DoA and GA. Every time that these outputs are released the Executive Board and the Grand Assembly will follow the commonly accepted pathways for data management, whenever these outputs are related to data handling. For example, in the case of newly produced models or QMEA, these will be assigned to the relevant DOI of the publications released with/from them or will be accompanied by their relevant metadata files and information and deposited to the open repository platforms of the project, to be made available and findable according to the FAIR principles.

4. Allocation of resources

Each partner of the consortium that use other or produce new research outputs will be the responsible for their sharing and archiving. They will have to discuss and/or present the followed pathways to secure their outputs during Grand Assembly and Executive Board. The same persons charges with the management of these outputs will be responsible as well for the day-to-day cross checks, backups, and other quality control activities maintenance. The resources allocated from partners' institutions (e.g., institutional servers) and those created under the implementation of the project (e.g., public repositories), will be used to secure not only research related outputs, but also any output created under FunShield4Med, for a decade after end of project's lifespan. The planned long-term preservation of data sets generated is foreseen to be supported from project's budget until its end and will be further supported from institutional budgets afterwards.

5. Data security

Until today the resources allocated for data security are the project's website under a WordPress environment, incorporating the latest security updates and plug-in patches, the project's Google Drive folder following Google security codes, and an external HDD at the premises of coordinator institute ELGO-ITAP and of PI responsibility to back-up research outputs on a regular basis. Following these measures, is foreseen the creation of project dedicated spaces to all partners institutional servers and regular updates, until end of project lifetime, and further maintenance for a 5-year period after. All data and metadata created will be regularly updated, with the relevant information (updates date, document version, reasons of update etc.) being reflected in the accompanying record following the dataset. Initial version will be also available through an archive dedicated space of the allocated resources (back-ups and repositories).

6. Ethics

Besides the Ethical clearance of FunShield4Med, the EB whenever needed will consider and adopt measures on ethical and legal issues relating DMP such as the general personal data protection, respect to sensitive data and minimizing burdens on research participating persons. The responsibility on alignment with ethical standards for DMP fall under the EB of FunShield4Med and the responsible authors of forthcoming versions of the present document. These regular updates will include additional provisions on handling data according to the expected ethical standards of HE programmes.

7. Other issues

N/A

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