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D6.1 - Data Management Plan

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Deliverable D6.1 - Data Management Plan (DMP)

Short summary:	This deliverable is the first version of the Data Management Plan (DMP) for the MOBILES project, funded under Horizon Europe. It outlines the management of 22 datasets and 21 public deliverables following FAIR principles and EU Open Science policy. The DMP ensures data findability, accessibility, interoperability, and reusability, using trusted repositories (Zenodo). Sensitive datasets are protected for commercial exploitation, while open-access outputs are licensed under Creative Commons. This document serves as a living platform for continuous updates throughout the project's lifecycle.
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MOBILES

1. SUMMARY

The MOBILES project, funded under the Horizon Europe programme, aims to develop portable, cost-effective, and high-performing biosensors for the detection and mitigation of environmental pollutants, including pathogens, Chemicals of Emerging Concern (CECs), and Persistent Mobile Chemicals (PMCs). The project focuses on improving air, soil, and water quality through innovative technologies that benefit human and environmental health. -It includes the following objectives:

- Objective 1: Development of Electronic Biosensors: For monitoring organic chemicals (e.g., pesticides, hormones) and antimicrobial-resistant bacteria/pathogens in air, water, and soil.
- Objective 2: Development of Organism-Based Biosensors: Using genetically modified organisms (e.g., chemiluminescent bacteria, colour-changing plants, and marine diatoms) for detecting organic/inorganic pollutants and monitoring bioplastic degradation in aquatic environments.
- Objective 3: Environmental Performance Studies: Assessing the ecological impact of developed biosensors and devices.
- Objective 4: Metagenomics Analysis: Investigating microbiota in polluted areas to identify functional gene clusters.
- Objective 5: Safety Tests: Conducting EFSA-like assessments to evaluate environmental safety.

The project outputs, including biosensors and monitoring systems, will cater to a broad range of stakeholders, from consumers to industry operators and emergency responders, ensuring adaptability to various pollutants.

MOBILES Data Management Plan (DMP)

The MOBILES Data Management Plan (DMP), a deliverable of Work Package 6 (WP6) delivered by task T6.4 leader, GRANT Garant (GG) ensures responsible management of all research data and outputs in compliance with the FAIR principles (Findable, Accessible, Interoperable, Reusable) and Open Access (OA) policy.

Key aspects of this deliverable include:

- **Definition of Datasets Generated:** The project will produce 22 datasets and 21 other research outputs (public deliverables) across its six work packages.
- **Findability:** Open datasets will be deposited primarily in Zenodo (under MOBILES community: <https://zenodo.org/communities/mobiles>), using persistent identifiers (e.g., DOIs) and Creative Commons licensing (CC BY for data, CC0 for metadata). Restricted datasets will follow stringent confidentiality measures.
- **Accessibility:** Majority of project datasets and other research outputs will have granted open access. Some project datasets and other research outputs (sensitive deliverables) will not be open in order to protect know-how for potential patent application.





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- **Interoperability:** Common open formats (e.g., MS Office, CSV, FASTA, PDF) will ensure compatibility with widely available tools, while proprietary formats will be supported by licensed software or Python libraries.
- **Reusability:** Comprehensive metadata, README files, and descriptive documentation will accompany datasets, ensuring ease of access, reproducibility, and compliance with Horizon Europe requirements.
- **Updates:** The DMP, prepared in M4 will be updated in M20 and M40. D6.1 provides a dynamic framework for ongoing improvements.

The MOBILES project is committed to transparency and open science principles while balancing ethical, legal, and commercial considerations.





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2. MOBILES Project Summary

Currently there are no portable test or biosensors validated for air, soil or water quality control for pathogens, CECs and PMCs, so such devices are much awaited by all stakeholders to ensure successful control and prevention of contamination and infections. Mobiles consortium will develop an interdisciplinary framework of expertise, and tools for monitoring, detection, and consequently mitigation of pollution from pathogens, CECs, PMCs, thus benefiting human and environmental health. Mobiles consortium will work to achieve the following objectives: Develop electronic biosensors for monitoring organic chemicals (pesticides, hormones) and antimicrobial resistance bacteria and pathogens in water, soil and air; Develop organism-based biosensor for detection of organic and inorganic pollution in water and soil; Study environmental performance of developed organisms and devices; Metagenomics analysis of organisms leaving in polluted areas in order to enable searches for diverse functionalities across multiple gene clusters Perform safety tests (e.g., EFSA) to assess the impact of developed organisms on the natural environment. Organism-based biosensor will consist on genetically modified chemiluminescent bacteria able to detect antibiotics, heavy metals, and pesticides in water; genetically modified plants that will change colour when in the soil is present arsenic; and marine diatoms that will be used to detect bioplastic degradation in marine and aquatic environments. Developed devices and organisms will be implemented by using flexible technologies, which can guarantee an easy adaptation to other biotic and abiotic pollutants. Devices and organisms, after proper validation and approval, could be used by consumers, inspection services and industry operators, as well as environmental emergency responders to monitor and detect PMCs, CECs and pathogens in water, air and soil.





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3. MOBILES Data Summary

3.1. PRINCIPLES OF THE DATA MANAGEMENT

MOBILES is a Research and Innovation Action project funded under the Horizon Europe programme. Over its 42-month long duration, the project will generate multiple digital datasets from various consortium members. Developing a viable Data Management Plan (DMP) to guide the team through the processes of data storage, availability, accessibility, and reuse, in compliance with the FAIR principles, represents a critical first step in the project's realization.

The guiding principles of the EU Open Science policy, broadly outlined in Annex V of the EU Grants Annotated Grant Agreement, along with the indicative DMP template, have provided a framework for creating a comprehensive plan to effectively manage data within the MOBILES project.

The Data Management Plan of the MOBILES project aims to:

- Deliver and regularly update a comprehensive **DMP, with scheduled updates at M20 and M40** of the project timeline.
- Manage all data in accordance with **FAIR principles** to ensure findability, accessibility, interoperability, and reusability.
- Deposit data in a **trusted repository (Zenodo)** as soon as possible in case of scientific publications, upon publication.
- Ensure open access to research data through the repository, using the latest version of the **Creative Commons Attribution International Public License (CC BY)** or the **Creative Commons Public Domain Dedication (CC0)**. Exceptions will be made if openness harms the beneficiaries' legitimate interests or contradicts constraints such as EU competitive interests or obligations under the Grant Agreement (note Art. 17).
- Provide repository-based information about research outputs and any tools or instruments required to reuse or validate the data.
- Ensure open **metadata (licensed under CC0)**, including key details such as the dataset's origin, publication information (author(s), title, date of publication, and venue), Horizon Europe grant information (project name, acronym, and number), licensing terms, and persistent identifiers for the publication, authors, organizations, and the grant. Where applicable, metadata will also include persistent identifiers for any research outputs or tools required to validate the publication's conclusions.





3.2. OBJECTIVES OF THE DATA MANAGEMENT PLAN

The current deliverable, D6.1, represents the first version of the MOBILES project's Data Management Plan (DMP). This plan supports the project team in achieving the efficient implementation of research objectives in compliance with the Grant Agreement and Open Science policy. Additionally, it facilitates effective communication, dissemination of project results, and project reporting.

The current MOBILES DMP has been developed as part of Work Package 6 (WP6), Task 6.4, whose main objectives are to:

- **Identify the main research digital datasets** that will be produced and link each dataset to the relevant project objective.
- **Ensure data management practices** adhere to the FAIR principles and promote Open Access/Open Data sharing.
- **Define key details for each dataset**, including formats, storage methods, restrictions for sensitive datasets (e.g., denial of access rights), and relevant repositories for storage.
- **Provide a dynamic platform** for ongoing updates and enhancements to Data Management practices.

The MOBILES DMP addresses both the digital research data generated within the project and other research outputs (notably, public deliverables). It is based on dataset information collected through an internal survey of MOBILES consortium members conducted during M3–M4 of the project. This document will be updated and expanded as necessary in M20 and M40.

3.3. DATA MANAGEMENT IN THE MOBILES PROJECT

Data management is a key task within WP6 (Project Management and Coordination), which is led by NTUA, the project coordinator. Within WP6, Task 6.4, focused on data management, is led by GG. The DMP form was prepared in coordination with the project coordinator and in close collaboration with all project team members, following a DMP template provided by EU authorities (EU Funding & Tender Portal [□](#) Reference Documents). This effort aimed to establish a solid foundation for the project's DMP, including its principles and objectives.

In addition, GG provides guidance to the entire project team throughout the data lifecycle and ensures they are informed about their relevant data management obligations. GG is also responsible for conducting periodic reviews of the DMP, working collaboratively with all project team members.

All related questionnaires are securely stored internally on the project's Google Drive.





3.4. SUMMARY OF MOBILES DATA AND OTHER RESEARCH OUTPUTS

The MOBILES project is structured into 6 work packages, 4 of which are dedicated to research and innovation. WP5 focuses on the dissemination, exploitation, and communication of project outcomes, while WP6 is responsible for project management and coordination.

The MOBILES project has identified 22 broad datasets that will be generated over its course. A brief description of these datasets, including their origin, format, and relation to the project's objectives, is provided in Table 1 (*See Attachments*).

Additionally, the project will produce approximately 21 other research outputs, primarily public deliverables provided in Table 2) (*See Attachments*).

3.4.1. DATASETS

The Table 1 provides a comprehensive overview of datasets generated within the MOBILES project, highlighting their origin, format, description, and relevance to the project objectives. The datasets are project-generated data originating primarily from laboratory work and, reflecting diverse experimental activities across multiple work packages (WP) and tasks. These datasets aim to support the development of innovative biosensors and assess their environmental performance, as well as the development of a soil metagenomic database aligning with the project's key objectives: The data encompass a wide range of formats, including numeric values, textual descriptions, images, DNA and RNA sequences, and models.

Relevance of datasets produced within the project to its objectives:

- **Objective 1: Develop electronic biosensors for the detection of organic chemicals, antimicrobial-resistant (AMR) bacteria, and pathogens in water, soil, and air.**
 - DAT_01_NTUA
 - DAT_03_INRAE
 - DAT_05_Eden
 - DAT_06_UPNA
 - DAT_9_Ubx
 - DAT_11_UBE
- **Objective 2: Develop organism-based biosensors for monitoring organic and inorganic pollution in water and soil.**





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- DAT_02a_CNR-IRET
- DAT_04_UR
- DAT_08_1_ARO
- DAT_08_2_ARO
- DAT_08_3_ARO
- DAT_08_4_ARO
- DAT_08_5_ARO
- DAT_08_6_ARO
- DAT_08_7_ARO
- DAT_10_CUT
- DAT_11_UBE
- DAT_12_Mat
- DAT_13_TUC
- **Objective 3: Study the environmental performance of the developed organisms and devices.**
 - DAT_01_NTUA
 - DAT_02a_CNR-IRET
 - DAT_03_INRAE
 - DAT_06_UPNA
 - DAT_11_UBE
 - DAT_12_Mat
 - DAT_13_TUC
- **Objective 4: Conduct metagenomics analysis of the microbiota in polluted areas to enable the identification of diverse functionalities across multiple gene clusters.**
 - DAT_02b_CNR-ISAFOM
 - DAT_04_UR
 - DAT_08_8_ARO
 - DAT_08_9_ARO





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- **Objective 5: Perform safety tests (e.g., EFSA) to assess the impact of the developed organisms and devices on the natural environment.**

- DAT_15_RICPA

3.4.2. OTHER RESEARCH OUTPUTS

The Table 2 provides a comprehensive overview of other research outputs (public deliverables of the project) generated within the MOBILES project. Public deliverables in the form of report will be published at the project website (www.mobiles-project.eu) once submitted and stored in the MOBILES community on Zenodo repository (<https://zenodo.org/communities/mobiles>) once approved by the Project Officer.

Overview in the Table 2 (*See Attachments*):





4. MOBILES FAIR data (Findable-Accessible-Interoperable-Reusable)

4.1. FINDABLE DATA INCLUDING PROVISIONS FOR METADATA

The MOBILES project is founded on open collaboration and the systematic sharing of knowledge while adhering to the project's data policy, which emphasizes achieving maximum openness as early and widely as possible. All research data generated by the MOBILES project will be managed responsibly, in accordance with the FAIR principles and the requirements set out under Horizon Europe (as outlined in the Annotated Grant Agreement, notably in the Article 17).

To ensure the findability of MOBILES data, all datasets (including other research outputs) will be **assigned persistent identifiers**, preferably DOIs, via selected trusted repositories, preferably at Zenodo, where project has already set a MOBILES community, that will serve as a main point for the long-term storage of MOBILES project research datasets and other research outputs.

Comprehensive **metadata frameworks** will accompany relevant datasets except DAT_12_Mat and DAT_13_TUC. These opted-out in order to protect the know-how and potential application for patent protection. Other metadata will be made openly accessible under the public domain dedication **CC0 at trusted repository under open access**. The metadata will include details such as dataset descriptions, date of deposit, authorship, venue, and embargo status; Horizon Europe funding information, project name, acronym, and grant number; licensing terms; persistent identifiers for datasets, authors, and their organizations, where applicable. Furthermore, where possible, the metadata will link to related publications and research outputs will be made harvestable for AI tools.

MOBILES datasets will be categorized using common keywords, such as "biosensors," "organic chemicals," "antimicrobial resistance," and "environmental monitoring," (not exclusively) to facilitate searchability and cross-referencing.

Detailed overview on the Data findability including provisions for metadata is provided in the Table 3 (*See Attachments*)

4.2. ACCESSIBLE DATA

In the initial questionnaire, MOBILES partners were asked a set of questions related to the accessibility of datasets produced during the project. All datasets generated within the MOBILES project (open or restricted) will be deposited in Zenodo. This platform ensures that datasets are assigned a persistent identifier (Digital Object Identifier, DOI) and linked to related publications or other datasets.

For the UBE partner, they have decided to use an institutional repository alongside Zenodo. In the UBE repository (Cherry), each dataset version will be tagged and accompanied by appropriate





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metadata, with links established between different versions. The UBE team will also define a naming convention for metadata, datasets, and templates to ensure ease of discovery. This convention will consist of three mandatory parts:

- A prefix indicating whether the file is a dataset, metadata, or a template.
- A root composed of:
 - A short, meaningful name of the dataset/template.
 - The acronym or short name of the data provider partner(s) (PFAS_{twin} by default for templates).
- A suffix indicating the date of the last upload to the repository in YYYYMMDD format.

MOBILES team members are encouraged to use this platform to store datasets and archive project results. Datasets supporting scientific publications will be deposited at the time of publication, ensuring accessibility through free and standardized access protocols.

While the majority of datasets and other research outputs are aligned with the FAIR principles and are openly accessible, some datasets will have restricted access due to their potential for patent applications. These include:

- DAT_05_EDEN
- DAT_12_Mat
- DAT_13_TUC

Similarly, two project deliverables under WP1 with sensitive dissemination levels will have restricted access:

- D1.1 - Design, characterization, and optimization of aptamers, DNA/RNA probes, and enzymes for biosensors (INRAE).
- D1.3 - Microfluidic network for sensor integration (EDEN).

Data will be retained and accessible for at least five years after the project's conclusion. Open datasets are expected to remain accessible long-term via Zenodo. Publicly accessible MOBILES datasets will be licensed under the Creative Commons Attribution International Public License (CC BY), while metadata will be licensed under the Creative Commons Public Domain Dedication (CC0). Ethical or legal issues related to data sharing will be carefully managed.





4.3. INTEROPERABLE DATA AND DATA RE-USE

The interoperability of datasets produced within the MOBILES project will be ensured through the use of open data formats, making them easier to validate, share, and reuse. Commonly used open formats include:

- CSV, PDF, DOCX, JPG, and PNG for general data representation.
- FASTQ and FASTA for sequencing data.
- CAD for 2D/3D modelling.
- OPJ and OPJU for scientific graphing and data analysis.

Large majority of formats can be accessed by common tools such as MS Office, PDF viewer, web browser, default image browser. FASTQ and FASTA files can be easily viewed and processed using widely available software tools commonly used within the scientific community. However, CAD and OriginLab formats (OPJ and OPJU) are proprietary and require licensed tools such as CAD software or OriginLab. OPJ and OPJU files can also be accessed using Python libraries, though this may have limited functionality compared to OriginLab's software.

Summary in the Table 4 (*See Attachments*):

To facilitate reuse, the project team will provide detailed metadata and comprehensive documentation for all datasets. This includes:

- Comprehensive descriptions in linked peer-reviewed articles.
- Readme files or supplementary documentation for datasets that are not self-explanatory.

These measures will enhance data reproducibility and ensure compliance with the FAIR principles. Metadata and documentation will also aid in indexing and aggregation by data repositories and scientific aggregators. Where applicable, datasets will be accompanied by version tracking to document updates or revisions.

Summary in the Table 5 (*See Attachments*):

Internal data handling procedures will align with institutional practices of project partners to ensure smooth integration of data management processes. Any potential conflicts with the project's Data Management Plan (DMP) will be resolved through communication and resolution procedures managed by the project coordinator.





5. CONCLUSION

The MOBILES project is a Horizon Europe- funded project, coordinated by the **National Technical University of Athens (NTUA)**, aiming to develop highly sensitive, portable, and low-cost biosensors for real-time environmental monitoring. These devices promise performance with equal or superior performance to existing techniques while being adaptable to onsite testing, enabling critical advancements in addressing pollutants such as pathogens, Chemicals of Emerging Concern (CECs), and Persistent Mobile Chemicals (PMCs). In parallel several soil microbiotas across Europe will be studied with metagenomic tools in order to identify gene clusters that are related to specific pollutants.

One of the main project management outputs is the comprehensive Data Management Plan (DMP), which adheres to the **EU Open Science policy and FAIR principles**. This living document, prepared initially by GRANT Garant (GG) during the project's early months, **defines 22 datasets and 21 other research outputs (public deliverables) and outlines the management** of these preliminary identified datasets. These datasets will be findable through persistent identifiers, detailed metadata, and accessible via trusted repositories mainly through **Zenodo**. Open access will be provided wherever feasible, under Creative Commons licenses, though certain datasets are safeguarded due to commercial exploitation interests.

The DMP also establishes mechanisms to ensure interoperability and reusability of project-generated data, leveraging commonly used and open formats, keywords, and metadata in desired format for long-term preservation. MOBILES' commitment to sustainability extends beyond the project's lifespan, with datasets guaranteed to be preserved for at least five years post-completion.

All datasets and outputs will be managed in accordance with the FAIR data principles, ensuring their findability, accessibility, interoperability, and reusability. This approach aims to contribute to the successful achievement of the MOBILES project goals and to boost the project impact, thereby enriching the European realm of science and innovation.

Updates on datasets produced within the MOBILES project lifespan are scheduled for **M20 and M40** when an internal survey will be repeated and **submitted to the EC as a separate deliverable D6.3 and D6.4 respectively**.





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5. Attachments

Table 1: MOBILES project datasets - description

Table 2: Other research outputs

Table 3: Findability of data including provisions for metadata

Table 4: Interoperability of data

Table 5: Reusability of data





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6. List of Figures

n/a

7. List of Tables

n/a

8. List of Abbreviations

Abbreviation	Abbreviation for
CC0	Creative Commons Public Domain Dedication
CC BY	Attribution International Public Licence
DMP	Data Management Plan
OA	Open Access





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10. Project Consortium



www.ntua.gr/en/



www.cnr.it/en



www.inrae.fr/en



www.uniroma1.it/en/pagina-strutturale/home



www.eden-microfluidics.com/



<https://www.unavarra.es/home>



www.en.iung.pl/



www.agri.gov.it/en/home



www.u-bordeaux.fr/en



www.cut.ac.cy/?languageId=1



www.chem.bg.ac.rs/index-en.html



www.mat4nrg.de/



www.tu-clausthal.de/en/



www.grant-garant.cz



www.proakademia.eu/en/

