

DATA MANAGEMENT PLAN (DMP)

PROJECT	
Project number:	101118880
Project acronym:	Synergy-Plague
Project name:	Reconstructing the environmental, biological, and societal drivers of plague outbreaks in Eurasia between 1300 and 1900 CE

DATA MANAGEMENT PLAN	
Date:	16.06.2026
Version:	1.2 (Revised / Consolidated Participant Review Version)

1. Data summary

This Data Management Plan (DMP) outlines the strategies for data collection, management, and sharing under the project **Synergy-Plague**. Synergy-Plague is a highly multi-disciplinary project aimed at advancing our understanding of plague – past and present.

1.1 Purpose of the data collection/generation

All data collection and processing aim to fulfil the project goals as outlined in the grant agreement. Data is collected to move knowledge from archives into the hands of modelling researchers.

1.2 Relation to the objectives of the project

The data to be collected are essential for investigating aspects of plague, aligning with the project's objectives related to historical and environmental contexts.

1.3 Types and formats of data generated/collected

The project will generate various types of data, including:

- Ecological data (e.g., population dynamics of rodent and flea hosts)
- Biological data (e.g. flea reproduction, molecular mechanisms)
- Historical data (e.g., chronicles, medical records)
- Climatic data (e.g., tree-ring and sediment cores)
- Soil data (e.g., soil samples and related variables)
- Image data (e.g., microCT images of soil, wood, flea larvae cocoons)
- 3D conception

Formats include:

- Ecological and climatic data: spreadsheets (CSV/Excel)
- Biological data: PDF, Word, Excel, .CSV, Graphpad, TIFF, JPEG
- Historical data: Spreadsheets (CSV/Excel) (Word)
- Soil data: Spreadsheets (CSV/Excel)
- Image data and their associated metadata: .tif, .jpg, .raw, .gl, .txt, .csv
- Code: .py, .C++
- 3D conception: .step .gcode

1.4 Re-use of existing data

Existing datasets on plague outbreaks, climatic and soil conditions, flea images, and genomics will be reused where applicable. Historical documents from various archives will also be utilized.

1.5 Origin of the data

Data will be generated from:

- Field studies conducted in regions historically impacted by plague
- Historical archives containing relevant records
- Experimental work
- Engineering work (mechanical; 3D conception)
- Home made software
- Freeware

Additional relevant sources are currently being identified and assessed. The project is in the process of mapping further repositories, collections, and datasets. This section will be updated as the data collection plan develops.

1.6 Expected size of the data

The overall volume of generated data will depend on the scope and extent of collection efforts. At present, precise estimates are not available but several terabytes are expected; indicative figures will be added as data collection progresses.

1.7 Data utility: To whom it will be useful

The data generated by Synergy-Plague will be **valuable to a broad range of users:**

- Researchers in ecology, microbiology, entomology, molecular biology, epidemiology, history, archaeology, and genomics who study plague dynamics and other infectious diseases.
- Public health authorities, policymakers, and pandemic preparedness agencies, who may use historical and ecological insights from plague and other outbreak data to better understand and prepare for current and future epidemics.
- Climate and environmental scientists, interested in historical environmental drivers of disease outbreaks.
- Historians and social scientists, for understanding societal, demographic, and economic factors influencing disease spread and mortality.
- Modelers and data scientists, using epidemiological, statistical, and mathematical models based on the integrated environmental, biological, and historical datasets.
- Engineers and IT developers working on automated analysis systems and biological data analysis.
- The wider scientific and educational community, as the datasets, tools, and visualisations (e.g., plague transmission mechanisms, maps, and dendrochronological data) will be openly available to support teaching, outreach, and cross-disciplinary studies.

2. FAIR data

2.1. Making data findable, including provisions for metadata

Each dataset will be accompanied by descriptive metadata detailing methodologies and data collection protocols. Unique identifiers such as **Digital Object Identifiers (DOIs)** will be assigned where possible.

A consistent naming convention and relevant search keywords will be applied. Versioning protocols will track dataset updates. Metadata will follow relevant community standards; where no standards exist, suitable custom metadata will be created.

In line with Horizon Europe requirements, metadata will be made openly available under a **Creative Commons Public Domain Dedication (CC0)** or equivalent licence. Metadata will include, at minimum: dataset description, author(s), date of deposit, funding information, licensing terms, and persistent identifiers for the dataset, authors, institutions, and the grant. All data sources and code used will be properly credited in both publications and metadata files to ensure full attribution.

2.2. Making data accessible

Non-sensitive data will be made openly available. Sensitive data will be subject to justified restrictions. Data will be hosted in trusted repositories; for example, climatic data such as tree-ring chronologies will be deposited in the **International Tree-Ring Data Bank (ITRDB)**, and climate reconstructions will be deposited in **NOAA** databases. Documentation outlining access will be provided. Deposited data will be made accessible under the principle “**as open as possible, as closed as necessary**”, using **CC BY** or **CC0** licences unless legitimate interests (e.g., IPR, security, exploitation potential) require restrictions.

The project website is hosted on University of Oslo (UiO) servers, using **Vortex – UiO Web Publishing (CMS)**. This allows the team to manage website resources and publish openly. The website is updated throughout the project: <https://www.synergy-plague.org/>.

2.3. Making data interoperable

Standard vocabularies and ontologies will be employed to enhance interoperability. Recognised community best practices will guide interoperability efforts.

2.4. Increase data re-use

Data will be openly licensed to promote re-use, specifically under **CC BY** or **CC0** licences, in line with Horizon Europe requirements. A clear timeline for data availability will be outlined, including any embargo periods. Documentation will accompany datasets to enable validation of analyses and facilitate re-use. Where data cannot be re-used or openly shared, the justification will be documented in the DMP.

3. Other research outputs and publications

The project will also generate outputs such as software tools, protocols, and documentation. These will be shared in line with open science practices, using persistent identifiers, version control, and open licences wherever possible to ensure accessibility and re-usability.

Software and models developed at the University of Oslo will be shared publicly on the University of Oslo’s local GitHub instance, wherever possible under an MIT license.

All publications will comply with **European Guidelines for Open Access**. Research findings will be published via **non-embargoed green or gold Open Access** in peer-reviewed journals. Whenever appropriate, to-be-published research findings will also be made available via preprint servers such as **MedRxiv**, **bioRxiv**, or **ArXiv**.

4. Allocation of resources

Resources will be identified and allocated as part of project funding. Costs associated with **data storage, long-term preservation, and submission to trusted repositories** (e.g., ITRDB, NOAA) will comply with ERC Synergy Grant policies. Additional effort for preparing metadata, ensuring proper attribution of reused datasets and code, and managing Open Access publications and preprints will be factored into project planning. Roles and responsibilities for data management, including **data deposition, version control, and documentation**, will be clearly defined within the project team.

5. Data security

Security protocols will be implemented for data recovery, secure storage, and transfer of sensitive data, in line with institutional, national, and EU requirements. Participating institutions **already maintain backup routines**; these will be relied upon and, where necessary, **complemented by project-specific recovery measures** in collaboration with institutional IT and research data management services.

Data will be safely preserved through **trusted repositories** that ensure long-term storage, curation, and established security measures. If sensitive information with security recommendations or EU-classified information is generated, it will be managed in accordance with the Grant Agreement, including obtaining prior approvals and ensuring dissemination only with written consent from the granting authority.

6. Ethics

All project activities will comply with ethical principles and the highest standards of research integrity, including the **European Code of Conduct for Research Integrity**. The project will respect EU, international, and national law, including the EU Charter of Fundamental Rights. Approvals from ethics committees and/or data protection authorities will be obtained prior to relevant data collection, kept on file, and submitted with English summaries where necessary.

Studies involving the collection of new data will be ethically approved by the host institution(s) if relevant. Required consents for data sharing will be secured.

7. Other issues

Dissemination of results will follow Grant Agreement rules: beneficiaries will give partners at least **15 days' advance notice** before disseminating results (unless otherwise agreed) and will respect legitimate interests, IPR, confidentiality, and security constraints.

In the event of a public emergency, the project may be required to provide immediate open access to relevant research outputs or grant non-exclusive licences under fair and reasonable conditions, in line with Horizon Europe obligations.

The project will align with institutional and national data management procedures, including **University of Oslo's policies and guidelines for research data management**:

<https://www.uio.no/english/for-employees/support/research/research-data-management/policies-guidelines.html>

The DMP will be maintained and regularly updated throughout the project lifecycle, in line with Horizon Europe requirements.

DATA MANAGEMENT PLAN		
VERSION	DATE	CHANGE
1.0	25.09.2025	Initial version
1.1	21.04.2026	Participant Review Draft
1.2	16.06.2026	Revised / Consolidated Participant Review Version